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. J. J. Gross*[1], K. Schlaeppi[2,3], U. Wyss[4], E. Kramer[5], D. Ramhold[5], P. Mateo[2], C. A. M. Robert[2], and M. Erb[2], [1]*Veterinary Physiology, Vetsuisse Faculty, University of Bern, Bern, Switzerland,* [2]*Institute of Plant Sciences, Faculty of Sciences, University of Bern, Bern, Switzerland,* [3]*Department of Environmental Sciences, Faculty of Science, University of Basel, Basel, Switzerland,* [4]*Agroscope, Ruminant Research Unit, Posieux, Switzerland,* [5]*ISF GmbH, Pinneberg, Germany.*

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. S. B. Potts*[1], A. M. Grev[1], and J. W. Semler[2], [1]*University of Maryland Extension, Keedysville, MD,* [2]*University of Maryland Extension, Boonsboro, MD.*

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. J. J. Gross*[1], P. Mateo[2], D. Ramhold[3], E. Kramer[3], C. A. M. Robert[2], and M. Erb[2], [1]*Veterinary Physiology, Vetsuisse Faculty, University of Bern, Bern, Switzerland,* [2]*Institute of Plant Sciences, Faculty of Sciences, University of Bern, Bern, Switzerland,* [3]*ISF GmbH, Pinneberg, Germany.*

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