168 Does brine temperature influence salt uptake by Ragusano cheese? C. Melilli*[1], D. M. Barbano[2], G. Licitra[1], G. Portelli[1], G. Di Rosa[1], and S. Carpino[1], [1]*CoRFiLaC, Regione Siciliana, 97100 Ragusa, Italy,* [2]*Northeast Dairy Food Research Center, Department of Food Science, Cornell University, Ithaca, NY.*

Twenty six 3.8 kg blocks were made on each of 3 different days. A block was analyzed prior to brine salting. Blocks (5) were placed into each of 5 different saturated brines at 12, 15, 18, 21, and 24°C. One block was removed from each brine tank after 1, 4, 8, 16, and 24 d, weighed, sampled, and analyzed for salt and moisture. Weight loss (net of moisture loss and salt uptake), salt uptake, and moisture loss after 24 d increased with increasing brine temperature. Cheese porosity and viscosity of the water phase within the pores influence the rate and extent of salt uptake during 24 d of brining. Previously, lower brine concentration (18 vs 24%) achieved higher surface porosity and faster salt uptake. In the present study, moisture loss occurred from all cheeses at all temperatures, mostly during the first 4 d. Moisture loss decreases surface porosity of the block and forms a barrier to salt penetration. Moisture loss increased with increasing temperature and this decreased surface porosity. If decreased porosity was the only factor influencing salt uptake at various brine temperatures, then the cheeses at higher temperature should have had lower salt content. However, the opposite was true (2.91, 3.05, and 3.36% salt after 24 d of brining at 12, 18, and 24°C, respectively). Brine temperature also influences the viscosity of the aqueous phase of the cheese. The water phase of cheese in lower temperature brine would have higher viscosity and slower salt uptake, even though the cheese at lower brine temperature would have a more porous structure (favoring faster salt uptake) than cheese at higher brine temperature. Therefore, reducing brine concentration at 18°C increased salt uptake by increasing cheese porosity, while decreasing brine temperature decreased salt uptake due to increased viscosity of the water phase of the cheese. Faster salt uptake and lower temperature will help control early gas development.

Key Words: Brine temperature, Salt uptake, Ragusano cheese

169 The influence of native pasture plants on aroma compounds in Ragusano cheese. S. Carpino*[1], S. Mallia[1], S. La Terra[1], G. Licitra[1], P. J. Van Soest[2], and D. M. Barbano[3], [1]*CoRFiLaC, Regione Siciliana, 97100 Ragusa, Italy,* [2]*Department of Animal Science,* [3]*Department of Food Science, Cornell University, Ithaca, NY.*

Raw milk from 13 cows fed TMR supplemented with native pasture and from 13 cows fed only TMR on one farm was collected separately 4 times with an interval of 15 d between collections and 2 blocks (14 kg each) of cheese were made from each milk. Our objective was to determine the influence of consumption of native plants in Sicilian pastures on the aroma compounds present in Ragusano cheese. Qualitative differences in the types of odor active compounds in the cheese were detected using GCO. Out of 31 odor active compounds found in the cheeses, 18 were detected only in cheeses produced from milk of cows consuming pasture. Of the 18 compounds 10 were also found in at least one of 14 plant species selected out of 40 in the pasture. Selected plant species from the genera: Anthemis, Beta, Calendula, Cerinthe, Diplotaxis, Erodium, Euphorbia, Fumaria, Geranium, Malva, Medicago, Rumex, Scorpiurus, and Sinapis were known to be selected by the cows and represented pasture diversity. For example *Calendula arvensis*, a Compositae, was one of the most abundant plants, while *Euphorbia helioscopia*, (well known for secondary compounds) was consumed in small amounts. The following compounds were found in all cheeses produced from milk of cows consuming pasture and not in cheeses from TMR milk (numbers in parenthesis indicate plant species containing the compound out of 14): delta decalactone (14), (E)-2-nonenal (13), (Z)-2-nonenal and citronellol (11), vanillin (9), phenylacetaldehyde (6), 1-carvone (4), ethyl 2-methyl butyrate and (E, E) 2,4 octadienal (2), geranyl acetate (1), while 2,4′decadienal, 3-hydroxy-2-butanone, 2-nonanone, methionol, 2,6-dimethyl pyrazine, dimethyl disulfide, (E)-methyl jasmonate and dodecanal were not found in the 14 plants species. Compounds found uniquely in pasture cheeses, but not found in the 14 plant species may have been present in other pasture plants not analyzed.

Key Words: Aroma, Pasture, Ragusano cheese

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171 Lipolysis and proteolysis within blocks of Ragusano cheese at different brine temperatures. C. Melilli[1], D. M. Barbano*[2], M. Manenti[1], J. M. Lynch[2], S. Carpino[1], and G. Licitra[1], [1]*CoRFiLaC, Regione Siciliana, 97100 Ragusa, Italy,* [2]*Northeast Dairy Foods Reseach Center, Department of Food Science, Cornell University, Ithaca, NY.*

The influence of brine temperature and salt gradients within blocks on lipolysis and proteolysis in Ragusano cheese was determined. Twenty six 3.8 kg blocks (15x15x15 cm) were made on each of 3 d. One block was analyzed prior to brine salting. Five blocks were placed into each of 5 different saturated brines at 12, 15, 18, 21, and 24°C. One block was removed from each brine after 1, 4, 8, 16, and 24 d of brining. Each block was divided into four portions of approximately equal weight representing, sequentially, the exterior surface to the center. Total (copper soap method) and individual (GLC) free fatty acids (FFA) and pH 4.6 and 12% TCA soluble nitrogen (SN) were measured. The pH 4.6 SN (5.12 to 7.37%, 12 vs 24°C) and 12% TCA SN (1.79 vs 4.27%, 12 vs 24°C) as a percent of TN at 24 d increased with brine temperature and they were higher in the block center and lower at the surface at all temperatures. Total FFA content increased with increasing brine temperature (ca. 76 to 221 mg/100 g; 12 vs 24°C) for all portions and the total FFA content across all temperatures was higher at the exterior 25% of the block than the interior 75% (ca. 180 to 115 mg/100 g, respectively) at 24 d. Higher total FFA content at the surface of the block was not expected and was the opposite of the behavior of SN. The average C4 as a percentage of total FFA increased (13.0, 27.9, and 38.2% at 12, 18, and 24°C, respectively) with increasing brine temperature at 24 d. The opposite behavior of total FFA content from the surface (i.e., high salt/low moisture) to the center of the block (low salt/high moisture) vs SN content may be due to a different direct effect of salt on enzyme and substrate interaction during lipolysis or a combination of this effect and movement of low molecular weight water-soluble FFA from the interior to the surface of the block with moisture movement during brine salting.

Key Words: Brine temperature, Lipolysis, Proteolysis

172 Impact of pH during aging on proteolysis, texture and melting characteristics of Mozzarella cheese. M.A.S Cortez[1], M. M. Furtado[1], M. L. Gigante[2], and P. S. Kindstedt*[3], [1]*Federal University of Vicosa/CAPES, MG/Brazil,* [2]*State University of Campinas, Campinas, SP/Brazil,* [3]*University of Vermont, Burlington, VT/USA.*

Previous studies demonstrated that the calcium distribution and apparent viscosity of newly made and aged Mozzarella cheeses were altered when the pH was altered using a novel post-manufacture approach. This study evaluated the effect of pH modulation on the proteolysis, unmelted texture and melting characteristics of Mozzarella cheese during aging. On four separate occasions, cultured LMPS Mozzarella cheeses were obtained from a commercial producer on the day after manufacture. Cheeses were sectioned into samples that were randomly assigned to two groups. Samples in Group 1 were shredded, subdivided, and exposed to either ammonia vapor to increase the pH by ca. 0.3 pH units or HCL vapor to decrease the pH by ca. 0.2 pH units. The samples were then vacuum packaged, stored at 4°C, and analyzed for pH 4.6 and 12% TCA soluble N, apparent viscosity, free oil and water soluble calcium on d 5, 12, 22 and 40. Group 2 samples were exposed to either ammonia vapor to increase the pH by ca. 0.6 pH units or HCL vapor to decrease the pH by ca. 0.25 pH units. The samples were then vacuum packaged, stored at 4°C for 15 d to allow the pH within samples to equilibrate, and then analyzed for TPA hardness and springiness, meltability, and pH 4.6 and 12% TCA soluble N on d 17, 29 and 41. Data were analyzed by ANOVA according to a spilt-plot design. Increasing the pH resulted in significantly higher TPA hardness and apparent viscosity and lower meltability and water soluble calcium values throughout aging. Decreasing the pH had the opposite effects. The rate of increase in pH 4.6 and 12% TCA soluble N during aging was not significantly affected by pH treatment. Thus, differences in cheese pH did not affect proteolysis rates over the ranges studied during 40 d of storage at 4°C. The significant

effects of pH on hardness, meltability and apparent viscosity were presumably caused in part by the observed pH-dependent changes calcium distribution.

Key Words: Mozzarella cheese, Functionality, pH

173 Purchasing and consumption behaviors, attitudes and expectations of Taiwanese urbanites toward cheese. I. M. Tsai* and M. R. McDaniel, *Oregon State University*.

Purchasing and consumption behaviors, attitudes and expectations of Taiwanese urbanites toward cheese were investigated. Four focus groups involving a total of 25 international Taiwanese students were conducted first, followed by a consumer survey in which 793 native Taiwanese urbanites participated. The focus group results provided good predictions and explanations of survey findings. Both studies found that in Taiwan cheese was treated as an ingredient in foods and that subjects lacked knowledge about cheese. Taiwanese consumed cheese at restaurants more frequently than at home. Chinese culture played an important role in subjects?attitudes and behaviors relating to cheese. Sensory, health and usage concerns, packaging, and marketing factors influenced purchasing decisions. A moderate cheese price, low fat, low cholesterol, high calcium, and individually wrapped slices were expected by subjects. Important sensory expectations were the presence of stringiness (appearance and texture) and creaminess (aroma) and the absence of oiliness (appearance and flavor), stickiness (appearance) and bitter and sour aftertaste. Finally, suggestions were offered to assist successful cheese export to the integrated Chinese marketplace, a high potential import market in Pacific Rim Asia.

Key Words: Taiwanese, Cheese consumption, Expectation

174 Gas chromatographic profile of volatiles in cheese induced by different fat globule surface coatings. D. W. Everett*[1], J. Crownshaw[1], A. Ginestet[2], M. Leus[1], and J.-P. Dufour[1], [1]*University of Otago, Dunedin, New Zealand,* [2]*Ecole nationale superieur de biologie applique a la nutrition et l'alimentation, Dijon, France*.

The effect of fat globule coating material on the production of volatile compounds in cheese slurries was examined by solid phase microextraction (SPME) coupled with gas chromatography (GC)-flame ionization detection and mass spectrometry. To prepare the slurries, skim milk was concentrated 2.5× by ultrafiltration. Anhydrous milk fat (40°C) or soy oil (room temperature) was homogenized at 75 MPa with casein, two types of spray-dried commercial buttermilk powder, or freeze-dried milk fat globule membrane (MFGM) isolated by ultracentrifugation of fresh buttermilk. The emulsions or the control cream sample were added to concentrated skim milk to form slurries with a fat to casein ratio of 4:3. *Mucor miehei* rennet protease was added to a second series of otherwise identical slurries. The slurries were cultured with *Lactobacillus bulgaricus* and *Streptococcus thermophilus* at 31°C until pH 5.5 was reached, then stored at 12°C until GC analyses at 30 and 120 d. Duplicate samples were heated at 50°C for 60 min to extract low boiling point compounds in the headspace by adsorption onto carboxen/polydimethylsiloxane SPME fibers.
Standard plate count of the four milk powders used for emulsifying the fat in the slurries was less than 10^3cfu/g at 32°C. Sensory analysis showed that the cream control slurry had a yogurt and cheese aroma with slight lipolytic overtones. The MFGM slurry had a low acid cheese aroma. The two buttermilk and the casein slurries had no detectable cheese aroma. GC analysis showed that 3-hydroxy-2-butanone and octanol were only detectable in the cream control. Compounds not detectable in the cream control, but present in the other slurries, included butanal, 2-heptanol, 2-octenol, 2,4-heptadienal, and 1-octen-3-ol. Compared to the others, the MFGM slurries contained a higher concentration of 2,3-pentadione and 2-heptanol whereas hexenal was not detectable. Benzaldehyde was only detectable in the cream and MFGM slurries. Nonanol was not detectable in the cream or MFGM slurries. The rennet protease had no significant effect on GC peak profiles of homogenized slurries. One factor in the development of cheese volatiles is evidently the nature of the fat globule membrane.

Key Words: Gas Chromatography, Cheese, Flavor

175 Impact of milk preacidification with carbon dioxide on the proteolysis of Cheddar cheese. B. K. Nelson* and D. M. Barbano, *Northeast Dairy Foods Research Center, Cornell University*.

In previous work, milk preacidification with citric and acetic acids increased proteolysis in Mozzarella cheese during storage. Our objective was to preacidify cheese milk, but not have residual acetic or citric acid in the cheese. Half of the pasteurized whole milk was injected with CO_2 in-line after the cooling section of the pasteurizer. The amount of added CO_2 was about 1600 ppm. Cheddar cheese was produced three times with a milled curd process. Make procedure, starter and coagulant addition, and rate of salt application were the same for both treatments. No effect of treatment on cheese moisture (grand mean = 37.25%) was detected, but salt content was higher and calcium lower ($p \leq 0.05$) for the CO_2 treatment. Both pH 4.6 and 12% trichloroacetic acid (TCA) soluble nitrogen (SN) increased with age for both treatments. Cheese made from CO_2 treated milk had a higher ($p \leq 0.05$) amount of pH 4.6 SN as a percentage of TN (e.g., 18.57 vs. 16.41% at 3 mo) indicating a greater extent of primary proteolysis. An increase ($p \leq 0.05$) in TCA SN was also observed (e.g., 8.33 vs. 7.68% at 3 mo). More proteolysis was observed for the CO_2 cheese, in spite of its higher ($p \leq 0.05$) salt-in-the-moisture (5.96 vs. 3.92%). The protein content of the expressible serum (ES) removed from the control and CO_2 curd prior to salting was not different, but the protein content of the ES was higher (3.05 vs 5.67%) for CO_2 cheeses immediately after pressing. No difference in intact casein content (by SDS-PAGE) of the ES from curd prior to salting was detected, but immediately after pressing the amount of intact casein in the ES (removed at 25°C) was higher for the CO_2 cheeses. Several factors may have increased primary proteolysis in the CO_2 cheeses:1) higher chymosin retention due to lower whey draining pH, 2) the lower calcium content in the cheese (2.08 vs. 2.82%), and 3), the higher casein content in the water phase of the cheese providing a greater accessibility of casein to chymosin.

Key Words: Proteolysis, Carbon Dioxide, Cheddar

176 Impact of preacidification of milk with carbon dioxide on composition and yield of Cheddar cheese. B. K. Nelson* and D. M. Barbano, *Notheast Dairy Foods Research Center, Cornell University*.

Work done previously in our laboratory with preacidification of milk for Mozzarella cheese with acetic and citric acids demonstrated that preacidification altered the serum phase of the cheese. The intent of this investigation was to achieve a similar change in the serum phase of the cheese without residual citric or acetic acid in the cheese. Two vats of milled curd Cheddar were made in the same day with and without CO_2 added to the milk. CO_2 was injected in-line after the cooling section of the pasteurizer. The mean level of added CO_2 in the cheese milk was about 1600 ppm. All cheese making conditions were kept the same for the two treatments to determine the effect of added CO_2 on milk component recoveries and yield. Weights of the pasteurized milk, whey, salt whey, and cheese were recorded and the compositions determined for three days of cheese making. The pH of whey at draining was lower for the CO_2 treatment (5.96 vs. 6.35). Total make time (rennet addition to milling at pH 5.3) was shorter for the treatment compared to the control (161 vs.176 min). No differences in cheese moisture and protein content were detected, but cheeses made with CO_2 treatment had lower ($p \leq 0.05$) fat and calcium content and higher salt (2.24 vs. 1.44%) and pH (5.08 vs. 5.00). The amount of salt added per weight of curd was the same for both treatments but the retention of salt was much higher in the CO_2 treatment. No significant difference due to CO_2 was detected in total accountability for fat, protein, calcium and total solids or protein recovery in cheese. There was a lower ($p \leq 0.05$) recovery of fat and calcium in the cheese made from milk with added CO_2 (87.57 vs. 93.08% and 43.56 vs. 59.75%, respectively). The lower recovery of calcium was expected due to the difference in pH of the whey at draining. The decrease in cheese yield efficiency due to higher fat and mineral loss in whey caused by the use of CO_2 was estimated to be 4.4 and 0.3%, respectively.

Key Words: Cheese Yield, Cheddar, Carbon Dioxide

177 Effect of supplemental dietary fish oil and soy oil on production and composition of milk and properties of butter from cows with low and high atherogenic index . G. Bobe*[1], S. Zimmerman[1], E. G. Hammond[1], A. E. Freeman[1], D. H. Kelley[1], J. Dedrick[1], P. A. Porter[2], C. M. Luhman[2], and D. C. Beitz[1], [1]*Iowa State University,* [2]*Land O'Lakes.*

The atherogenic index (AI), defined as AI = [%C12:0 + 4 × %C14:0 + %C16:0] ÷ [Σ%unsaturated fatty acids], characterizes the atherogenicity of dietary fats. Fats with higher AI-values are assumed to be more detrimental to the human health. Previously, we demonstrated that properties of butter differ between cows on the same diet that produce milk fat with high and low AI. Butter from low AI milk fat was more spreadable. The objective of this experiment was to determine whether the difference in properties of butter as well as the production and composition of milk of cows with high and low AI can be affected differently by feeding additional dietary fish oil and soy oil. These diets have been shown previously to decrease the AI of milk fat. A 3×3 latin square design with one replication in summer and one in fall was used. Holstein cows (60-200 days in milk) that produced before the treatment period milk fat with low AI (n=6) and high AI (n=6) were fed for three 3-week feeding periods with either a control diet (3.66% fat) or diets that contained additionally 1% fish oil and 1% soy oil as roasted beans, respectively. Feed intake and milk production was recorded during the third week on each diet. Milk samples were collected twice during the third week and analyzed for milk fat, protein, lactose, total solids, somatic cell count, and fatty acid composition. Furthermore, butter was made and analyzed for penetration distance and creep. Cows preselected for a low AI of milk fat maintained a lower AI than did cows with a high AI ($P \leq 0.05$). Feeding additional soy oil decreased the AI and increased the penetration distance in comparison to the control diet ($P \leq 0.05$), whereas feeding additional fish oil had no significant effect ($P \geq 0.05$). Feeding additional soy oil and fish oil increased numerically the difference in the response of AI and penetration distance, but the interactions were not statistically significant ($P \geq 0.05$). Dry matter intake, milk production, and milk composition were not affected by AI or diet ($P \geq 0.05$). We conclude that feeding additional soy oil and selecting cows with low AI act additively to produce a lower saturated milkfat that can be used to produce a more spreadable butter.

Key Words: Atherogenicity, Butter, Soy oil

Forages & Pastures: Silages, forage composition

178 Evaluating chemical characteristics of mixed corn plant and tomato pomace silage using experimental silos. R. Tahmasbi[1], B. Saremi*[2], and A. Naserian[2], [1]*Dasht dairy farm, Neyshabour, khorasan, Iran.,* [2]*Ferdowsi university of Mashhad, khorasan, Iran.*.

The aim of this study was to compare chemical characteristics of mixed silages (corn plant with various amounts of wet tomato pomace) and to examine whether corn plant will ferment properly with various amount of wet tomato pomace or not. Whole corn plants were chopped from a single field and mixed with 0(T1), 7.5(T2), 15(T3) and 100(T4)% (DM basis) wet tomato pomace and ensiled in 5-gallon plastic containers. The silos were packed with a hydraulic press, which permitted all silages to be made at similar densities. All containers were opened 60 days later and dry matter (DM), pH, ammoniated nitrogen (N-NH3), crude protein (CP), ASH, calcium (Ca), phosphorus (P), Acid detergent fiber (ADF), Neutral detergent fiber (NDF) were measured. Tomato pomace used in this experiment had 40.1±6.13%(DM-basis) seed. Data were analyzed using General Linear Models procedures of SAS v6.12 for ANOVA to evaluate differences among experimental groups. The design was completely randomized (equal replicates). Means were compared with Duncan test. Data showed that there was no difference for DM, NDF, Ca and P among treatments (P = 0.36, 0.09, 0.15 and 0.38 respectively). However, CP, Ash, ADF (P < 0.0001) and pH (P < 0.02) showed significant differences among treatments. Based on the results of this experiment, it seems that tomato pomace could increase crude protein of silage significantly without any reduction in the quality of silage fermentation and could reduce pH of silage to some extent because of its high concentration of organic acids.

Items	T1	T2	T3	T4	SEM
DM%	28.62^a	27.80^a	27.87^a	24.9^a	0.88
CP%	8.47^c	9.73^b	10.5^b	19.4^a	0.18
Ash%	7.63^a	7.55^a	7.38^a	5^b	0.18
Ca%	1.14^a	1.16^a	1.04^a	0.92^a	0.04
P%	0.48^a	0.55^a	0.30^a	0.30^a	0.07
ADF%	33^b	34^b	32^b	49.5^a	0.45
NDF%	61^{ab}	61.25^{ab}	57.5^b	63^a	0.82
pH	3.86^b	3.89^b	3.87^b	3.99^a	0.02
N-NH3(mg/dl)	10.32^a	10.51^a	10.43^a	3.11^b	0.05

Key Words: Tomato pomace, Corn silage, Experimental Silos

179 Chemical characteristics of alfalfa silage treated with urea and sulfuric acid. E. Khafipour, M. D. Mesgaran*, and F. E. Shahroudi, *Ferdowsi University of Mashhad,Mashhad,IRAN.*

This study was conducted to determine whether the addition of urea and/or sulfuric acid to alfalfa before ensiling would alter fermentation patterns. Second cut alfalfa (about 27% DM) was harvested, left for 8 h untill got 33% DM, then ensiled with urea (0.0 and 1% of DM) and/or sulfuric acid (0.0,0.3,0.9,1.5 and 2.1% of DM) in a complete randomized design, using small laboratory silos (4 silos per each treatment). The Chemical composition of silages was determined by the standard procedures, 45 days after ensiling. pH and N-NH3 were determined in the each silage extraction, CP and NPN in dry samples. Alfalfa silages containing urea, compared with the others, had significantly higher pH (4.28 vs 4), CP (205.9 vs 177.9 g/kg, DM) and NPN (18.7 vs 15.8 g/kg, DM)for 0.0,p< 0.05. Using sulfuric acid caused to decrease pH(4.6 vs 3.56)and N-NH3 (13.56 vs 8.18 mg/dl), but increased CP (183.4 vs 197.5g/kg) for 0.0 and 2.1% sulfuric acid respectively(p< 0.05). It has been indicated that urea, as an additive, for alfalfa silage, increased pH,CP and NPN. The effects of urea are relevant to its chemical composition as a source of nitrogen; On the other hand urea reduced heating,discoloration and visible molds in silage. Simultaneously use of urea and sulfuric acid decreased pH to the optimal range. It seems that positive effect of acid on CP content is relevant to its prohibitive function on proteins degradability in silage. Reduction in N-NH3 content of the acid treated silages is another reason for prohibitory function of acid on proteins degradation to soluble nitrogen and increasing of protein efficiency in silage. So, it has concluded that sulfuric acid can be used as a good preservative in alfalfa silage.

Key Words: Alfalfa silage, Additives, Chemical composition

180 Effect of hybrid, stage of maturity and use of silage innoculants on dry matter yield, nutritional value and digestibility of corn silage. L. O. Burciaga-Robles*, O. Ruiz-Barrera, C. Arzola-Alvarez, A. Grado-Ahuir, and Y. Castillo, *Universidad Autónoma de Chihuahua, Facultad de Zootecnia. Secretaría de Posgrado e Investigación.*

Two corn hybrids (Golden Harvest EX313 and H216) selected for high grain and high DM yield were harvested at two different stages of maturity (1: one third milkline or 2: two third of the milkline from the top of the kernel). The objective of this experiment was to evaluate the corn hybrids to determine potential differences in nutritive value of whole plant corn silage. Hybrids were grown in 2 plots of 5 Ha each in Bachniva, Chihuahua, Mexico on April 2001, harvested, and translated to the University Animal Nutrition Research Laboraory for evaluation. Samples of the plots were ensiled with or without corn silage inoculants (Control, Sill All® , Bio Sile®, and Urea) on 2 kg lab scale silos. Whole plant samples of EX313 had a lower (P < 0.05) percentage of DM content on the early harvest date, but no differences (P > 0.05) were detected on the late harvest date. Silage made from EX313 had a lower (P < 0.05) pH and CP. Silage made from H216 had lower values (P < 0.05) of lignin , IVDMD , and lactic acid. No significant differences were found on NDF, ADF, hemicelulose , or cellulose. Inoculation drastically affected the pH and lactic acid content of corn silage. There was no difference (P > 0.05) between Control, Sill All, and Bio Sile on pH values for early and late harvest. The pH values for Urea-inoculated corn silage were higher (P < 0.05) for early and late harvest for EX313 and H216. Also, the lactic acid content was higher (P < 0.05) for silage inoculated with Sill All versus the other treatments for both hybrids and