improved herd management. To date, five of the 20 farms have received Level Two Certification. In conclusion, the TU MGPC program provided producers with valuable information necessary for meat goat producers to become competitive in this global economy.

Key Words: goats, extension, producer education

**W112 Influence of citronella and geranium essence treatment on milk aroma.** S. Carpino, G. Belvedere, T. Rapisarda, G. Azzaro, and G. Licitra, 1 CoRFiLaC, Regione Siciliana, Ragusa, Italy; 2 D.A.C.P.A. University of Catania, Italy.

A commercial mix containing geranium and citronella essence was used in a farm against flies. Several authors report volatile compounds can be transferred by breath and skin to blood and consequently to milk. This study was performed in a dairy cow farm located in the South of Sicily. The aim of this study was to detect the influence of geranium and citronella essence treatment on milk aroma profile at different times. Geranium and citronella mix was spread on lactating cows trough the farm cooling system. Milk samples were collected at 0 (M0), 12 (M12), 24 (M24) and 36 (M36) hours from mix spreading and then analyzed.

**Key Words:** milk, volatile compounds, geranium citronella essence

**W113 Relationship of corn silage dry matter content to density in bunker silos.** K. E. Griswold, G. P. Craig, and S. K. Dinh, 1 Penn State Cooperative Extension, Lancaster; 2 Penn State Cooperative Extension, Dauphin.

Dry matter (DM) content and density of corn silage (CS) was investigated in 103 bunker silos and piles over a 5-year period. For each silo/pile, 12 samples were collected using a 5.08 cm diameter stainless-steel coring tube driven by a gas-powered drill. Core depth was recorded to the nearest 0.64 cm, and wet weight was determined on a digital scale. Sample DM was determined with a Koster Crop Tester. Density was calculated by dividing core dry weight by core volume. Cores were collected at three vertical levels, bottom = 1 m from silo floor, top = 1 m from top edge, and middle = equidistant between bottom and top. At each level, cores were collected horizontally at four locations, I and IV within 2.4 m of the outside edges, and II and III equidistant between I and IV. Data were analyzed using PROC REG and RSREG within SAS. When individual core density and DM content were regressed, there was a significant quadratic relationship ($P < 0.0001$, $R^2 = 0.13$). However, when level and location were included in the model as covariates, the strength of the relationship increased ($R^2 = 0.43$). Location was not significant in the model. These results suggest that DM content of corn silage is weakly related to density within bunker silos/piles and that level at which density is measured has a greater impact on density than DM content. Regression of the silo/pile average density and DM content showed a significant quadratic relationship ($P < 0.0001$, $R^2 = 0.28$), which suggested that DM content of corn silage may have greater impact on overall density of corn silage in silo/pile than density at specific positions within a silo/pile.

**Key Words:** corn silage, dry matter, density

Forages and Pastures: Silages


A two yr study was conducted to measure the biomass yield and nutrient content of three forages for potential silage use. Forages used were conventional (Round-Up Ready®; CC) and organic (OC) corn (Zea mays) and pearl millet (Pennisetum americanum; PM). Plots measuring 18x18 m were used in a completely randomized design with four replications. Fertilization considered organic status as well as soil test recommendations. Forages were seeded at recommended rates and harvested at the same time both years. Four weeks after planting, CC was treated with glyphosate. Areas of 3.05 x 3.05 m were manually sampled to a 10-cm stubble height. Samples were weighed to determine fresh biomass accumulation, fed into a silage flail-type mower conditioner and sub-sampled for nutritional content analysis by near infrared reflectance spectroscopy (Dairy One, Ithaca, NY). Biomass yield was influenced by a forage x yr interaction ($P < 0.01$). Corn forages had greater ($P < 0.05$) yields than PM for both years, however, CC and OC yield were similar in yr 1 but CC was greater than OC for yr 2 (a year with less rainfall). Both forage type and year influenced CP, TDN and NSC ($P < 0.05$) with values higher for yr 1 than yr 2 and higher for CC and OC (which were similar) than for PM. Values for ADF, NDF and Ca were influenced by treatment ($P < 0.001$) with CC and OC values being similar but lower than that for PM. Variety and year both influenced levels of P, K, and Mg ($P < 0.05$). Corn forages had similar levels for both years but P was higher than PM in yr 1, lower in yr 2; K was lower in PM for yr 1 than yr 2 and PM Mg was similar to CC but lower than OC in yr 1 and lower than both CC and OC in yr 2. Overall, corn produced silage with greater biomass and better nutritional values than PM with organic and conventional corn silage forages having similar nutrient profiles.

**Key Words:** organic corn, pearl millet, silage
W115 Selection of bacterial strains to improve ensiling of alfalfa under sub-optimal conditions. S. Hansen*, A. Smith, and T. Rehberger, Agtech Products Inc., Waukesha, WI.

The quality of fermented forage is important in the dairy industry, with 40-60% of the diet consisting of ensiled field crops. The objective in this study was to identify and isolate bacteria unique to well-ensiled alfalfa and test them under optimal and sub-optimal conditions in order to develop a silage inoculant capable of fermentation over a broader moisture range. Previous studies using DGGE (Denaturing Gradient Gel Electrophoresis) reported a unique bacterial banding pattern associated with well-ensiled haylage when compared to haylage ensiled at sub-optimal moisture conditions. These unique DGGE bands mainly corresponded to the genus Weissella, previously Leuconostoc. Two Weissella strains were selected for testing in mini silos, air tight 5 gallon buckets containing haylage at a density of 46.5 pounds/cubic foot. Strains were tested in combination and applied at 2.0 × 10^6 cfu/gram of haylage. Alfalfa was wilted for 24 hours in the field before it was chopped. The moisture level of the alfalfa upon arrival was 53%, within the ideal level for ensiling of alfalfa (45-55%) and was packed immediately (normal treatment). To simulate sup-optimal ensiling; alfalfa was laid out in the sun to dry for an additional two hours and ensiled at 43% moisture (dry treatment). Furthermore, water was sprayed on alfalfa to simulate a quarter inch of rain, dried for one hour and ensiled at 61% moisture (rain treatment). Each mini silo was sampled on day 0, 2, 6, 11, 13, 32 and 98 post ensiling. Volatile fatty acids (VFAs) and pH were measured at each time point, as well as the enumeration of lactic acid bacteria and spoilage organisms (coliforms, yeasts, molds) on selective media. Analysis of the pH and VFAs indicated that the inoculated alfalfa had an improved fermentation under the dry and normal treatments. The inoculant decreased the pH and increased the rate and total concentration of lactic acid (P < 0.05) compared to the uninoculated alfalfa. The tested bacterial strains improved alfalfa fermentation, ensuring higher quality forage even under sub-optimal conditions of ensiling.

Key Words: alfalfa, forage, inoculant

W116 Effect of additive inclusion on dry matter loss of sugarcane silage. L. Borgatti1, A. Conrado1, J. Pavan Neto1, P. Meyer1, C. Marin1, and P. Rodrigues1, 1University of São Paulo, Pirassununga, São Paulo, Brazil; 2Brazilian Institute of Geography and Statistics, Pirassununga, São Paulo, Brazil.

This study aimed to evaluate the effects of adding alkalis to sugarcane silage on dry matter loss. A completely randomized design was used, with 6 additives in two different concentrations (1 or 2%), plus a control group, totaling 13 treatments with four replications. The tested additives were: sodium hydroxide, limestone, urea, sodium bicarbonate, quicklime and hydrated lime. The experimental silos were stored and opened at 53, 60, 67 and 74 days after ensiling. Before opening, the silos were weighed for dry matter loss determination, calculated as the difference between the mass weight at ensiling and at opening multiplied by the respective dry matter contents. The loss was transformed on percentage of initial mass. Data were submitted to polynomial regression analysis by GLM procedure, which decomposed the effects in linear and linearity deviation. Differences were declared at P<0.05. All additives caused a decrease in total dry matter loss of silages (P<0.05) in relation to control (Table 1). Sodium hydroxide decreased 43.5% dry matter loss in relation to control when added at 1% and by 62.5%, when was added in 2%. The decrease in dry matter loss caused by additives mainly occurred by a decrease in digestible dry matter loss (especially nonstructural carbohydrates). It could also be due to, in less scale, result of a decrease in hemicellulose and cellulose losses. The tested additives were efficient in the reduction of dry matter loss resulting from sugarcane silage fermentation.

Table 1.

<table>
<thead>
<tr>
<th>Additive</th>
<th>Doses (%GM)</th>
<th>Prob.</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>CyD (losses)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>33.1</td>
<td>18.7</td>
<td>12.4</td>
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<td>Limestone</td>
<td>33.1</td>
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</tr>
<tr>
<td>Urea</td>
<td>33.1</td>
<td>23.8</td>
<td>20.7</td>
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<tr>
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<td>20.5</td>
<td>24.6</td>
</tr>
<tr>
<td>Quicklime</td>
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<td>20.7</td>
<td>23.5</td>
</tr>
<tr>
<td>Hydrated lime</td>
<td>33.1</td>
<td>20.8</td>
<td>25.7</td>
</tr>
</tbody>
</table>

Key Words: alkalis, fermentation, silage

W117 Effects of microbial inoculants and dry matter content at harvest on the fermentation, aerobic stability and digestion of NDF of two corn silage hybrids. M. C. Santos*, L. T. Tati2, M. C. Der Bedroso1, W. Hu1, O. G. Pereira1, L. A. Williams1, M. A. Gilinsky1, and L. Kang Jr.1, 1University of Delaware, Newark, 2Universidade de Sao Paulo, Piracicaba, SP, Brazil; 3Universidade Federal de Vicsa, Vicsa, MG, Brazil.

The objective of this study was to compare the effects of microbial inoculants on the ensiling process of two corn silages ensiled at different DM contents. Two hybrids (DeKalb 6339 and Pioneer 33A88) were harvested at four DM contents (30, 32, 37 and 42%) and untreated or treated with 11CFT (Pioneer Hi-Bred International, Inc., Johnston, IA) at a rate of 1 × 10^5 cfu of L. buchneri PTA6138 and 1 × 10^6 cfu of L. casei PTA6135 or with Buchneri 500 (Lallemand Animal Nutrition, Milwaukee, WI) at a rate of 4 × 10^5 cfu of L. buchneri 40788 and 1 × 10^6 cfu of P. pentosaceus 12455 per g of wet forage. Approximately 600 g of fresh forage was ensiled in vacuumed and heat sealed bag silos (quadruplicate per treatment) and stored for 150 days. At the time of opening, a representative sample was taken and analyzed for fermentation end products, microbial populations, aerobic stability and nutritive value. NDF digestion was determined using dried samples ground through a 6-mm screen in a Wiley mill, weighed into in situ bags and incubated in the rumen of fistulated steers for 48 h. There were hybrid × DM × treatment interactions for all fermentation end products except lactic acid, numbers of lactic acid bacteria and aerobic stability. Over all hybrids and DM contents, corn silages treated with Buchneri 500 and 11CFT had higher (P < 0.0018) concentrations of acetate when compared with untreated silages (1.52 and 1.55 vs. 1.05% of DM). The same response was observed for 1,2-propanediol (0.57 and 0.52 vs. 0.24% of DM) and the number of lactic acid bacteria (8.22 and 8.01 vs. 6.30 log10 CFU/g). Buchneri 500 and 11CFT silages were also more stable when exposed to air (291 and 269 h for silage temperature to reach 2°C above ambient vs. 203 h for control) and had fewer yeasts at the time of opening (0.84 and 0.76 vs. 2.35 log10 CFU/g in untreated silages). Inoculation did not statistically improve NDF-D for either hybrid, but when combined as a main effect there was a trend (P < 0.1026) for silage treated with 11CFT to be more digestible than untreated silage (45.49 vs. 43.96% of NDF).

Key Words: ferulic acid esterase, silage, digestibility
W118 Using molecular techniques to identify and differentiate bacterial species and strains used in commercial silage inoculants. N. D. Walker*1, M. E. Quintino Cintora1, R. Schmid2, and R. Charley2, 1Lallemand Animal Nutrition, Montreal, QC, Canada, 2Lallemand Animal Nutrition, Milwaukee, WI.

One of the problems encountered when analyzing the bacterial profiles found in silage inoculants is that they may contain a mixture of closely related species and strains which exhibit similar biochemical properties. However the advancement in molecular techniques has led to the development of a number of methods which enable this problem to be overcome. In this study, a DNA fingerprint method was used to identify species of bacteria present in commercially available silage inoculants; specific primers were used to identify isolates of Lactobacillus buchneri from these samples, and RAPD-PCR was used to differentiate closely related isolates of this organism and compare them to L. buchneri 40788. Commercial preparations (5) which contained L. buchneri were plated out. DNA was extracted from each plate and amplified. The resulting amplicons were separated by TTGE and the band positions compared with known standards (L. buchneri, L. casei, E. faecium, L. plantarum). In most instances, the package label corresponded to what was found in the packet except one sample which was supposed to contain L. buchneri did not appear to contain any viable cells of this organism as seen by the absence of a L. buchneri band. Further attempts to use L. buchneri specific primers on this preparation also did not produce a reaction, confirming this. To differentiate between strains of L. buchneri, single colonies were isolated from each commercial sample. Each isolate was Gram stained and those which resembled L. buchneri in morphology were selected, their DNA extracted and amplified using specific primers. Those which gave a positive reaction were then subjected to RAPD-PCR using 5 different primers and compared with the corresponding fingerprint of L. buchneri 40788. All were different to 40788 however, some of these new isolates only exhibited minor differences to each other, indicating that they were very closely related. A rapid method has been developed which can enable the identification and differentiation of different species of lactic acid bacteria and strains of L. buchneri commonly used in commercial silage inoculants.

Key Words: L. buchneri, silage, fingerprint

W119 Sorghum forage as an alternative to corn silage in dairy cows feeding. S. Colombini, G. Galassi, G. M. Crovetto*, and L. Rapetti, University of Milan, Milan, Italy.

Aim of the study was to study the possibility of substituting corn silage with low lignin (brown midrib, BMR)-sorghum silage in the diet of lactating cows. Two TMRs containing BMR333 single harvest sorghum forage silage (SF) or corn silage (CS) were fed to 60 Holstein dairy cows in a change-over design. Diets included (dry basis) 26.3% CS or 17.3% SF, 6.0% alfalfa hay, 11.0% Italian ryegrass hay and 56.6% or 65.7% concentrate for CS or SF diet, respectively. Diets had 15.5% CP, 31.5% aNDFom and 24.2% starch, on DM. Due to the low SF starch content (2.8% on DM), a higher amount of corn meal was included in the SF diet (5.7 vs 8.0 kg/d). Forages were also incubated in situ to determine rumen degradability and degradation rate (kd) of NDF. All data were statistically analyzed by SAS-GLM procedure. DMI was not affected by diet (24.4 vs 25.4 kg/d for CS and SF fed cows). Milk yield (32.6 and 33.1 kg/d for CS and SF diets), milk fat (4.16% for both diets) and milk protein (3.42 and 3.40% for CS and SF diets) were not affected by dietary treatment (NS). MUN was lower in the diet CS (9.2 vs 9.9 mg/dl; P<0.001); this was probably due to the higher starch fermentability of corn silage as compared to corn meal, included at a higher proportion in the SF diet, resulting in a better N utilization for CS diet. The rate of aNDFom degradability (kd) was higher for SF, although only a trend was detected. On the other hand potentially degradable aNDFom (a+b) was higher for CS; thus, effective degradability was not different between the two forages (table 1), confirming the results obtained in vivo. BMR sorghum silage can be effectively used in dairy cow feeding, provided starch content of the diet is balanced.

| Table 1. In situ rumen DM and aNDFom degradability |
|-------------------|--------|----------------|-----------------|--------|----------------|-----------------|--------|
|                   | CS     | SF     | SE     | P      | CS     | SF     | SE     | P      |
| a (%)             | 33.1   | 23.7   | 0.44   | ***    | 3.63   | 3.27   | 1.08   | NS     |
| b (%)             | 46.3   | 48.7   | 0.23   | **     | 67.3   | 63.3   | 1.55   | NS     |
| k_d (%/h)         | 3.3    | 3.3    | 0.19   | NS     | 2.5    | 3.10   | 0.17   | 0.07   |
| a+b(%)            | 79.4   | 72.4   | 0.39   | ***    | 70.9   | 66.6   | 0.71   | *      |

Key Words: sorghum forage BMR, dairy cow, NDF degradability

W120 Nutritive value and fermentation profile of sorghum silages with urea and two storage periods. F. E. P. Fernandes1, R. Garcia*1, A. J. V. Pires2, O. G. Pereira1, and C. S. Fernandes1, 1Federal University of Viçosa, Viçosa, MG, Brazil, 2State University of Bahia, Itapetinga, Ba, Brazil, 3Fapemig, Belo Horizonte, MG, Brazil.

The objective of the study was to determine the effects of doses of urea (0.0, 2.5, 5.0, and 7.5%, DM base) and storage periods (30 and 60 days) on the chemical composition, IVMDM, NH3-N, pH values and WSC of the silages. The addition of urea doses showed a quadratic effect upon DM content. The smallest estimated DM content of silage (21.87%) was observed at 5.69% of urea dose added. The urea addition in the ensiling process of sorghum increased the CP, NDIP, and IVDMD and reduced the NDF, ADF, cellulose and lignin contents. The fermentation characteristics of the silages, the urea doses had a quadratic effect in the NH3-N contents. The pH values of the silages increased linearly. There effect of the silage periods on the NH3-N content and pH value. However, the urea addition in the ensiling process of sorghum did not cause any significative change in reducing the fermentative characteristics of the silages. The nitrogen fractions of the silage were influenced by the urea addition, being verified positive linear effect for the A fraction, negative linear effect for B1+B2, B3 and C fractions. It was detected a linear reduction of CT contents in function of the urea addition. The fractions of CT were influenced by urea addition, being verified negative linear effect on the content of A+B1 fractions; positive linear effect on the B2 and C fractions for the storage period of 60 days. The addition of urea in the ensiling process of sorghum can reduce losses by fermentation and increasing the nutritive value of the silage.

Key Words: ensilage, digestibility, ammoniation
Elephantgrass with and without wilting, added of cassava meal in silage production. R. Garcia*1, A. C. Oliveira1, A. J. V. Pires2, O. G. Pereira1, and F. E. P. Fernandes1, 1Federal University of Viçosa, Viçosa, MG, Brazil, 2State University of Bahia, Itapetinga, Ba, Brazil

Two experiments were conducted, using a completely randomized design, to evaluate the nutritive value, fermentative characteristics and losses in elephantgrass with and without wilting and added cassava meal (0; 7.5; 15 and 22.5% natural base), in the ensiling process and to determine protein and carbohydrate fractions of silage. In experiment I, wilting associated with cassava meal was efficient to increase dry matter (DM) content, to minimize DM losses and to reduce crude protein (CP), acid detergent insoluble nitrogen, neutral detergent fiber, neutral detergent fiber ash and protein free, acid detergent fiber, and cellulosics contents. Cassava meal addition in elephantgrass silage production caused reduction in ether extract, hemicellulose and lignin contents and increased organic matter content, in vitro DM digestibility, and total digestible nutrients. The wilting treatment had effect only in neutral detergent insoluble nitrogen content. It was observed quadratic effect of without wilting on pH and butyric acid, with pH showing minimum value of 3.7% in 15.9% cassava meal level. It was observed quadratic effect of without wilting on ammonia nitrogen and acetic acid but linear effect of wilting on ammonia nitrogen and acetic acid. In experiment II the regression analysis detected a linear increase of total carbohydrates (TC) content as a function of cassava meal addition. The association of wilting with different levels of cassava meal influenced the TC fractions (A+B1 and B2), but did not have effect on nitrogen fractions (A and B1+B2). The wilting of elephantgrass associated to cassava meal was efficient to reduce the moisture and the losses in the silage. The cassava meal improved the in vitro DM digestibility. The level of 22.5% of cassava meal (natural base) in the ensiling process of elephantgrass (19.5% DM) can be recommended to improve the nutritive value and fermentative characteristics of silage.

Key Words: digestibility, Pennisetum purpureum, by-product

Effects of ensiling corn and sorghum silages under normal or adverse conditions on proportions of long chain fatty acids. B. C. do Amaral1, S. C. Kim2, O. F. Zacaroni1, A. T. Adesogan1, and C. R. Staples*1, 1University of Florida, Gainesville, 2Gyeongsang National University, Jinju, South Korea

The objective was to determine the effect of ensiling regime and storage duration on long chain fatty acid (LCFA) profiles of corn (CS) and sorghum silages (SS). Corn (Pioneer 30F34) and sorghum (NK300) forages, grown at the University of Florida, were ensiled at 31 and 36% dry matter, respectively. Chopped forages were packed into 20-L silos in triplicate and ensiled for 0, 7, 21 and 156 d. Half of the silos were sealed immediately and stored at 24°C (normal ensiling) and half were placed in a 30°C room for 48 h before sealing and storage at 30°C (adverse ensiling). Silages were subsampled, freeze-dried, ground, and analyzed for FA using gas chromatography. Sorghum silage had greater (P<0.05) concentrations of total FA (1.90 vs. 1.80% of DM), 18:1n-9 (20.9 vs. 19.5% of FA), and 18:3n-3 (17.9 vs. 15.6% of FA) than CS whereas CS had greater concentrations of C16:0 (23.8 vs. 20.0% of FA) than SS. Adverse ensiling tended to increase (P=0.06) total FA concentration over time (18.9 vs. 18.2% of DM), increased proportions of C16:0 (22.3 vs. 21.5% of FA) and C18:0 (3.1 vs. 2.7% of FA) but decreased proportions of C18:2n-6 (36.6 vs. 38.5% of FA) across both silage types. The effect of storage duration on the proportions of individual FA differed between CS and SS. The proportions of C18:3n-3 decreased linearly with storage duration but the decrease was greater for SS (20.2, 19.7, and 13.8% of FA) than for CS (16.2, 16.5, and 14.1% of FA for 0, 7, and 156 d of ensiling, respectively). In contrast, proportion of the other unsaturated FA, C18:1n-9 and C18:2n-6, increased with storage duration. In silages prepared under adverse conditions, the proportion of C18:3n-3 in silage did not decrease dramatically until 156 d whereas proportions of C18:3n-3 decreased at both 7 and 156 d of ensiling in silos ensiled under normal conditions. Approximately 13 to 31% of linolenic acid was degraded in corn and sorghum silage during ensiling but proportions of linoleic acid remained relatively unchanged.

Key Words: ensiling time, fatty acid

Nutritive value of corn hybrids for silage production according to the maturity stage. M. Zopollatto*1, L. G. Nussio1, J. O. Sarturi2, G. B. Mourão1, A. P. Duarte3, C. M. M. Bittar1, and V. P. Santos3, 1University of Sao Paulo/ESALQ, Piracicaba, SP, Brazil, 2University of Nebraska, Lincoln, 3Apta Regional, Assis, SP, Brazil

The objective of this study was to evaluate the nutritive value of corn hybrids for silage production harvested across maturity stages A randomized block design, with an 8×6×2 factorial scheme based on eight harvesting ages, six corn silage hybrids and two harvesting years (2001/02 and 2002/03). The hybrids CO 32, semi–hard endosperm; AG 5011 – soft endosperm; P 3041 – hard endosperm; DKB 333B – semi–hard endosperm; AG 1051 – soft endosperm and Z 8550 – semi–soft endosperm were harvested when they reached 50% tasseling, 15 days later and weekly, totalizing eight harvesting times. Maturity advance resulted in increases in (P<0.05) in the mean starch content (1.8 to 26.1%) and digestible dry matter production (5.9 to 16.3 t/ha –DDMP). However, decreases (P<0.05) in forage neutral detergent fiber – NDF (71.9 to 52.8%); digestible NDF (64.7 to 54.4%) and crude protein (12.5 to 7.0%) were observed across the time. The in vitro true dry matter digestibility (IVTDMD) did not change along maturity stage (71.8 to 72%) At the ensiling stage (30–35% DM – at the 5th harvesting age, from 94 to 105 days after seeding) P 3041, AG 1051 and Z 8550 hybrids showed the most desirable quality characteristics for silage production: the lowest (P<0.05) NDF content (54.9; 55.2 and 55.1%, respectively) and the highest (P<0.05) digestible NDF content (60.0; 62.4 and 61.0%, respectively), IVTDMD (75.4; 74.3 and 75.6%, respectively) and DDMP (14.4; 14.3 and 13.9 t/ha, respectively). Furthermore, AG 1051 and CO 32 hybrids showed the highest (P<0.05) starch content (23.5 and 20.9%, respectively) at the ensiling stage. The forage nutritive value is a result of the interactions between fiber and starch kernel contents and differences observed across the maturity indicated that the maximum forage nutritive value for setting a harvesting window may differ among cultivars.

Key Words: digestibility, fiber, starch
three days of opening) with three replicates; to evaluate the effect of the addition of soybean hulls, sunflower crushed seeds and urea on the nutritional quality of sunflower silage. The averages were analyzed by the Tukey test to 5% of probability. The treatments were: Control (100% of Sunflower plants - SS), SS + 5% of soybean hulls, SS + 5% of crushed sunflower seeds and SS + 5% of urea. The silos were opened at 14, 21 and 28 days after ensilage. There was no effect (P>0.05) for day of opening, or addition on organic matter (OM), neutral detergent insoluble protein (NDIP), mineral matter (MM), neutral detergent fiber (NDF) or acid detergent fiber (ADF), (mean = 91.12, 8.66, 9.29, 62.54, 46.02%, respectively). Dry matter (DM) and ether extract (EE) presented interaction for addition and days of opening (P<0.05). 5% of soybean hulls increased the DM after 28 days of ensilage (34.9%), for the crushed sunflower seeds the MS were higher after 21 days (31.7%). The DM of SS at 28 days was 26.4%. The addition of 5% crushed sunflower seeds presented higher EE to the 28 days of ensilage (6.96%). The control presents at 28 silage day of 4.8% EE and 26.4% DM. There was an effect on crude protein (CP), acid detergent soluble protein (ADIP) and total carbohydrates (TC), for additions (P<0.05), but not for opening dates. Urea provided increment of nitrogen’s fractions, and consequently larger crude protein and acid detergent insoluble protein (23.5 and 1.3% DM), while other treatments presents a media of 11.8% and 0.8% of AIPD. The addition of 5% of soybean meal and crushed sunflower seeds increased the total carbohydrates in sunflower silage (76.9 and 71.5%), this didn’t happen with the urea addition (63.1%). The SS presents total carbohydrates of 73%. The addition of urea provides a higher CP and ADIP and 5% of sunflower crushed seeds and soybean hulls increases DM and EE after 21 days of silage and the total carbohydrates of sunflower silage.

Key Words: crushed sunflower seeds, soybean hulls, urea.

W125 In situ dry degradation coefficients of whole crop barley silage treated with Lactobacillus plantarum or mixed with Pedicoccus pentosaceus plus Propionbacter freudenreichii. M. Vatandoost, M. Danesh Mesgaran*, A. Heravi Mousavi, and A. R. Vakili, Ferdowsi University of Mashhad, Mashhad, Iran.

The aim of the present study was to determine the chemical composition and in situ dry matter (DM) degradation of whole crop barley silage (WCB, 35% DM) as untreated or treated with Lactobacillus plantarum (8×1010 CFU (LP8) or 16×1010 CFU (LP16) per g of DM) or mixed with Pedicoccus pentosaceus+Propionbacter freudenreichii (5.5×1010 CFU (PP5.5) or 11×1010 CFU (PP11) per g of DM) for 30 days (n = 4). Standard procedures were used to determine the chemical composition of the samples. The pH of silage extract was determined using a pH meter (Metrohm 691, Swiss). NH3-N concentration was determined using potassium mercuric acetate method (Kjeltec 2300 Autoanalyzer, Foss Tecator, Sweden). The rumen degradable parameters of DM of the silages were determined using in situ procedure. Four sheep (44±5 Kg Body Weight) fitted with the rumen fistulae were used in the present study. 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, and four bags for each treatment were incubated for each time (2, 4, 8, 16, 24, 48, 72, 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 dry matter degradation coefficients (a = quickly degradable fraction, b = slowly degradable fraction, c = fractional degradation rate constant). Both additives did not have any significant effect on pH (UT = 4.07, P3 = 4.05, P6 = 4.03, AP1 = 3.95 and AP1.5 = 3.93; SEM = 0.15) or crude protein concentration (UT = 7.98, P3 = 8.03, P6 = 8.11, AP1 = 8.06 and AP1.5 = 8.08 g/kg DM; SEM = 0.09). However, these additives caused a significant (P < 0.05) increase in neutral detergent fibre content (UT = 554, P3 = 661, P6 = 664, AP1 = 577 and AP1.5 = 595 g/kg DM; SEM = 7.7). NH3-N concentration (mg/dl) was significantly increased when ammonium propionate was applied (UT = 9.10, AP1 = 11.69; SEM = 0.53). The additives caused an increase in slowly degradation fraction of DM (UT = 0.46 ± .03, P3 = 0.56 ± 0.03, P6 = 0.57 ± 0.04, AP1 = 0.49 ± 0.02 and AP1.5= 0.52 ± 0.03).

Key Words: silage, propionic acid, propionate ammonium

W126 The effect of propionic acid or propionate ammonium on chemical composition and in situ dry matter degradation of whole crop barley silage. M. Vatandoost, M. Danesh Mesgaran*, A. Heravi Mousavi, A. R. Vakili, Ferdowsi University of Mashhad, Mashhad, Iran.

The aim of this study was to evaluate the effect of propionic acid or ammonium propionate on chemical composition and in situ dry matter (DM) degradation of whole crop barley silage. It was harvested (about 35% DM), chopped, and then ensiled as untreated (UT) or treated with propionic acid (3 or 6 g per Kg of DM; P3 or P6, respectively) or ammonium propionate (1 or 1.5 g per Kg of DM; AP1 or AP1.5, respectively) for 30 days (n = 4). Standard procedures were used to determine the chemical composition of the samples. 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. The ruminal degradable parameters of DM of the silages were determined using in situ procedure. Four sheep (44±5 Kg Body Weight) fitted with the rumen fistulae were used in the present study. 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, and four bags for each treatment were incubated for each time (2, 4, 8, 16, 24, 48, 72, 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 dry matter degradation coefficients (a = quickly degradable fraction, b = slowly degradable fraction, c = fractional degradation rate constant).

Apples have positive effects as a natural antioxidant. Manzarna (Mzn) is a solid state fermentation product of apple byproducts. Mzn could preserve some of the apple properties; in addition, it has high yeasts content. The objective was to evaluate Mzn influence over plasma antioxidant activity (AA) and white blood cells concentration on lambs.
(n=24 lambs), during a feedlot trial. Six males (M) and six females (F) were fed with a ≈10% of Mnz in diet (n=12; t1), six M and six F were fed with a common diet (t2). Animals remained on individual stalls with water and feed ad libitum during 56 d. Samples of blood were taken on July 31 (1), August 30 (2) and September 26 (3) of 2007 to determinate during 56 d. Samples of blood were taken on t1 lambs were fed with a ≈10% of Mnz in diet (n=12; t1), six M and six F were fed (n=24 lambs), during a feedlot trial. Six males (M) and six females (F) were fed (n=24 lambs). Inoculant-treated corn silage quality and performance of lactating cows. A. Ghampour1, G. R. Ghorbani1, M. Khorvash1, and A. Nikkhah*2, 1Isfahan University of Technology, Isfahan, Iran, 2Zanjan University, Zanjan, Iran.

It has been a question for large dairy holders if applying inoculants to low-DM corn crop can improve preservation quality. The objective was to determine the effect of microbial inoculant application to high moisture corn crop on silage quality and performance of lactating cows. Crop corn was harvested at milk stage of maturity with 21% DM, cut at a theoretical particle length of 2 cm, filled in four 60-ton bucket silos, and treated with 1) no inoculants, 2) inoculant A (Ecosyl) containing Lactobacillus plantarum, 3) inoculant B (Biotal) containing Pediococcus pentosanus, Lactobacillus plantarum and Propionibacter freudenreichii or 4) the combination of inoculants A and B. Eight multiparous lactating Holstein cows at 100 ± 20 days in milk with an average body weight of 650 kg were used in a 4 × 4 Latin square design with four 20 d periods, 14 d of adaptation and 6 d of sampling. Treatments were total mixed rations (TMR) with inoculant-treated corn silages as above. Diets contained 32.9% corn silage, 14.3% alfalfa hay, 15% ground barley, 13.1% ground corn, 17.4% soybean meal, 3.4% cottonseeds, 1.8% fat powder, 0.8% sodium bicarbonate, 0.45% calcium carbonate, and 0.8% vitamin and mineral supplement. Orts were adjusted to not exceed 10% of the daily TMR. Cows were milked in a milking parlor three times daily at 0500, 1300 and 2100 h. Rumen fluid was sampled by rumenocentesis at 4-h post-feeding. Inoculants did not affect silage pH, and concentrations of ammonia, lactate, acetate, CP, NDF, ADF, ash and water soluble carbohydrates. Dry matter intake (21.5, 22.8, 21.7 and 21.7 ± 0.6 kg/d) and milk yield (33.7, 32.8, 32.3 and 33.6 ± 1.4 kg/d), and milk percentages of fat (3.32, 3.14, 3.32, and 3.15 ± 0.16), protein (3.05, 3.08, 3.06 and 3.08 ± 0.06) and lactose (5.44, 5.45, 5.47 and 5.44 ± 0.08) were unaffected by corn silage inoculant treatment. Applying inoculants to corn crop before ensilage did not significantly affect rumen pH VFA concentrations, and total tract nutrient digestibility. Results suggest little effect of inoculants on corn silage quality and performance of mid lactation dairy cows on diets with 32.9% corn silage.

Key Words: corn silage, inoculant, dairy cow

W129 Fitted models for description of cumulative gas production profiles from silages of sunflower and corn. R. Mello*1, A. L. R. Magalhães2, F. C. Breda1, A. J. Regazzi3, A. C. de Queiroz1, and J. L. Nörnborg1, 1Univesidade Federal de Roraima, Boa Vista, Roraima, Brazil, 2Universidade Federal Rural de Pernambuco - Unidade Acadêmica de Garanhuns, Garanhuns, Pernambuco, Brazil, 3Universidade Federal de Viçosa, Viçosa, Minas Gerais, Brazil, 4Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil.

The aim of this work was to identify among the Brody, Von Bertalanffy, Gompertz, France, Logistic, Modified logistic and Dual-pool logistic models, the one that presents the highest quality of fit for description of cumulative gas production curves from silages of sunflower and corn. Twelve different sunflower silages and two different corn silages samples were obtained from different ensiling experiments using laboratory siles. Substrates were incubated with ruminal fluid buffered in triplicate, resulting in 42 individual curves. Gas production was followed over time in a semi-automated in vitro system with pressure transducer. Parameters of the models in question were estimated through the Marquardt algorithm implemented in the NLIN procedure of SAS® software. The quality of fit was evaluated by coefficient of determination, residual mean square, graphic analysis of the observed and estimated curves, graphic analysis of dispersion of the studentized residual, average percentage error, relative efficiency and number of iterations to converge. Brody, France and Dual-pool logistic models showed the largest values of coefficient of determination in both substrates, and the difference among them was considered worthless. They also showed the smallest values of residual mean square in sunflower silages, being the difference among them was considered worthless. Brody and France models presented smaller residual mean square in corn silages, but these models estimated negative gas production on initial times of incubation in both substrates, being biologically impossible. All the models showed positive dispersion of the residual in both substrates after 144 hours of incubation. The Brody model showed smaller average percentage error and number of iterations in both substrates. The Dual-pool logistic and France models showed higher relative efficiency, respectively, in sunflower and corn silages. Thus, the Dual-pool logistic model showed higher quality of fit to the cumulative gas production curves in sunflower and corn silages.

Key Words: fermentation kinetics, mathematical models, nonlinear models

W130 Nitrogenous compounds and fermentation characteristics of king grass - leucaena silages. T. Clavero* and R. Razz, Universidad del Zulia, Maracaibo, Estado Zulia, Venezuela.

In order to increase nitrogenous compounds and improve fermentation quality of king grass (Pennisetum purpureum × Pennisetum typhoides) silage, ensiling with Leucaena leucocephala was tested. King grass and leucaena were cultivated in a very dry tropical forest in north west of Venezuela. The treatments for silage making were: 100% king grass (KG), 30% leucaena (L)-70% KG, 70%L-30% KG and 100% L. Fresh plant materials were chopped to 1 cm length, mixed according to treat-
W131 The effect of sewage irrigation on mineral composition and in-vitro digestibility of two corn forage varieties. E. Yosef*1, E. Zukermann2, J. Miron1, M. Nikbahat1, and D. Ben-Ghedalia1, 1The Volcani Center, ARO, Bet Dagan, Israel, 2Extension Service-Ministry of Agriculture and Rural Development, Bet Dagan, Israel.

Summers in Israel are dry and forage crops must be irrigated. The usage of sewage irrigation of summer forages, increased in Israel due to regional droughts and the necessity to eliminate the excess of urban usage of sewage irrigation of summer forages, increased in Israel due to regional droughts and the necessity to eliminate the excess of urban waste waters. The purpose of this study was to evaluate the effect of secondary-treated sewage water irrigation on the composition and in vitro digestibility of two corn forage varieties: Oropesa (Europe origin) and 32P75 (USA Pioneer). The irrigation treatments were sewage vs. flood water at a level of 3380m^3^/ha. In each treatment, both corn varieties were grown as five replicated plots and sampled by manual harvesting at the soft dough stage of maturity. The conductivity of the sewage irrigation treatment of corn plants was similar. The sewage treatment improved dry matter and NDF in vitro digestibility of corn Oropes as compared with flood water treatment (71.2% vs. 68.8% and 53.8% vs. 45.7%, respectively). However, sewage treatment decreased in vitro digestibility of 32P75 as compared with flood treatment (66.5% vs. 71.6% and 51.3% vs. 57.6%, respectively). In both treatment of each variety the nitrate contents were similar, but Oropesa contained 2-3 folds higher nitrate content then 32P75. In this study the mineral concentrations of secondary-treated sewage water were below the critical level which may damage the corn plants quality.

Key Words: silage, Leucaena leucocephala, nitrogenous compounds

W132 Biomin® BioStabil Mays enhanced the fermentation and the aerobic stability of corn silage under tropical laboratory conditions. A. A. Rodriguez*1, Y. Acosta-Aragón2, and E. Valencia1, 1University of Puerto Rico, Mayaguez, PR, 2Biomin GmbH, Austria.

An experiment was conducted to determine the effects of the silage additive Biomin® BioStabil Mays (BSM, blend of homo- and heterofermentative bacteria) on the fermentation characteristics and aerobic stability of corn whole plant (QPM variety) growth and ensiled in Puerto Rico. Corn was harvested 75 d after planting and chopped finely. Prior to ensiling, the vegetative material was treated or not with BSM (1 x 105 cfu/g silage). Treatments were applied to weighted portions of corn forage, manually mixed, and packed into PVC laboratory silos. Samples of fresh forage and triplicates silos of each treatment were taken at 0, 3, 45 and 90 d of fermentation, analyzed for pH, chemical composition, and fermentation products. Statistical analysis was performed as a completely randomized design with a 2 by 4 factorial arrangement of treatments. Tukey t-test was used for mean separation. For aerobic stability determination, triplicate silos from each treatment were emptied after 45 and 90 d of ensiling, placed into styrofoam containers lined with a plastic bag and exposed to air for 5 d. Temperature was monitored every 6 hours during the 5 d with a thermometer embedded in the surface of the exposed silage. pH was measured after 0, 1, 3 and 5 d. Statistical analysis of pH data was performed as a completely randomized design with a 2 by 5 factorial arrangement of treatments. The same model was utilized for temperature data except that 19 times of aerobic exposure (hours) were utilized instead of 5 d. Tukey t-test was also used for mean comparison. BSM enhanced the fermentation characteristics of corn ensiled during 45 d as evidenced by lower pH (P<0.05) and higher lactic acid content (P<0.05). After 90 d of fermentation BSM lowered the ratio of NH3-N/total-N (P<0.05) as compared with corn ensiled without additive. After the opening of the silos at the d 45 and 90 the temperature of silages treated with BSM was lower than that of the control silage (P<0.05). In summary, BSM improved the fermentation characteristics and the aerobic stability of corn ensiled under tropical laboratory conditions.

Key Words: corn silage, additive, tropical environment

W133 Dairy farm milk quantity, quality, and revenue within a private organization in Central Thailand. S. Yeamkong1, S. Koonavootitrirun1, M. A. Elzo*2, and T. Suwanasopoe1, 1Kasesart University, Bangkok, Thailand, 2University of Florida, Gainesville.

Survival of dairy farming in Thailand depends on the ability of dairy farmers to increase profitability and efficiency of their dairy operations. Revenues are primarily related to amount of milk produced, and secondarily to milk quality. The objective here was to determine factors affecting milk quantity, quality, and revenue in dairy farms from a private organization in Central Thailand. The dataset had 34,133 farm monthly records for milk yield per cow (MC), fat percentage (FP), protein percentage (PP), lactose percentage (LP), solids-not-fat percentage (SP), total solids percentage (TP), somatic cell count (SC), and milk revenue per cow (RC) collected from September 2003 to December 2007 in 1,101 dairy farms. Seasons were winter (November to February),