tended to be less effective (68% and 72% responders, respectively)(P≤.1). It appears that dairy producers can realize a 40% savings in PGF cost by injecting 60% of the prescribed dose via the IRF in lactating cows without decreasing the rate of luteolysis.

Acknowledgements: We express appreciation to Vanessa Davis, Warren Bingham and Richard Miller for assistance with the cattle.

Key Words: Cattle, Luteolysis, Prostaglandin

110 Effect of ground canola seed on milk production and composition, and blood metabolites of lactating Holstein cows. F. M. Lewis*, D. R. Bae, M. S. Laubach, W. L. Keller, D. E. Schimek, and C. S. Park, *North Dakota State University*, *Fargo*.

The objective of this study was to examine the effect of ground canola seed on milk production and composition, and blood metabolites of early lactation cows. Twenty-four primiparous and multiparous Holstein cows (588 ± 48 kg body weight; 33 ± 21 d in milk) were assigned to one of two treatments: with or without canola seed. Ground canola seed were blended into the treatment diet as a total mixed ration with ca. 15% of total ration dry matter as ground canola seed which contained ca. 37% lipid. Diets were comprised of corn silage, alfalfa haylage, beet pulp, and concentrate mixture and fed ad libitum as a total mixed ration. Corn and barley in the control diet was replaced with ground canola seed in the treatment diet. Twelve cows were housed in tie stalls, and twelve cows were housed in a pen with calen gates where they were fed individually for 12 wk. Cows were milked twice daily. Milk yield and dry matter intake were recorded daily. Blood and milk samples were collected at 3-wk intervals. Body weight and body condition scores were also recorded at 3-wk intervals. Data were analyzed using the general linear models procedure of SAS. Dry matter intake, body weight, and body condition scores were not affected by treatment ($P > 0.05$). Milk production and composition were not different between treatments ($P > 0.05$). However, cows fed canola seed had higher serum concentrations of nonesterified fatty acids (109.2 vs. 159.1 μEq/L; $P < 0.01$) and triglycerides (11.6 vs. 14.1 mg/dL; $P < 0.01$) compared to that of control cows. Feeding ground canola seed at 15% of the diet dry matter (ca. 3.2 kg/d) increased serum nonesterified fatty acids and triglycerides without affecting milk production and composition.

Key Words: Canola Seed, Milk Production, Dairy Cow

111 Case study of prevention and therapy strategies in a high somatic cell count herd. L. Schultz* and L. Timms, *Iowa State University*, *Ames*.

This case study involves a 60 cow dairy whose DHIA average somatic cell count (SCC) was > 750,000 cells/ml (linear scores 4.3-5.2) for eight months prior to study initiation. Initial study DHI SCC showed 948,000 herd average SCC with 56% of the cows >300,000 (36% were >1,130,000). Milk from all quarters of all cows was individually evaluated at milking time (California Mastitis Test and aseptic samples taken for bacteriological analysis initially and 4 weeks later). Combined bacteriological analyses showed: Uninfected: 27 cows(C), 159 quarters(Q); Staphylococcus aureus: 18C, 35Q; Streptococcus dysgalactiae: 14C, 25Q; Strep. alpha hemolytic: 2C, 3Q; Strep. uberis: 1C, 1Q. Following initial culture results, a new milking order was immediately established to stop infection spread. Uninfected cows were milked first, followed by Strep-infected cows, with S. aureus cows milked last. Only one new infection (based on DHI-SCC) occurred before the therapy trial began 8 weeks later. Herd visit evaluations showed excellent cow cleanliness (score1.1), leg score (1.3), body condition score (~3), tie and free stall cleanliness and comfort, and very good milking equipment performance and teat health. Milking procedures evaluation revealed inadequate udder stimulation, no drying of teats, and improper prep lag timing. Based on these observations, corrective milking procedures were instituted. A targeted therapy trial was conducted based on antibiotic sensitivity tests. Nine Strep. cows (20 quarters) were treated using recommended pirlimycin therapy (one 10 ml plastet 50 mg pirlimycin HCl (Pirsue, Pfizer, Inc.) at 24-hour intervals for two days). Eleven S. aureus cows (19 quarters) were treated using an extended pirlimycin therapy (one plastet every 24 hours for eight days). 65% of treated cows had a SCC reduction with average change of -521,000 for all treated cows 20 days post treatment. DHI SCC was 484,000 (linear score 4.0), with 13% of the herd having a SCC > 1,130,000. Follow-up cultures to assess true bacteriological cure will be conducted ~ 45 days post therapy (mid Feb. 2005), with long term strategies based on results.

Key Words: Somatic Cell Count, Mastitis, Pirlimycin

Graduate Student Competition: ADSA Southern Branch

112 Use of formaldehyde-treated protein capsules as a means to protect conjugated linoleic acid from ruminal biohydrogenation. P. J. Myers*, S. E. Ellis, K. J. L. Burg, and T. C. Jenkins, *Clemson University*, *Clemson, SC*.

Improved technologies for protecting dietary lipids from ruminal biohydrogenation are needed to take advantage of the benefits of unsaturated fatty acids (FA), such as improved reproductive performance or altering milk composition to meet consumer preferences. This study investigates a novel method for protecting FA by their containment within porcine-based protein capsules treated with hydroalcoholic solutions of formaldehyde. The treatment consists of washing capsules in 5% formaldehyde solution, rinsing in ethanol and drying. Protection was assessed by placing capsules in nylon bags, incubating in cultures of mixed ruminal microorganisms for 24 hours, and then analyzing for FA content by gas chromatography. The capsules (n=10) were loaded with 59±1 mg of a conjugated linoleic acid (CLA) supplement containing 12.3 ± 0.01% oleic acid, and 74.2 ± 0.12% total CLA consisting of three isomers: (A) 36 ± 0.1% *cis*-9, *trans*-11, (B) 35.7 ± 0.1% *trans*-10, *cis*-12, and (C) 2.54 ± 0.03% *trans*-9, *trans*-11. Treated capsules (n=5) were intact after incubation (opposed to untreated) with an average weight loss of 4.0 ± 2.3%. After incubation, the capsules (n=25) contained similar oleic acid (12.4 ± 0.1%) and total CLA (69.7 ± 1.1%) concentrations as before incubation. However, a shift occurred in proportions of individual CLA isomers (18.4 ± 2.0% A, 18.1 ± 1.9% B, and 33.1 ± 3.1% C) indicating isomerization. Treated capsules (n=10) were then suspended in buffer alone and the final CLA composition (35.8 ± 0.7% A, 35.4 ± 0.7% B, and 3.5 ± 0.4% C) showed no isomerization. Similarly, no isomerization was detected when treated capsules were suspended in clarified ruminal fluid (microorganisms removed by centrifugation), or in ruminal fluid boiled for 10 minutes to denature enzymes. This study shows that formaldehyde-treated protein capsules substantially reduces FA loss due to biohydrogenation. Isomerization was observed in treated capsules, but only in the presence of viable microorganisms. Encapsulation in protected capsules therefore shows promise for the development and delivery of high-quality rumen-bypass supplements.

Key Words: CLA, Rumen, Biohydrogenation

113 Effect of combining GnRH and ECP with a CIDR-$PGF_{2\alpha}$ protocol on pregnancy rates in Holstein Heifers submitted to timed AI. J. L. Fain*, W. M. Graves, J. M. Haslett, S. C. Nickerson, and J. K. Bernard, *University of Georgia*, *Athens*.

Our objective was to determine if incorporation of GnRH and ECP into the EAZI-BREED CIDR-$PGF_{2\alpha}$ protocol would increase pregnancy rates of dairy heifers using timed artificial insemination (TAI). This study was conducted over

a 6-mo period at The University of Georgia Teaching Dairy in Athens. Forty Holstein heifers with average age of 16 mo were randomly allocated to one of two treatment groups. In Treatment 1, 20 heifers were synchronized by: 100 µg GnRH (-9 d), CIDR (1.38g progesterone) (-9 d), 25 mg $PGF_{2\alpha}$ (-3 d), 1 mg ECP (-2 d), CIDR removal (-2 d), 100 µ GnRH (0 d), and TAI (0 d), (OverSynch). A second group of 20 heifers (Treatment 2) were synchronized by: CIDR (1.38g progesterone) (-9 d), 25 mg $PGF_{2\alpha}$ (-3 d), CIDR removal (-2 d), and TAI (0 d). Treatment 2 is the recommended CIDR protocol with a TAI. Upon CIDR removal, retention rates and discharges were recorded. Estrus activity was determined using Estrus Alerts (Universal Cooperatives, Eagan, MN) applied on -3 d. Timed AI occurred 48h after CIDR removal. Pregnancy diagnosis was conducted by ultrasonography at 35d post AI. For both treatments, CIDR retention rate was 100% and discharge was minimal with no significant effect on pregnancy rate ($P > 0.05$). Pregnancy rates for heifers synchronized by OverSynch (Trt 1) was 9 of 20 (45%) and similar to those in the heifers synchronized with the standard CIDR protocol (Trt 2) with 11 of 20 (55%). Pregnancy rates were not significantly different between treatments ($P > 0.05$). In Treatment 1, 16 of 20 (80%) heifers had Estrus Alerts that were all or partially rubbed while only 11 of 20 (55%) were observed in Treatment 2. Additionally, 55% of the Estrus Alerts on heifers in Trt 1 were completely rubbed while only 15% were in Trt 2. Signs of estrus synchronization through visual appraisal of Estrus Alerts were significantly higher in the OverSynched (Trt 1) heifers ($P < 0.05$). Although the OverSynch treatment did not increase pregnancy rate with a TAI protocol, it did significantly increase estrus activity prior to TAI.

Key Words: Dairy Heifer, Estrus Synchronization, Timed Artificial Insemination

114 Evaluation of immunological differences among Jersey, Holstein, and crossbred calves. J. V. Ware*[1], S. T. Franklin[1], A. J. McAllister[1], J. A. Jackson[1], K. I. Meek[1], and B. G. Cassell[2], [1]*University of Kentucky*, *Lexington*, [2]*Virginia Polytechnic Institute and State University*, *Blacksburg*.

Previous studies reported greater survival of crossbred dairy calves compared to purebred dairy calves. The objective of this study was to investigate immunological differences among crossbred groups [Holstein x Jersey (HJ) and Jersey x Holstein (JH)] and purebred groups [Holstein x Holstein (HH) and Jersey x Jersey (JJ)] as a possible explanation for differences in survival. Holstein and Jersey cows were bred using mixed semen (Holstein and Jersey). Calves (n = 68) were removed from their dams prior to nursing and fed pooled colostrum based on birth weight. Blood samples were collected on d 0, 1, 7, 14, 21, 28, 35, and 42 and analyzed for serum protein concentrations and white blood cell counts. Percentages of CD2, CD4, CD8, and γδ T-cells, B-cells, and monocytes were determined by flow cytometry using blood samples from d 0, 1, 7, 14, 28, and 42. Leukocyte proportions and white blood cell counts were used to calculate numbers for each cell type. Numbers are reported as cells/mL x 10^{-6}. Daily fecal scores were obtained to indicate general health. Serum protein concentrations were higher ($P < 0.01$) for JH (5.73 ± 0.07 g/dL) compared with HH (5.43 ± 0.05 g/dL) and HJ (5.54 ± 0.06 g/dL). Numbers of B-cells, CD2, CD4, CD8 and γδ T-cells differed ($P < 0.01$) among purebred and crossbred groups. Numbers of B-cells were highest ($P < 0.05$) for JH (0.97 ± 0.06) compared to HH, HJ, and JJ (0.58 ± 0.05, 0.67 ± 0.06, and 0.71 ± 0.09, respectively). Fecal scores were greater ($P < 0.02$) for HH (1.75 ± 0.06) compared to JH (1.45 ± 0.07). White blood cell counts and monocyte numbers did not differ among treatments. All parameters measured varied ($P < 0.001$) over time. In general, JH calves had higher serum protein concentrations and B-cell numbers and lower fecal scores compared to HH calves, with HJ and JJ being intermediate. These results may indicate better health of JH calves, possibly contributing to greater survival of crossbred calves compared with purebred Holsteins.

Key Words: Immune, Calves, Crossbred

115 Effect of supplemental energy source on the performance of lactating dairy cows fed diets based on sorghum and ryegrass silage. J. Boyd* and J. Bernard, *The University of Georgia*, *Athens*.

Two trials were conducted to evaluate the effect of energy supplement source and forage combination on performance, ruminal fermentation, and apparent digestibility. In trial 1, 41 Holstein cows were fed a standardized diet for 2-wk and then assigned randomly to one of 6 treatments for the following 5 wk. Treatments were arranged as a 2 x 3 factorial and included two combinations of sorghum and ryegrass silage (50:50 or 75:25) supplemented with one of three energy sources (finely ground corn [GC], hominy [H], or a 50:50 blend of GC and H [B]). There were no differences in DMI or milk yield observed among treatments. Milk protein percentage was higher (*P<0.004*) for diets based on 50:50 compared with 75:25 when supplemented with B. No differences were observed in concentrations of milk protein, lactose, or SNF. Yield of milk fat (*P<0.05*), and energy-corrected-milk (*P<0.03*), and efficiency of milk production (*P<0.02*) were higher for cows fed diets based on 75:25 than 50:50. In trial 2, three ruminally cannulated Jersey cows were used in a 3 x 3 Latin square trial to determine the effects of energy supplement source (GC, H, or B) to the diet based on 50:50 ryegrass and sorghum silage. Ruminal pH (*P<0.06*) and molar proportions of propionate (*P<0.02*) were higher and ammonia (*P<0.04*) and molar proportions of butyrate (*P<0.002*) were lower for cows supplemented with B compared with GC and H. No differences were observed in total VFA or molar proportions of acetate, isovalerate, and valerate among supplements. Nutrient intake and total tract digestibility and ruminal pH, ammonia, and proportions of VFA were similar among energy supplements. Results of these trials indicate that a higher proportion of forage should be provided by sorghum silage than ryegrass silage when these forages are fed together. Source of energy supplement did not alter animal performance although ruminal fermentation was altered.

Key Words: Silage, Hominy, Ruminal Fermentation

116 Effects of starch sources on nitrogen capture in dairy cows on pasture. A. M. Gehman*, J. A. Bertrand, T. C. Jenkins, and B. W. Pinkerton, *Clemson University*, *Clemson, SC*.

The objective of this experiment was to determine if feeding starch sources more rapidly degraded than corn affected N utilization in dairy cows grazing ryegrass pasture and, therefore, milk yield and components. Fifteen cows were used in a 3x3 Latin square design with 3 21-d periods. Treatments were grain supplements based on: (1) corn (C), (2) barley (B), or (3) citrus pulp (CP). For B and CP, diet composition was the same as C except half the ground corn was replaced with rolled barley and molasses or citrus pulp and molasses. Cows were fed the supplement after milking at 0700 h and 1600 h and grazed from 0830 h to 1530 h and 1730 h to 0630 h. Milk samples were collected on d 18 to 20 and analyzed for total fat, fatty acids, protein, and milk urea nitrogen (MUN). Milk yield was recorded daily, and 3.5% fat corrected milk (FCM) and energy corrected milk (ECM) were calculated. For milk fatty acids, there were no significant differences ($P > 0.05$) in C14:0, C16:0, C18:0, C18:1, or *cis*-9, *trans*-11 CLA. Inclusion of citrus pulp in the supplement for grazing dairy cows decreased milk protein % as compared to the all-corn supplement but did not affect nitrogen capture, milk yield or other components. Addition of barley increased MUN levels as compared to corn but did not affect milk yield or components.

	C	B	CP	SEM
Milk Yield (kg/d)	30.6	29.9	30.0	3.44
FCM (kg/d)	28.9	28.6	28.5	2.42
ECM (kg/d)	31.3	31.0	30.9	1.74
Milk Fat (%)	3.20	3.27	3.26	0.15
Milk Protein (%)	2.81^{a}	2.77^{ab}	2.70^{b}	0.08
MUN (mg/dL)	10.05^{a}	11.43^{b}	9.85^{a}	0.42
MUN (mg/dL)	10.05^{a}	11.43^{b}	9.85^{a}	0.42

[a,b]Least square means in the same row with different superscripts differ ($P < 0.05$)

Key Words: Pasture, Nitrogen Capture, Starch