studies are needed to examine the palatability of treated silage and its effects on animal performance.

Key Words: essential oil, isothiocyanates, silage fermentation

2193T Conversion of benzoxazinoids during ensiling of maize.
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The fate of plant secondary metabolites during crop harvest, fermentation, and storage remains poorly understood. We investigated the conversion of benzoxazinoids (BXs) in a wild type maize genotype (W22) and in a Ds insertion mutant line *bx1*::Ds (*bx1*) during ensiling and storage. Laboratory scale silage experiments were performed in 2 consecutive years, where chopped maize of both genotypes was ensiled for either 0h, 12h, 24h, 36h, 48h, 72h, 4d, 5d, 7d, 14d, 21d, 28d, 2mo, 3mo, 4mo, 5mo, or 6 mo in glass containers and vacuum sealed bags, resp. At all time points, up to 5 replicates were sampled and frozen until analysis (silage pH, nutrient composition, DM loss, BX concentrations). Statistical analysis was carried out with a mixed model with genotype, duration of ensiling, and the genotype x time interaction as fixed effects. In both experiments, silage pH dropped rapidly within the first 2 d of ensiling and remained stable at rather constant pH values < 4. DM loss was less than 10% during the experiments. In the first year experiment, *bx1* silage contained more crude fiber, ADF, NDF, and water-soluble carbohydrates (WSC), but less starch, than W22. In the second year, the chemical composition of *bx1* and W22 was very similar. BX contents were lower in the mutant line *bx1* than in W22 silage in both years. Despite greater BX concentrations in the first experiment, the degradation kinetics of BXs during ensiling was comparable between the 2 genotypes: Within 3 d of ensiling, concentrations benzoxazinone glucosides (e.g., DIMBOA-Glc, HMBOA-Glc) decreased to concentrations close or below the detection limit. Concomitantly, the concentrations of benzoxazinone aglycones (DIMBOA, HMBOA) increased after 1 d of ensiling, reaching a plateau between d 2 and 21 of ensiling, and declined thereafter. Concentrations of benzoxazolinones (MBOA, BOA) began to rise after 1 wk and remained elevated until the end of the experiments. In conclusion, BX contents changed during the silage fermentation process. While benzoxazinone glucosides decreased in parallel to the decline of silage pH, MBOA and BOA were the stable end products of BX metabolism under anaerobic conditions.

Key Words: benzoxazinoids, maize silage, plant secondary metabolism

2194T Effect of an improved grazing management system on dairy heifer performance.
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The replacement program often represents a significant expense on dairy farms and thus, approaches to reduce costs without compromising performance are important for economic sustainability. The objective of this multi-year study is to evaluate the effect of an intensive grazing management system on pregnant dairy heifer performance. From April to December 2021 pregnant Holstein heifers (n = 60) from the University of Maryland Dairy were enrolled in the study after confirmation of pregnancy and remained on the study until 3 weeks before expected calving. Heifers were blocked by due date and assigned randomly to one of 2 treatments: rotational grazing (ROT) or control (CON). Due to rolling enrollment, the size of the treatment groups varied throughout the season (15 to 22 per group) but were kept consistent between treatments at any given time. The CON heifers were managed on a 2-ha continuous perennial grass pasture and received a TMR (11 kg/head/d). The ROT heifers were rotationally grazed on 7.7 ha of perennial and annual pastures subdivided into 0.25-ha paddocks (1–2 d rotation) and received a daily mineral/corn grain mix (0.6 kg/head/d). Body weight (BW), hip height (HH), and body condition score (BCS) were recorded every 14 d. Average daily gain (ADG) was calculated by linear regression and data were analyzed using a mixed model which included the fixed effect of treatment and random effect of block. Mean days on study was 140 and was similar for both treatments. Initial BW (509 kg), BCS (3.7), and HH (145 cm) did not differ between ROT and CON heifers ($P >$ 0.05). However, ADG (0.63 vs. 0.75 kg/d); $P = 0.03$) and final BCS (3.5 vs. 3.7; $P = 0.01$) were significantly lower, and final BW (597 vs. 626 kg; $P = 0.08$) tended to be lower for ROT heifers. Despite this, ROT heifers were still able to achieve acceptable gains to reach > 85% of mature BW before calving. These results demonstrate that pregnant heifers managed in an intensive grazing system can achieve satisfactory growth relative to TMR-fed counterparts. Future work will continue to evaluate the economic implications of this system and investigate potential carryover effects on first-lactation performance.

Key Words: pasture, replacements, grazing

2195T Changes of benzoxazinoids during aerobic deterioration of maize silage.
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While plant specialized metabolites can affect mammal health, their fate during aerobic deterioration of crop silage remains poorly understood. Here, we investigated the changes in the benzoxazinoid (BX) profiles in silages of 2 maize genotypes (wild type W22 and Ds insertion mutant line *bx1*::W22 (referred to as *bx1*)) during aerobic deterioration. Silages were loosely filled into 2-L polyethylene containers covered with a laboratory towel. The silage temperature was recorded with data loggers every 15 min. Three silage samples per genotype and per sampling point were obtained at d 0, 1, 2, 3, 5, 7, 10, and 14 of aerobic exposure. We measured the dry matter loss by weighing the containers, the silage chemical composition by Near Infrared Reflectance Spectroscopy (NIRS), and BX profiles through ultra-high performance liquid chromatography coupled to mass spectrometry (UHPLC-MS). The fermentation products of silages were analyzed by HPLC. In addition, we recorded silage pH, yeast and mold counts. Aerobic stability was considered as long as silage temperatures did not exceed ambient temperature by more than 2°C. Data were analyzed in SAS using a mixed model with genotype, time, and genotype x time as fixed effects, and replicate (3 per sampling point and genotype) as random factor. Significant effects were considered at $P < 0.05$. The chemical composition of the silages of the 2 genotypes was similar (W22 vs. *bx1*; DM: 211 vs. 227 g/kg, NDF: 422 vs. 420, ADF 237 vs 230 g/kg DM) except for BX contents that were lower in *bx1* compared with W22 (2.1 vs. 32.2 µg/g; $P < 0.05$). The aerobic stability was shorter in W22 compared with *bx1* maize (54.0 vs. 60.6 h, $P = 0.003$). Similarly, the time to the peak temperature was shorter in W22 compared with *bx1* maize (70.3 vs. 75.7 h, $P = 0.0301$). The silage pH increased to a greater extent in W22 compared with *bx1* silage (6.7 vs. 5.8, $P = 0.026$). A greater proliferation of yeasts and molds (12.3 vs. 9.5 log_{10}cfu/g) was detected in W22 compared with *bx1* silage at d 5 and 7 of aerobic exposure, respectively ($P < 0.05$). The BX profiles of the bx1 silage did not change during 5 d of aerobic exposure. In W22, DIMBOA (2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one) and HMBOA (2-hydroxy-7-methoxy-1,4-benzoxazin-3-one) concentrations started to decline from 10.3 ± 1.4 μg/g at d 3 close to the detection limit, MBOA (6-methoxy-1,3-benzoxazol-2-one) and BOA (1,3-benzoxazol-2-one) contents were increased at d 5 (15.5 ± 3.9 and 0.22 ± 0.06 μg/g) compared with d 1–3 (7.0 ± 0.7 and 0.00 ± 0.00 μg/g) of aerobic exposure in W22. In conclusion, concentrations of BX aglycons (DIMBOA, HMBOA) decreased and concentrations of benzoxazolinones (MBOA, BOA) increased in W22 maize silage during aerobic deterioration, but no changes were observed in *bx1*.

Key Words: benzoxazinoids, aerobic exposure, maize silage

2196T Alfalfa and corn forage quality is related to soil analysis and plant tissue mineral content. K. Felton*[3], J. Slosarczyk[3], H. Soldner[3], D. Sawyer[1,2], and J. Goeser[1,2], [1]*Rock River Laboratory Inc., Watertown, WI,* [2]*University of Wisconsin–Madison, Madison, WI,* [3]*ALCIVIA, Cottage Grove, WI.*

Forage quality is a substantial influencing factor for dairy cattle performance and feed conversion efficiency. However, dairy farmers and crop growers would benefit from further understanding the relationships between agronomic practices and forage quality. The objective of this field study was to determine if correlations exist between agronomic and forage quality measures. Three growers were enrolled in an intensive sampling study from April through September 2021, in Southern WI, USA. Alfalfa and corn fields, 3 to 5 and 4 to 6 per grower, respectively, were enrolled based upon soil analysis P (Bray-1) and K (Bray-1) results of samples collected within the previous 4 years. Plant tissue (PT) samples were collected at VT stage. Freshly chopped alfalfa (ALF) and corn samples (CS), 189 and 89 for each crop, respectively, were collected at harvest for nutrition analysis by NIR, using commercial models developed by Rock River Laboratory, Inc. Observational data analysis was conducted using the Generalized Regression procedure with elastic net option in SAS JMP Pro v15.0. Grower was included as a fixed effect and data were analyzed separately for each forage. Significant correlations were identified at $P < 0.05$, trends at $P < 0.15$. Forage TDN, RFV, NDF, starch, starchD and TTNDFD were related to plant tissue and soil mineral concentrations. Following data analysis, many significant relationships and trends in correlations were identified. Not all are presented here. Intriguing significant (*) or trend (**) - or + parameter estimates are presented in the table below. While correlation does not imply causation, these observations warrant further research in the future and may provide direction for researchers to improve forage quality.

Table 1.

Item	Alf	CS
Soil OM	+RFV*, −NDF*	−TDN**, −TTNDFD*
Soil P	−TDN*	+StarchD*
PT S	−TDN**	
PT P	+RFV, −NDF*	−Starch*, +TTNDFD*
PT Mg		+Starch*, −TTNDFD*
PT Cu		−Starch*, +TTNDFD**

Key Words: forage quality, soil fertility, plant tissue

2197T Effect of ensiling on in vitro dry matter and fiber degradability of sorghum and corn varieties in El Salvador. E. E. C. Guillen*[1], M. V. Mendoza[1], K. G. Arriola[2], D. Vyas[2], and J. M. Castro-Montoya[3], [1]*Departamento de Zootecnia, Facultad de Ciencias Agronómicas, Universidad de El Salvador, San Salvador, El Salvador,* [2]*Department of Animal Sciences, University of Florida, Gainesville, FL,* [3]*Programa de posgrado y educación continua, Facultad de Ciencias Agronómicas, Universidad de El Salvador, San Salvador, El Salvador.*

This study was aimed to evaluate the effect of ensiling on in vitro nutrient digestibility of corn and sorghum varieties. Each of 5 varieties of corn and sorghum were established in 4 replications using 40 plots (4 m × 6 m) and harvested after 74 and 85 d, respectively. Forages were chopped (20 mm) and 1 kg fresh forage was ensiled in vacuum plastic bags and stored for 60 d. Fresh and ensiled samples were dried and ground (60°C; 1 mm) and weighed (0.5 g) in triplicate in F57 filter bags and incubated at 39°C with 52 mL of buffered rumen fluid for 24

Table 1 (Abstract 2197T). Effect of ensiling on IVDMD and IVNDFD of corn and sorghum varieties

	IVDMD					IVDMD			
Corn	Fresh	Ensiled	SEM	*P*	Sorghum	Fresh	Ensiled	SEM	*P*
CB-HS5G	45.6	43.4	1.03	0.35	C-RCV	39.0	41.7	2.00	0.54
C-H-59	44.9	41.3	0.82	0.01	DUWEST-85P20	35.0	35.5	2.03	0.91
C-HCAS	45.5	40.9	1.19	0.04	C-LIBERAL	39.6	43.1	0.97	0.06
C-PASAQUINA	44.4	44.0	1.19	0.87	C-CF	35.7	36.7	0.87	0.59
PIONEER-4226	44.0	41.1	0.69	0.02	C-S3-BMR	40.2	40.2	1.28	0.99
	IVNDFD					IVNDFD			
CB-HS5G	38.4	36.0	3.23	0.73	C-RCV	23.6	23.0	1.68	0.86
C-H-59	37.8	32.0	1.41	0.03	DUWEST-85P20	21.6	18.3	2.24	0.51
C-HCAS	41.7	32.3	2.79	0.04	C-LIBERAL	13.1	27.5	2.85	<0.01
C-PASAQUINA	33.8	36.6	2.25	0.17	C-CF	12.2	16.7	1.14	0.02
PIONEER-4226	31.3	31.1	1.94	0.96	C-S3-BMR	18.6	22.9	2.01	0.31