1582 Lactation performance and methane intensity of Holstein cows fed diets containing alfalfa grass silage inoculated with a multi-strain inoculant. G. O. Omoruyi*[1,2], C. S. Ballard[1], J. R. Green[1], H. M. Dann[1], A. Barkley[3], R. A. Scuderi[3], and S. Y. Morrison[1], [1]*William H. Miner Agricultural Research Institute, Chazy, NY,* [2]*University of Vermont, Burlington, VT,* [3]*Lallemand Specialties Inc., Milwaukee, WI.*

Holstein cows (n = 50; 111 ± 23 DIM; 2.9 ± 0.9 lactations) were enrolled in a randomized, complete block design study with 1-wk covariate and 6-wk treatment periods to evaluate the use of a multi-strain inoculant (*Pediococcus pentosaceus*, *Lactobacillus buchneri*, and *Lactobacillus hilgardii*; 4.7×10^5 cfu/g) for alfalfa grass silage (AGS). Treatments were a diet with untreated AGS (CON) or inoculated AGS (INOC). Chopped alfalfa grass mixture was ensiled by inoculant treatment in individual bunkers (19.8 m × 6.1 m × 2.0 m) for ~124 d before use. Alfalfa grass silage was sampled at wk 0, 2, 4, and 6 during the treatment period for enumeration of lactic acid bacteria, yeasts, molds, and aerobic stability evaluation. Diets contained 62% DM forage (41% AGS, 21% corn silage) with 15.2% CP, 31.8% NDF, and 26.3% starch. The AGS had similar nutrient profiles (34.4 vs. 34.7% DM, 17.2 vs. 17.0% CP, 51.0 vs. 50.7% NDF, and 68.9 vs. 68.5 30-h NDF digestibility, % NDF for CON vs. INOC, respectively) and fermentation profiles consistent with inoculant use. Cows were group-housed, fed individually 1×/d, milked 3×/d, milk sampled 6×/wk, and had access to GreenFeed. Silage data were analyzed in RStudio (R v 4.4.2) using a Kruskal Wallis test by time. Cow data were summarized by week and analyzed by ANCOVA (MIXED procedure of SAS v 9.4). The model contained fixed effects (diet, week, diet × week, block). Yeast count at wk 6 was lower ($P < 0.01$) and aerobic stability at wk 2, 4, and 6 was improved ($P \leq 0.05$) for INOC vs. CON AGS. The DMI was not affected by diet, but ECM, fat, and true protein yields were greater for cows fed the INOC diet (Table 1). Methane (CH_4) production and intensity were not different, and yield was not different within week. This study confirmed the importance of using an inoculant for AGS to reduce yeasts, improve aerobic stability, and improve animal performance.

Key Words: silage inoculant, cow, efficiency

1583 Enhanced aerobic stability in grass, alfalfa, and corn silages through microbial inoculation. R. C. Amaral*[1], K. L. Witt[1], I. Hindrichsen[1], J. N. Joergensen[1], K. A. Bryan[2], V. Vrotniakiene[3], and J. Jatkauskas[3], [1]*Novonesis, Lyngby, Denmark,* [2]*Novonesis, Milwaukee, WI,* [3]*Lithuanian University of Health Sciences, Baisogala, Lithuania.*

Table 1 (Abstr. 1582). Study results

	Diet			*P*-value	
Item	CON	INOC	SE	Diet	Diet × Wk
DMI, kg/d	27.6	27.5	0.2	0.63	0.91
Milk, kg/d	47.8	49.5	0.4	<0.01	0.85
ECM, kg/d	50.8	53.5	0.6	<0.01	0.96
Fat, kg/d	1.89	2.02	0.03	0.01	0.71
True protein, kg/d	1.39	1.46	0.02	0.01	0.90
ECM/DMI	1.83	1.85	0.02	0.45	<0.01
CH_4, g/d	473	476	6	0.66	0.44
CH_4 yield, g/kg DMI	16.88	16.52	0.20	0.24	0.04
CH_4 intensity, g/kg ECM	9.25	8.92	0.13	0.11	0.76

Silage inoculants support silage preservation by improving fermentation, enhancing aerobic stability to reduce spoilage, while maintaining nutrient quantity and quality. This study evaluated the effects of a combination of *Lactococcus lactis* and *Lentilactobacillus buchneri* on the aerobic stability of different silages. The study was conducted using grass, alfalfa, and corn harvested at recommended maturity. Grass was wilted to 29.4% DM and chopped to 2–3 cm, alfalfa to 29.7% DM and chopped to 2–3 cm, and corn to 34.0% DM and chopped to 10 mm. Each crop was ensiled in 3-L mini silos, with 5 replicates per treatment, and stored at room temperature. Treatments included (1) control (C) with no inoculant, and (2) inoculant (*L. lactis* [DSM11037] and *L. buchneri* [DSM22501]; SiloSolve FC, Novonesis, Lyngby, Denmark) applied at 150,000 cfu/g of fresh matter. Silages were stored for 90 d and thereafter opened, sampled, and analyzed for chemical composition. Aerobic stability was assessed by measuring pH, yeast and mold counts, maximum temperature (°C), and hours until temperature was more than 3°C above ambient temperature. Statistical analysis used the GLM procedure in SAS (version 9.4), with significance set at $P \leq 0.05$. In grass silage, inoculated silage had a higher DM content at silo opening ($P < 0.001$) and significantly reduced pH after 10 d of aerobic exposure ($P < 0.001$) compared with the control silage. Yeast and mold counts decreased, maximum temperature dropped ($P < 0.001$), and aerobic stability was 4-fold higher compared with control ($P < 0.001$). Alfalfa showed similar patterns, although DM content was similar between treatments ($P > 0.05$). Spoilage microorganisms decreased (yeast $P < 0.05$, molds $P < 0.001$), and aerobic stability improved ($P < 0.05$). In corn silage, the DM content was higher in inoculated silage ($P < 0.001$); pH and maximum temperature did not show differences between treatments ($P > 0.05$); and aerobic stability time improved 2 times in inoculated silage ($P < 0.05$). In conclusion, in this study, inoculation with *L. lactis* and *L. buchneri* enhanced aerobic stability and reduced microbial spoilage across all silages.

Key Words: silage inoculant, aerobic stability, microbial population

1584 Effect of drought on microbiome community and metabolite profiles in kikuyu (*Pennisetum clandestinum*). V. T. L. Tan*[1,2], B. Brito-Rodriguez[2,3], P. T. W. Wong[1], A. Singh[1], R. Trethowan[1,2], and K. L. Plett[2,3], [1]*The Plant Breeding Institute, University of Sydney, Cobbitty, NSW, Australia,* [2]*Dairy UP Program, Camden, NSW, Australia,* [3]*Elizabeth Macarthur Agricultural Institute, NSW Department of Primary Industries and Regional Development, Menangle, NSW, Australia.*

Kikuyu (*Pennisetum clandestinum*) is a perennial grass widely used in grazing systems for beef and dairy production worldwide due to its rapid growth and adaptation to harsh conditions. Unfortunately, kikuyu poisoning is an important factor hindering its expansion in grazing systems. Occasionally, the grass becomes toxic and causes poisoning in grazing livestock, with cattle (8.9%–32% mortality rate) being more susceptible than sheep and goats. Poisoning has been consistently observed when rapid grass growth is triggered by rainfall or irrigation following a prolonged period of summer drought. Additionally, previous studies have suggested that *Fusarium torulosum*, an endophyte, may be a causal agent of kikuyu poisoning. This study aimed to examine changes in the fungal community and metabolite profiles in 3 kikuyu cultivars: a drought-resistant cultivar, a drought-susceptible cultivar, and Whittet, under "toxic" conditions. Six replicate pots of each kikuyu cultivar were subjected to 6 weeks of "drought" treatment (30% field capacity)

followed by 1 week of re-watering to field capacity to stimulate rapid growth. Control pots were maintained at 80% field capacity throughout the 6-week treatment period, followed by 1 week of watering to field capacity. After 1 week of re-watering, leaf, stem, root, and soil samples were collected for ITS sequencing and non-targeted metabolomics. Interestingly, although *Fusarium* was among the 20% most abundant genera, other notable fungal genera identified included *Sarocladium*, *Cladosporium*, *Sporothrix*, *Poaceascoma*, *Myrmecridium*, *Phialophora*, and *Podospora*. Results from this experiment could assist researchers in gaining better understanding of the microbiome and metabolite profiles in kikuyu under favorable conditions, as well as the changes that occur under unfavorable conditions. This knowledge could aid in identifying potential causal factors of kikuyu poisoning.

Key Words: kikuyu poisoning, endophyte, drought

1585 Climate-smart ruminant production through dietary manipulations in a climate-resilient environment. T. A. Arilekolasi*[1], O. B. Omotoso[2,3], and J. A. Alokan[2], *[1]Federal University Oye-Ekiti, Oye-Ekiti, Ekiti State, Nigeria, [2]Federal University of Technology, Akure, Ondo State, Nigeria, [3]Net Zero and Resilient Farming Rothamsted, North Wyke, UK.*

Ruminants contribute significantly to global warming through the emission of enteric CH_4. A farmer-friendly approach to ensuring climate-smart production is through dietary manipulations. This study was laid out in a 3 × 3 factorial arrangement to examine the effect of 3 fertilizer types and 3 drying methods on the nutritive quality and CH_4 production of *Cajanus cajan* hay as feed for ruminants. *Cajanus cajan* pasture was artificially sown on nitrogen-depleted tropical soil. Poultry manure (PM) was applied 2 weeks before planting at 3 t/ha, and urea was applied to a portion 2 weeks after planting (WAP) at 30 kg/ha. Another portion was established without fertilizer application (control plot). Forages were harvested at 12 WAP and subjected to 3 drying methods (air drying, sun drying, and solar cabinet drying) for hay production. Chemical analyses were carried out using standard procedures. The feed value of hay was determined using the in vitro gas production technique (IVGPT). Data collected were subjected to statistical ANOVA using the GLM procedure of Minitab 18, and means were separated using Tukey's (HSD) test at a 5% probability level. There were significant differences in the values obtained for proximate components, fiber fractions, anti-nutritional factor (ANF) composition (alkaloids, tannins, phytates), in vitro dry matter degradability (IVDMD), gas volume, and CH_4 production of the produced hay. Interactions of different combinations showed that unfertilized, sun-dried hay had the highest dry matter (DM) content (91.62%), whereas solar cabinet-dried, urea-fertilized hay had the highest crude protein (CP) content. However, the lowest CP was recorded in urea-fertilized, air-dried hay. Poultry manure air-dried hay had the least crude fiber (CF; 22.68%), whereas PM air-dried hay had the highest energy content (15.34 kJ/100 g DM), which was similar to the energy content of unfertilized sun-dried and PM sun-dried hay. Additionally, PM solar-dried hay had the lowest CH_4 production (3.66 mL/200 mg) and the highest organic matter digestibility (OMD; 41.96%). Thus, PM was the most efficient fertilizer applied, and the solar drying method improved the nutrient and feeding values of the hay. This approach could be adopted for hay-making as part of climate-smart feed strategies.

Key Words: *Cajanus cajan*, poultry manure, methane production

1586 Palatability of inoculated and uninoculated corn silage at 0 and 24 h post-defacing when fed to pregnant Holstein heifers. C. S. Ballard[1], A. E. Pape[1], J. R. Green[1], A. Barkley[2], R. A. Scuderi*[2], and M. Castex[3], *[1]William H. Miner Agricultural Research Institute, Chazy, NY, [2]Lallemand Specialties Inc., Milwaukee, WI, [3]Lallemand SAS, Blagnac, France.*

The study objective was to evaluate palatability of corn silage treated with a multi-strain inoculant immediately and 24 h after defacing. Conventional corn hybrid was inoculated with water (control, C) or treated (T) with a multi-strain inoculant containing 1 homofermentative strain (*Pediococcus pentosaceus*) and 2 heterofermentative strains (*Lentilactobacillus buchneri* and *Lentilactobacillus hilgardii*) at 2.5 × 10^5 cfu/g forage. After ensiling for 189 d, spoilage was removed daily, and silage was dispensed into forage carts and stored out of sunlight at ambient temperature. Silage was sampled relative to experimental feeding period on d 0, 6, and 12, evaluated for aerobic stability, and enumerated for lactic acid bacteria, yeasts, and molds. Sixteen pregnant Holstein heifers were introduced to 1 of 4 corn silage treatments for 30 min over 4 d: freshly defaced control (C0), control after 24-h aerobic exposure (C24), freshly defaced treatment (T0), and treatment after 24 h of aerobic exposure (T24). A TMR was fed ad libitum for the remainder of the day. Palatability of silage treatments (C0, C24, T0, T24) was evaluated by offering each heifer 2 bins of different silage treatments for 3 h over a 12-d treatment period and measuring dry matter intake (DMI) after 30 min and 3 h. Silage characteristics were analyzed in R (v. 4.4.2) using Kruskal-Wallis within sampling time. Effects of silage treatments on intake were analyzed using the MIXED procedure in SAS v. 9.4. Relative palatabilities of each feed type were estimated via a paired comparisons analysis that considered a range of thresholds for proportional intake required to designate a feed type as preferred. Combined with 2 durations of feed availability (30 min and 3 h), palatability was estimated separately for each of 8 distinct configurations. Inoculation reduced yeasts on d 0 and 12 and improved stability on d 0. Both DMI and relative palatability at 30 min and 3 h ($P < 0.05$) were greater for freshly defaced corn silage (1.18 vs. 0.91 kg/30 min and 2.79 vs. 2.32 kg/3 h, respectively). There were higher levels of intake for T corn silage compared with C after 30 min (1.14 vs. 0.94 kg; $P = 0.01$). Under some configurations, inoculant appeared to have a moderate preservative effect, attenuating the decrease in palatability due to aerobic exposure.

Key Words: silage inoculant, palatability

1587 Revealing the real nutritional value for maize silage. M. R. Islam[1,2], M. Correa-Luna[1,2], C. E. F. Clark[3], J. I. Gargiulo[2,4], and S. C. Garcia*[1,2], *[1]University of Sydney, Camden, NSW, Australia, [2]DairyUP Program, Camden, NSW, Australia, [3]Charles Sturt University, Wagga Wagga, NSW, Australia, [4]NSW Department of Primary Industries and Regional Development, Menangle, NSW, Australia.*

Whole-crop maize silage (WCMS), a common forage feed for ruminants, is typically considered as one unit, but it is composed of both stover (forage) and grain fractions. Stover supplies fiber, and grain supplies starch; both fractions contribute to the total energy content of the feed. Although the starch content is almost fully digestible in the whole tract of cows and provides almost full energy, WCMS with varying starch has been reported to contain similar total metabolizable energy (ME). We reviewed over 217 studies published from the year 2000 onward to explore the reasons behind the similar energy contents in WCMS containing contrasting starch amounts and to reveal the real nutritional value of WCMS. When WCMS contained >25% starch, fiber digestibility was reduced, likely due to a decrease in rumen pH and the intolerance of fibrolytic bacteria to acidity. Conversely, amylolytic bacteria, which degrade starch, are more tolerant to low rumen pH, and any undigested starch in the rumen is almost completely digested in the intestinal tract