Graduate Student Competition: ADSA-ASAS Northeastern Branch

117 The effects of damaging ears of corn in the field and the use of potassium sorbate on the fermentation, aerobic stability, and production of mycotoxins in corn silage. R. S. Teller*[1], R. J. Schmidt[1], B. M. Moulder[1], C. N. Mulrooney[1], V. R. Veenema[1], L. Kung, Jr.[1], and L. S. Whitlow[2], [1]*University of Delaware*, *Newark*, [2]*North Carolina State University*, *Raleigh*.

We studied the effects of damaging ears of corn in the field and the use of potassium sorbate (PS) on silage fermentation and the production of mycotoxins in whole plant corn. Ears of corn were left alone or were slashed, 27 d or 9 d prior to harvest, exposing damaged kernels to the environment. Whole plants were harvested at 36% DM and ensiled in vacuum-sealed bags (6 and 18 d) and 20-L laboratory silos (95 d) in a 2 × 3 × 3 factorial arrangement of treatments. Factors were no additive or 0.1% (fresh wt.) PS, time of damaging the ears (27 d, 9 d, or no damage) relative to harvest, and d of fermentation. After 95 d of ensiling, silages treated with PS had a greater DM recovery (100 vs. 96% $P < 0.05$), fewer yeasts (0.28 vs. 4.89 $\log_{10}$ cfu/g, $P < 0.05$) and molds (1.18 vs. 3.90 $\log_{10}$ cfu/g, $P < 0.05$) and took longer to heat after exposure to air (157 vs. 35 h, $P < 0.05$) than silage without the additive. At harvest, concentrations of deoxynivalenol (> 20,000 ppb vs. < 1500 ppb, $P < 0.05$) and fumonisin B1 (FB1; 12.5 ppm vs. < 1.5 ppm, $P < 0.05$) were greatest in fresh forage that had ears damaged at 27 d. Concentrations of mycotoxins remained relatively constant throughout the ensiling period (0, 6, 18 and 95 d) and after 48 h of aerobic spoilage with the exceptions that the concentration of T2 trichothecenes were greater after 95 d of ensiling and the concentration of FB1 increased after 48 h exposure to air ($P < 0.05$). The addition of PS, at the time of ensiling, decreased the numbers of yeasts and molds and increased the aerobic stability of silage but had no effect on the concentrations of mycotoxins. Prolonged damage of ears in the field resulted in the production of mycotoxins. Aerobic deterioration of silage may also lead to production of specific mycotoxins.

Key Words: Potassium sorbate, Mycotoxins, Aerobic stability

118 Effects of energy status, breed and plasma metabolites on new intramammary infections in periparturient Holstein and Jersey dairy cows during the transition period. P. Rezamand*[1], S. M. Andrew[1], K. M. Moyes[2], and R. M. Clark[1], [1]*University of Connecticut*, *Storrs*, [2]*University of Illinois*, *Urbana*.

The objectives of this study were to determine if plasma concentrations of lipid metabolites and lipid-soluble vitamins differed for Holstein and Jersey cows that were selected for new intramammary infection (new IMI) status and to determine factors affecting the risk for developing a new IMI during the transition period. Using a subset of cows from a larger study, 10 Holstein and 10 Jersey multiparous cows, of which 5 Holstein and 4 Jersey cows had developed a new IMI, were fed similar rations from dry-off (wk -9) through 8 wk postpartum. Lacteal secretions collected aseptically at wk -9, 1, 4, and 8 were analyzed for mastitis pathogens. A new IMI was defined if the pathogen isolated postpartum differed from wk -9 culture results. Body condition score (BCS), plasma concentrations of cholesterol, phospholipids, triacylglycerols, α-tocopherol, β-carotene and retinol were measured at wk -2, 1, 2, 4, and 8. Breed differences were analyzed using the repeated measures of ANOVA. Logistic regression was used to determine significant factors associated with an increased risk for a new IMI. Jersey cows had greater plasma retinol (1.46 vs. 1.25 μg/ml, P = 0.009) and β-carotene (6.41 vs. 4.42 μg/ml, P = 0.005) concentrations compared to Holstein cows, respectively. Plasma cholesterol concentrations were significantly greater for Holstein cows at wk 4 and 8 postpartum compared to Jersey cows (P < 0.01). Cows that had developed a new IMI had a significant delay in recovery of postpartum plasma β-carotene to prepartum levels (P < 0.01) compared to cows which did not develop a new IMI. A greater BCS at wk -9 was associated with an increased risk for developing a new IMI for both breeds (P = 0.03). Holstein and Jersey cows differed in plasma concentrations of several lipid metabolites and lipid-soluble vitamins. However, an increase in prepartum BCS similarly increased the risk for developing a new IMI postpartum for both breeds.

Key Words: Retinol, β-carotene, New intramammary infection

119 Effect of ruminally degraded protein source on production performance in Holstein cows. A. B. Peterson*[1], R. L. Baldwin, VI[2], and R. A. Kohn[1], [1]*University of Maryland*, *College Park*, [2]*USDA-ARS*, *Beltsville, MD*.

To evaluate the effect of two ruminally degraded protein (**RPD**) types (amino acids vs. non-protein N) eight early lactation Holstein cows were arranged in a repeated 4x4 Latin square design balanced for carryover effects with 21 d periods. All diets were isoenergetic (1.71 Mcal/kg) and had the same RUP content (5.6%). Cows were fed either a base diet containing 12.8% CP or one of three treatment diets containing 16% CP supplemented with urea, casein or both. Dry matter intake (**DMI**) was lowest for cows fed the base diet (16.8 kg/d) while cows fed the urea and urea/casein diets had the highest DMI at 18.8 and 18.6 kg/d, respectively ($P < 0.05$). Cows fed the casein diet consumed less than cows fed the urea diet (18.2 kg/d; $P < 0.05$) however this cannot be explained by apparent dry matter or NDF digestibility as they were not affected. Milk yield averaged 29.0 kg/d (SEM=2.6) for cows fed the base diet compared to cows fed the urea/casein diet which averaged 33.9 kg/d ($P < 0.05$). Cows fed the urea and casein diets yielded 32.9 and 32.6 kg/d of milk, respectively, which were not different from each other but were higher than the base diet and lower than the urea/casein diet ($P < 0.05$). Milk fat and protein percentages did not differ among treatments. Milk urea nitrogen (**MUN**) was lowest for cows fed the base diet averaging 6.6 mg/dl ($P < 0.05$) while MUN from cows fed the other diets averaged 12.5 mg/dl and did not differ from each other. Though the energy content of the diets was the same, the urea/casein diet may have provided a better combination of available ammonia and amino acids to the rumen microbes which may have increased microbial yield and therefore milk production. The type of RDP affects DMI and milk yield as cows may require both readily available amino acids as well as a source of ammonia for maximum yield.

Key Words: Rumen degraded protein, Milk yield, Amino acid

120 Effect of forage processing and corn particle size on milk production and composition, and nutrient digestibility for high producing Holstein dairy cows. N. E. Brown*, V. A. Ishler, Y.-H. Chung, T. W. Cassidy, K. S. Hyler, and G. A. Varga, *Pennsylvania State University*, *University Park*.

A replicated 4 X 4 Latin Square design experiment was conducted to evaluate either grass silage (GS) or grass hay (GH) with fine ground or cracked corn in diets for lactating dairy cows. One replicate contained four rumen cannulated cows. Cows averaged 76 ± 11 d in milk. Diets were formulated to contain 50% forage on a DM basis, (50% GH or GS and 50% corn silage). Within each forage source either fine ground corn or coarse corn was provided. The diets were formulated to contain 16% CP, 32 % NDF, and 1.64 NEL Mcal/kg DM. Each period lasted 28 d, the final 7 d were for sample collection of milk yield and components, rumen measures and fecal output. Dry matter intake (DMI) was lower (P<.01) for cows fed GH diets (20 vs. 23 kg/d), while amount of NDF consumed did not differ across diets. Milk yield (37.2 ± 1.37 kg/d) and fat corrected milk yield (FCM; 36.7 ± 3.3 kg/d) did not differ. Dry matter efficiency (FCM/DMI) was higher (P=.08) for cows fed GH vs. GS diets (1.92 vs. 1.54). Dry matter digestibility was higher for (P<.03) GS diets (54.7 vs. 48.4%), however no differences were observed for NDF digestibility across diets (37.8% ± 3.36). Fecal output (% DM basis) was highest (P<.02) for the GH diet with coarse corn compared to the other three diets (13.8 vs. 9.85 kg/d). Numerical trends were observed for ruminal contents (as is basis) such that cows provided the GS diets had greater amounts of ruminal digesta than cows provided GH diets (90.4 vs. 75.6 kg). Propionic acid concentration was higher (P<.01) for cows provided diets containing fine ground corn vs. cracked corn. Higher concentrations of total VFA and isoacids were observed for diets containing GS vs. GH. Opportunities exist to provide greater quantities of GH in lactating cow diets without compromising milk volume or components and enhancing DM efficiency provided that ruminal fermentability of carbohydrates are matched for the forage utilized.

Key Words: Grass silage, Alfalfa silage

121 Lactoferrin addition to an intensified milk replacer feeding regimen. K. Cowles*, R. White, N. Whitehouse, and P. Erickson, *University of New Hampshire*, *Durham*.

The objective of this study was to evaluate lactoferrin (L) addition to milk replacer (MR) on DMI, growth, and days medicated. Thirty three Holstein heifer calves were assigned to 4 treatments in a 2x2 factorial arrangement of treatments in a randomized complete block design. Treatments were: 586 g conventional MR (20% CP/20% fat) ±1g L daily (C1, C0 n=9, 8) or high protein MR (28% CP/20% fat) fed on an ME basis, 0.2 Mcal/kg $BW^{0.75}$, and from d10 to d42, at 0.27 Mcal/kg $BW^{0.75}$, ± 1g L (H1, H0 n=8, 8). Calves were fed starter (25 % CP) in 227.5 g increments beginning on d 2 and had free access to water. Weaning was as follows: 1X feeding on d 42 for 7 d (weaning), on d 49 calves were weaned. Calves were on the study for 14 d postweaning. DMI was determined daily. Growth measurements were taken weekly. Calves on C treatments ate more starter preweaning (402 g vs. 170 g, $P \leq 0.001$) weaning (1256 g vs. 635 g, $P \leq 0.001$), and postweaning (1927 g vs. 1585 g, $P \leq 0.001$). Preweaning, H calves had higher DMI (1251 g vs. 951 g, $P \leq 0.001$). Weights of H calves were greater at weaning (78 kg vs. 74 kg, $P \leq 0.001$). H calves had greater ADG preweaning (753 g/d vs. 464 g/d, $P \leq 0.001$) and overall (577 g/d vs. 497 g/d, $P=0.03$). H calves were more efficient preweaning (0.59 vs. 0.49, $P=0.003$), but C calves were more efficient during weaning (0.44 vs. 0.03, $P=0.04$). H calves had greater hip heights during weaning (94.9 cm vs. 91.9 cm, $P=0.04$) and postweaning (96 cm vs. 94 cm, $P=0.04$). H calves had greater heart girths preweaning (90 cm vs. 86 cm, $P=0.002$), weaning (98 cm vs. 93 cm, $P=0.001$) and postweaning (100 cm vs. 96 cm, $P=0.05$). Days medicated were higher preweaning (2.7 d vs. 1.4 d, $P=0.02$) and overall (3.2 d vs. 1.7 d, $P=0.05$) for calves fed H. There were no effects of L on any experimental variable. H calves consumed less starter but had higher ADG overall. H calves had larger frames and greater BW than C calves.

Key Words: Lactoferrin, Calves, Milk replacer

ADSA-SAD-Dairy Production (Undergraduate)

122 Shorter dry periods: A different approach to dry cow management. C. Lilly*, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

The dry period length of 45-60 days has been much debated. This standard recommendation of 60 days was not based on research field trials but by analyzing DHIA records. When these records were analyzed the majority of farms used were already managing for a 60-day dry period. Under this system cows that fell into the short or reduced dry period were those whose dry period was compromised by abortion, incorrectly recorded calving dates, or calving unusually early. These factors may reduce a cow's performance in the lactation that follows. With cows producing more today than years ago, cows are being dried off producing more milk per day. Persistency of the lactation has also been prolonged with the use of bST. Recent studies are showing that a shorter dry period is possible. Wisconsin research examined six studies that looked at dry period length. Four of six studies reported no significant difference in milk production of cows with a short dry period as compared to cows with a long dry period. However, none of the studies included milk produced by short dry period cows during their extra days in the milking herd. The short dry period cows were equal to or greater in fat and protein production than the standard dry period cows. A Florida study reported short dry period cows lost 5% of their body score as compared to 11% of the standard dry period cows. Shorter dry periods would simplify feeding management as a far off dry group would not be required. This would help an expanding herd compensate for crowded dry cow facilities and would require only one ration to be formulated. In addition dry cows would only need to adjust rumen mircoflora twice as compared to a herd managed for a far off dry group and a close-up group. Under the right management conditions, shorter dry periods should be considered.

Key Words: Dry Period

123 Manure as Energy: Converting an abundant waste product to a beneficial energy source. A. Bush*, *University of Kentucky*, *Lexington*.

A growing number of dairy farms are incorporating methane gas recovery as a secondary source of income, as well as a practical means of waste disposal. After manure is washed form the parlor and freestall barns, it is fed into a digester that can recover the methane produced when bacteria break down the manure. The methane can be used to fuel a combustion engine for electrical energy, heat water, or be burned off and released as carbon dioxide. A dairy milking 300 cows can produce enough power to offset energy costs for its own operations, and sell the excess to a local electric provider. Because manure is broken down by methanogenic bacteria, the digester is held at 95-105° F. This temperature is high enough to kill many pathogens and weed seeds. This means any digested manure applied as fertilizer will be less hazardous to water sources, contain fewer active weed seeds, and could retain more nitrogen than typical manure. Anaerobic manure digestion also reduces odor by 97% and prevents the release of methane gas into the atmosphere. Installation of the system is still rather costly, but with a 5-10 year payoff, and thousands of dollars available in state and federal grants, methane gas recovery is something to be considered by the dairy industry.

124 Accelerated calf growth: You make the call. T. Bridges* and C. Williams, *Louisiana State University*, *Baton Rouge*.

The goal of a successful heifer rearing program is to provide the opportunity for the animals to develop full genetic potential for milk production at the desired age with minimal expense. The first and most important step is the development of the young calf. On most farms, calves receive colostrum for the first 24 to 48 hours, followed by milk replacer or whole milk. Conventional feeding programs typically consist of feeding 1 pound of milk replacer containing 20% protein and 20% fat daily along with free access to calf starter. In recent years, a new feeding system has become the buzzword in calf rearing programs. Accelerated growth programs, or intensified early nutrition, have been introduced to increase weight gain in neonatal calves. The goal of this feeding system is to capitalize on rapid early lean growth potential of young calves and allow greater lean growth without fattening. Accelerated feeding programs advocate feeding milk replacers containing 25 to 30% protein and 20% fat at the rate of 2 to 2.5 pounds per day. Because of potential problems, an accelerated feeding system must be carefully examined prior to implementation. Potential advantages of this program include decreased time to breeding and first calving, increased efficiency of body size gain, improved health and immune system, and enhanced milk production ability at calving. Conversely, disadvantages of this program include increased costs during the milk feeding period, increased scouring and rough-looking calves, delayed rumen development, and increased management. Dairies with intensive management systems would be the farms most likely to consider this system. If raising bigger, taller, longer heifers is the goal, then accelerated feeding programs make sense. However, if goals are economic and centered more toward animal health, then accelerated feeding programs must be carefully evaluated. In deciding whether to implement the intensified early nutrition programs, dairy producers must consider their goals. In a rapidly evolving industry, new management strategies for calf rearing continually appear. Dairy producers must make the call as to whether an accelerated calf feeding program is right for them.

Key Words: Calves, Growth, Accelerated