

**106 Lipid content and fatty acid composition of grasses sampled on different dates through the first 139 d in 2004.** P. Mir<sup>\*1</sup>, S. Bittman<sup>2</sup>, D. Hunt<sup>2</sup>, T. Entz<sup>1</sup>, and B. Yip<sup>1</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Agassiz, BC, Canada.

Hydrogenatable fatty acids (HFA) content of the grasses was estimated after determining dry matter (DM) yield, lipid content and fatty acid concentration in samples of orchard grass (OG), perennial rye grass (PRG) and tall fescue (TF) from four plots per species, on d 89, 113, 119, 133 and 139 of 2004. Fatty acid and HFA content of the grasses was estimated as the product of fatty acids concentration and lipid content, and the sum of the content of C18:1, C18:2 and C18:3, respectively. The HFA content is the available substrate for production and deposition of fatty acid bioconversion compounds such as conjugated linoleic acid in ruminants that consume the grass. The DM yield of the three species of grasses increased ( $P < 0.05$ ) between 89 and 113 d to average yields of  $3694 \pm 153$  kg. By d 139 the DM yield estimates were  $5246 \pm 234$ ,  $6185 \pm$

$514$ ,  $8642 \pm 502$  kg, for OG, PRG and TF, respectively, and different ( $P < 0.05$ ) from each other. However, the lipid content decreased in all the grasses over the 139 d of sampling. Although concentration of the saturated fatty acids and C18:1, C18:2 and C20:4 increased over the sampling period, the content did not alter substantially. In OG samples, C18:2 concentration and content was higher ( $P < 0.05$ ) than that in PRG or TF samples obtained on d 89, 119, 133 and 139. The concentration and content of C18:3 was highest (65 to 70% of fat) in all the forages, but declined progressively to 52-55% of fat. The C18:3 concentration remained the highest in PRG samples obtained up to 113 d. The availability of HFA up to 113d was greatest in PRG, ( $3.1 \pm 0.2\%$ ) and lower ( $P < 0.05$ ) in OG and TF ( $2.2 \pm 0.1$  and  $2.0 \pm 0.4\%$ ). However, by d 139 of the season TF produced more DM but with substantially reduced lipid ( $1.6 \pm 0.2\%$ ) and HFA ( $1.1 \pm 0.1\%$ ) content. The results indicate that PRG would provide greater levels of HFA until the first 113 d of the season in 2004.

**Key Words:** Grasses, Hydrogenatable Fatty Acids, Ruminants

## ADSA-SAD: Original Research (Undergraduate)

**107 On-farm Rota-Coronavirus prevention methods.** A. Nelkie<sup>\*</sup>, North Carolina State University, Raleigh.

Rota-Coronavirus is one of many scours-causing pathogens and costs calf growers time and money. It is prevalent 7 to 10 days after birth. There are 2 different vaccination approaches used to prevent this virus; 1) through passive immunity by vaccinating the dam pre-calving, then feeding the calves the immunoglobulin-rich colostrum; 2) administering an oral vaccine to the calf at birth. Currently, there is no recommended time at which the oral vaccine should be given in relationship to feeding colostrum. In this case study, a farm vaccinating all cows and heifers pre-calving still had a 100% scour rate among calves 7 to 10 days after birth and lost 3 calves. An initial fecal sample collected in March was sent to Michigan State University Diagnostic Laboratory where the Rota-Coronavirus was cultured. In August, a scouring calf sent to Michigan State University was diagnosed with Rota-Coronavirus. Due to the presence of Rota-Coronavirus on the farm, 5 different protocols were attempted to prevent scours in calves, including: 1) administering Calf Guard<sup>®</sup>, an oral Rota-Coronavirus vaccine given at birth with colostrum ( $n=30$ ); 2) using Bio Moss<sup>®</sup>, a mannan oligosaccharide that prevents the binding of pathogens to the lining of the small intestine ( $n=10$ ); 3) cleaning the maternity pen with bleach ( $n=3$ ); 4) administering Calf Guard<sup>®</sup> 10 minutes before colostrum ( $n=5$ ); and 5) cleaning the maternity pen with bleach and administering Calf Guard<sup>®</sup> 10 minutes before colostrum ( $n=24$ ). The fecal samples were taken: 1) at the beginning of the study; 2) during protocol 1; and 3) after protocol 2. Because scours stopped, fecal samples were not taken after protocols 3, 4, and 5. Since the implementation of protocol 4 scours have not been observed, therefore, protocols 4 and 5 appear to be successful in eliminating scours caused by Rota-Coronavirus, while protocols 1-3 were not successful as scours continued. Limiting calves' exposure at birth to the Rota-Coronavirus by cleaning maternity pen and administering preventative Calf Guard<sup>®</sup> 10 minutes before colostrum appears to be part of successful protocols to prevent scours caused by the Rota-Coronavirus.

**Key Words:** Scours, Rota-Coronavirus

**108 Effect of sunflower oil delivery method on conjugated linoleic acid (CLA) content in milk.** G. McGregor<sup>\*</sup>, A. Meszaros, Y. Parrott, S. Tam, M. Oba, and L. Doepel, University of Alberta, Edmonton, Alberta, Canada.

The effect of supplementing sunflower oil directly into the rumen vs. incorporating it into a total mixed ration (TMR) on milk CLA concentration was examined. Four ruminally cannulated multiparous Holstein cows ( $127 \pm 4.5$  days in milk) were used. Sunflower oil (2.5% of dietary dry matter) was either dosed ruminally twice per day (RD) or fed once daily in a TMR (CTL) in a crossover design with 6-day periods. The same basal TMR was fed to both groups except the TMR for RD treatment was devoid of sunflower oil which was instead dosed

ruminally in an amount based on each cow's dry matter intake the previous day. Dry matter intake was  $22.8$  vs.  $21.9 \pm 1.6$  kg/d ( $P = 0.39$ ), and milk yield was  $31.4$  vs.  $31.0 \pm 0.7$  kg/d ( $P = 0.50$ ), respectively, for RD and CTL. Milk fat, protein and lactose content, and somatic cell count were also unaffected by treatment. Milk from cows receiving RD had a higher concentration of *trans*-10, *cis*-12 CLA ( $0.04$  vs.  $0.02 \pm 0.003\%$ ;  $P = 0.05$ ), and tended to have a lower concentration of short-chain fatty acids (C: <16) compared to the milk of CTL cows ( $52.6$  vs.  $57.1 \pm 0.9\%$ ;  $P = 0.07$ ). *Trans*-11 vaccenic acid concentration was greater ( $5.39$  vs.  $3.33 \pm 0.27\%$ ;  $P = 0.03$ ), and *cis*-9, *trans*-11 CLA concentration tended to be greater ( $1.72$  vs.  $1.12 \pm 0.12\%$ ;  $P = 0.07$ ) for RD cows. It is speculated that, compared to gradual consumption of sunflower oil supplemented within a TMR, infrequent large doses of sunflower oil suddenly increase the availability of unsaturated fatty acids, thus exceeding the capacity of the rumen microbes to complete biohydrogenation. This might have allowed accumulation of *trans*-11 vaccenic acid in the rumen which is then desaturated to *cis*-9, *trans*-11 CLA in the mammary gland. These results indicate feeding management affecting the frequency of lipid intake alters milk CLA concentration and fatty acid composition.

**Key Words:** Conjugated Linoleic Acid, Sunflower Oil, Ruminant Dose

**109 Prostaglandin-induced luteolysis: Effects of dosage and route of administration in lactating Holstein cows.** J. Brinkerhoff<sup>\*</sup> and R. Silcox, Brigham Young University, Provo, UT.

We previously reported that the luteolytic response of cyclic, lactating dairy cows did not differ between cows administered 15 mg prostaglandin F2 alpha (Prostamate<sup>™</sup>)(PGF) by way of the ischioanal fossa (IRF) as compared to those given 25 mg PGF intramuscularly (IM). This study utilized a two by two factorial design to determine if luteolytic response to PGF was affected by dosage (15 vs 25 mg) and/or by route of administration (IRF vs IM). A total of 100 non-pregnant, lactating Holstein cows that were approximately 128±5 (range=73-245) days in milk during their 1-5 lactation were recruited into the study based on the presence of a functional corpus luteum (CL≥20 mm) as determined by transrectal ultrasonography. Number, location, and diameter of CL, location and diameter of the two largest follicles, and body condition score were recorded. A blood sample (~7ml) was collected, and cows were injected with PGF according to their randomly assigned treatment. Blood samples were collected 24 and 72 hr later and ovaries of cows were examined by ultrasound 72 hours post-injection. Cows were considered responders (luteolysis induced) if CL diameter decreased by at least 5 mm. Luteal regression, induced in 80 of the 100 cows, was not affected by lactation number ( $P \geq 0.05$ ). Injection of 3 ml PGF by way of the IRF (92% responders) was just as effective in inducing luteolysis as 5 ml injected IM (88% responders)( $P \geq 0.05$ ). Injection of 3 ml IM or 5 ml IRF

tended to be less effective (68% and 72% responders, respectively)( $P \leq 1$ ). 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.

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**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 ( $588 \pm 48$  kg body weight;  $33 \pm 21$  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.  $159.1$   $\mu\text{Eq/L}$ ;  $P < 0.01$ ) 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 (score 1.1), 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 plasset 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 plasset 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  $\sim 45$  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  $59 \pm 1$  mg of a conjugated linoleic acid (CLA) supplement containing 12.3  $\pm 0.01\%$  oleic acid, and 74.2  $\pm 0.12\%$  total CLA consisting of three isomers: (A) 36  $\pm 0.1\%$  cis-9, trans-11, (B) 35.7  $\pm 0.1\%$  trans-10, cis-12, and (C) 2.54  $\pm 0.03\%$  trans-9, trans-11. Treated capsules ( $n=5$ ) were intact after incubation (opposed to untreated) with an average weight loss of  $4.0 \pm 2.3\%$ . After incubation, the capsules ( $n=25$ ) contained similar oleic acid (12.4  $\pm 0.1\%$ ) and total CLA (69.7  $\pm 1.1\%$ ) concentrations as before incubation. However, a shift occurred in proportions of individual CLA isomers (18.4  $\pm 2.0\%$  A, 18.1  $\pm 1.9\%$  B, and 33.1  $\pm 3.1\%$  C) indicating isomerization. Treated capsules ( $n=10$ ) were

then suspended in buffer alone and the final CLA composition (35.8  $\pm 0.7\%$  A, 35.4  $\pm 0.7\%$  B, and 3.5  $\pm 0.4\%$  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<sub>2a</sub> 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<sub>2a</sub> protocol would increase pregnancy rates of dairy heifers using timed artificial insemination (TAI). This study was conducted over