Graduate Student Competition: ADSA Production Division
Graduate Student Poster Competition - PhD Division

M166 Effects of using protective cover sheaths at the time of AI on fertility of lactating dairy cows. S. Bas*, G. M. Schuenemann, A. Hoet, E. Gordon, D. Sanders, and K. N. Galvao, *Department of Veterinary Preventive Medicine, The Ohio State University, Columbus.*

The objective of this study was to evaluate the effectiveness of using a disposable sheath protector (SP) on top of the regular AI sheath to minimize contamination of the AI catheter (AIC) on pregnancies per AI (PAI) in lactating dairy cattle. Services (n = 2843) during spring (67%) and summer (33%) from lactating Holstein cows [primiparous (PRIM; n = 1158) and multiparous (MULT; n = 1062)] in 3 commercial herds were included in this study. Animals were presynchronized with 2 injections of PGF2α (PG) given 14 d apart (starting at 26 ± 3 DIM) followed by Ovsynch (GnRH-7d-PG-56 h-GnRH-16 h-Timed AI) or Cosynch (GnRH-7d-PG-72 h-GnRH+Timed AI) 12 d later. Cows presenting signs of standing estrus at any time during the protocol were AI while the remaining cows were subjected to Timed-AI. At the time of AI, services were randomly (every other cow) assigned to 1 of the 2 groups: 1) with (TRT; n = 1405) or 2) without (CON; n = 1438) the use of SP. In TRT, the AIC protected with a SP was introduced into the vagina and only the AIC was manipulated through the cervix into the uterine body for semen deposition. CON cows were AI without the use of SP. Sterile cotton swab samples were collected from the AIC (n = 102) immediately after AI (from TRT and CON) for bacteriology. Pregnancy diagnosis was determined by ultrasonography 40 ± 5 d after AI. Data were analyzed using GLIMMIX (PAI) and FREQ (culture) procedures of SAS. Swab samples revealed that the use of SP was effective in minimizing contamination of the AIC at the time of AI in TRT (51.9%) compared with CON cows (98%; $P < 0.05$). Overall, PAI was greater ($P = 0.01$) for cows in TRT (30.1 ± 1.7%) than in CON (25.4 ± 1.9%). Results from this study suggested that the use of SP reduced contamination of the AIC at the time of AI and improved PAI in lactating dairy cows. To achieve consistent reproductive outcomes over time, the cleanliness of the AI procedure and equipment should not be compromised for convenience.

Key words: dairy cattle fertility, AI, sheath protector

M167 Metabolism of ruminally dosed butyrate and lactose in lactating dairy cows. K. J. Herrick*[1], A. R. Hippen[1], K. F. Kalscheur[1], D. J. Schingoethe[1], S. C. Moreland[2], and J. E. van Eys[2], *[1]South Dakota State University, Brookings, [2]Nutriad Inc., Elgin, IL.*

The objective of this research was to investigate the effect of ruminal butyrate on metabolites of lactating dairy cows. Jugular catheters were inserted into 4 ruminally-fistulated Holstein cows (45.5 ± 2.1 kg milk/d; 152.5 ± 26.9 DIM) in a 4 × 4 Latin square with 3-d periods. At d-1 of each period, 2 h after feeding, cows were ruminally dosed with one of four treatments: 2 L of water (CON), 1 g/kg BW of lactose (LAC), 1 g/kg BW of butyrate (1G), or 2 g/kg BW of butyrate (2G). Sodium butyrate was the source of butyrate and NaCl was added to CON, LAC and 1G to provide equal amounts of sodium as the 2G treatment. All treatments were dissolved in 2 L of water. Serial blood samples were collected at −2, −1, −0.5, 0, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 4, 6, and 8 h relative to dosing. Samples of rumen fluid were collected at similar intervals. Area under the curve (AUC) was calculated using the pre-dosing values as a baseline to determine treatment response (see table). Butyrate had a significant ($P < 0.05$) effect on plasma glucose and β-OHB and altered rumen VFA. There were no significant ($P > 0.05$) changes in AUC for plasma insulin or NEFA, but there were numerical differences. Milk protein (2.60, 2.85, 2.82 and 3.13%), MUN (11.5, 9.5, 11.8 and 13.4 mg/dL), and fat yield (1.58, 2.29, 1.95 and 1.63 kg/d) for the CON, LAC, 1G and 2G treatments respectively were affected ($P < 0.05$) 24 h post dosing. Rumen pH (6.1, 5.9, 6.3 and 6.6) was increased ($P < 0.01$) by butyrate while AUC for rumen ammonia (−8.1, −22.3, −38.1 and −35.6 mg/dL•h) decreased ($P < 0.01$). Results demonstrate that butyrate dosed in the rumen increases plasma β-OHB and decreases blood glucose.

Table 1. Least squares means of AUC responses by dairy cows to butyrate or lactose

	Treatment[1]				
Metabolite	CON	LAC	1G	2G	SEM
Blood					
Glucose (mg/dL•h)	91.7[a]	−18.7[b]	−76.7[bc]	−131.4[c]	27.3
β-OHB (mM•h)	2.91[b]	2.37[b]	22.3[a]	33.4[a]	3.88
Insulin (μIU/L•h)	−4.9	79.3	68.5	1132.8	651.8
NEFA (μM•h)	−1061.5	−1189.0	−813.0	−523.1	484.1
Rumen					
Acetate (mM•h)	−82.2	93.2	37.3	−39.7	54.8
Propionate (mM•h)	−22.3[ab]	13.3[a]	−3.8[ab]	−32.7[b]	14.8
Butyrate (mM•h)	−14.1[c]	11.4[c]	169.0[b]	575.9[a]	30.9

[1]Least squares means with different superscripts within row differ (P<0.05).

Key words: butyrate, lactose, ketone

M168 Antioxidant activity of calf milk replacers. M. A. Soberon*, D. J. R. Cherney, and R. H. Liu, *Cornell University, Ithaca, NY.*

A milk replacer (MR) is designed to mimic the nutritional benefits of milk in an effort to nourish a newborn calf, reduce calf mortality, strengthen immunity and increase animal life span and productivity. Antioxidants (AO) can enhance immune defense by reducing oxidative damage, but milk replacers are traditionally not formulated for AO activity. The objective of this study was to compare total AO activities of bovine milk with 6 calf MR (Table 1), varying in amount and source of fat and protein. MR was donated by Milk Products, Inc. Milk was obtained from the Cornell Dairy Research Farm bulk tank, representing milk produced within 24 h by 455 cows. MR was mixed to 150 g/L with 40°C, purified water. All samples were extracted in triplicate. Following hexane lipid extraction, both milk and MR samples were extracted 5 times with ethyl acetate, and then evaporated and reconstituted with 70% methanol/water. Samples were assessed for total AO activity using the peroxyl radical scavenging capacity assay where each sample was diluted to 5 descending concentrations, plated in triplicate. Ascorbic and gallic acids were standards for each plate. Results for total AO activity are expressed as umol of vitamin C equivalent(VCE)/mL of milk or reconstituted MR. The only known distinguishing feature of MR A, which exhibited the highest total AO activity (86.0 umol VCE/mL; $P < 0.001$) is its soy protein whereas natural bovine milk (52.7 VCE/mL) is distinguished by its increased fat content. Fat ($P = 0.057$) as opposed to protein ($P = 0.140$) content

may have an effect on AO activity. Total fat content may explain the difference between the 2 MR with similar amounts of NeoTec4, a commercial essential fatty acid supplement, (44.2 umol VCE/mL versus 14.9 umol VCE/mL). Future research is warranted to compare MR with a broader range of fat content as well as the effect of additional compounds in milk that may impact AO activity.

Table 1. Characterization of milk and milk replacers

ID	Description	Protein Source	Animal Fat, %	Vegetable Fat, %	VCE, umol[1]	SE
A	21% CP, 20% fat	50% milk, 50% soy	100	0	86.0[a]	1.92
Milk	Bovine milk; 27% CP, 29% fat	milk	100	0	52.7[b]	1.92
B	NeoTec4; 22% CP, 20% fat	milk	98.4	1.56	44.3[c]	1.92
C	20% CP, 20% fat	milk	100	0	16.1[d]	2.35
D	NeoTec4; 28% CP, 18% fat	milk	98.6	1.39	14.9[d]	1.92
E	28.5% CP, 15% fat	milk	100	0	12.1[d]	1.92
F	5% plasma; 22% CP, 20% fat	animal	100	0	10.5[d]	1.92

[1]Means with different superscript differ, $P < 0.001$.

Key words: antioxidant, milk replacer, calf

M169 In situ ruminal degradability of diets, dried distillers grains with solubles and soybean meal under different rumen conditions. S. D. Ranathunga*, K. F. Kalscheur, A. R. Hippen, and D. J. Schingoethe, *South Dakota State University, Brookings.*

The objective of this study was to investigate the in situ degradability of diets, distillers grains with solubles (DG) and soybean meal (SBM) under different ruminal conditions. Four Holstein cows with ruminal fistulae were assigned to a 4 × 4 Latin square in a 2 × 2 factorial arrangement of treatments. Diets contained low forage (LF; 41% of diet DM) or high forage (HF; 60% of diet DM) and DG at 0 or 18% of diet DM. Forage consisted of 80% corn silage and 20% alfalfa hay (DM basis). Ground corn and soybean feeds were partially replaced by DG from 0% DG diets to formulate 18% DG diets. Dacron bags containing DG, SBM, and dietary TMR were incubated in duplicate in the rumens of the cannulated cows at 0, 2, 4, 8, 12, 24, 48, and 72 h on d 15 each period. Each TMR was incubated only in cows assigned to the corresponding diet. Rumen passage rate (Kp) was greater for HF (6.2 vs. 6.6%/h) and 0 DG (6.5 vs. 6.3%/h) diets. Effective degradability (ED) of DM for TMR was lower for 18% DG diets (64.8 vs. 62.7%). Similarly, ED of DM for DG (55.8 vs. 55.0%) and SBM (72.0 vs. 70.1%) were lower in 18% DG diets. For TMR, ED of NDF was greater in HF (28.0 vs. 34.5%) and 18% DG diets (29.9 vs. 32.6%) whereas ED of NDF for DG was greater in HF diets (37.1 vs. 40.4%). ED of CP for TMR was lower in HF (54.7 vs. 53.3%) and 18% DG diets (54.9 vs. 53.0%). Similarly, ED of CP for DG was lower for HF (50.6 vs. 48.6%) and 18% DG diets (50.1 vs. 49.0%). For SBM, CP was degraded to a lower extent for the 18% DG diets (62.7 vs. 60.4%). Results suggest that forage and DG concentration in diets affect ruminal degradability of nutrients.

Table 1.

	ED, %					
	LF	LF	HF	HF		
Feed	0DG	18DG	0DG	18DG	SEM	P^1
TMR-DM	64.8	62.5	64.8	63.0	0.74	D
NDF	27.7	28.2	32.0	37.0	1.54	F, D, F×D
CP	54.9	54.5	55.0	51.6	0.93	F, D, F×D
DG -DM	55.7	55.2	55.9	54.8	0.71	D
NDF	38.1	36.2	40.3	40.5	1.42	F
CP	51.0	50.1	49.3	47.9	0.59	F, D
SBM-DM	71.4	70.7	72.5	69.4	0.99	D, F×D
CP	62.6	61.4	62.8	59.4	1.19	D

[1]F or D = Forage or DG effect; F×D = Forage and DG interaction ($P < 0.05$).

Key words: distillers grains, forage, in situ

M170 Effect of air-flow controlled chambers and cows of contrasting feed efficiency on methane emission. C. Arndt*[1], M. A. Wattiaux[1], J. M. Powell[2], and M. J. Aguerre[1], *[1]Department of Dairy Science, University of Wisconsin, Madison, [2]USDA-ARS U.S. Dairy Forage Research Center, Madison, WI.*

The objective of this study was to determine the effect of chamber on methane (CH_4) emission, the number of days needed for adaption to chambers (using DMI as an indicator), and CH_4 emission between 2 high feed efficient (HE) and 2 low feed efficient (LE) cows (2nd parity, 101±11 DIM) as determined by MY/DMI. Emission of the 4 individual cows was measured in 4 chambers in a modified tie-stall barn. Cows were rotated among chambers every 4 d and measurements during each 4 d period included DMI, MY, and CH_4 emission (average duration of CH_4 measurements 18.5 h/d, using a Photo-acoustic Multi-gas Monitor; Innova Model 1412). All cows were fed the same TMR at 0800h and were milked twice daily. Data was analyzed as a 4x4 Latin square design with proc mixed procedure of SAS assuming cow efficiency as fixed treatment effect (1 df), cow within feed efficiency as random effect (2 df term used to test cow efficiency), days as repeated measures, and chamber and period as blocking factors. Chamber did not affect CH_4 emission ($P = 0.38$). An effect of period and period by day interaction ($P < 0.05$) was observed for DMI. Dry matter intake was greater in period 4 (28.8 kg/d) than in period 1 and 2 (averaged 26.3 kg/d), but not period 3 (27.4 kg/d). Although no consistent patterns were detected, DMI differed among days within all periods except period 4. These results suggest that cows were adapted to chambers by the beginning of period 4, although rotation among chambers may have extended required time for adaptation. Compared to LE cows, HE cows (1.90 vs. 1.52 (MY/DMI); $P = 0.01$) tended to have a greater MY (50.3 vs. 42.2 kg/d; $P = 0.06$), lower CH_4 emission (802 vs. 1000 g/d; $P = 0.08$), CH_4/DMI (30.3 vs. 36.0 g/kg; $P = 0.10$), CH_4/MY (16.0 vs. 23.7 g/kg; $P = 0.01$), and $CH_4/(NE_l+NE_m)$ (19.3 vs. 24.5 g/Mcal; $P = 0.02$). Although the effect of feed efficiency was tested against 2 degrees of freedom only, our preliminary results suggested that HE was associated with lower CH_4 emission. In addition, designs of future experiments do not require rotation of treatments among the chambers, which had no effect on CH_4 measurements in this study.

Key words: methane, feed efficiency, chambers

M171 Comparison of two resynchronization protocols initiated at different intervals after insemination on fertility in lactating dairy cows. R. G. S. Bruno*[1,2], J. G. N. Moraes[3], J. A. Hernández-Rivera[1,2], K. J. Lager[1,2], P. R. B. Silva[3], A. L. A. Scanavez[3], L. G. D. Mendonça[3], R. C. Chebel[3], and T. R. Bilby[1], *[1]Texas AgriLife Research and Extension Service, Texas A&M System, College Station, [2]Department of Agricultural Science, West Texas A&M University, Canyon, [3]Department of Veterinary Population, University of Minnesota, St. Paul.*

The objective of this study was to evaluate effects of 2 resynchronization timed AI (TAI) protocols beginning at different intervals after AI on fertility in dairy cows. Lactating cows from 2 dairies located in TX (n = 2233) and MN (n = 3077) were assigned to 1 of 4 TAI protocols 17 ± 3 d after AI. All cows were examined for pregnancy 31 ± 3 d after AI. Cows assigned to EOV or OV received the OvSynch56 starting 24 or 31 d after AI, respectively. Cows assigned to EGGPG or GGPG received a presynchronizing GnRH 17 or 24 d after AI, respectively, 7 d before the start of OvSynch56. Any cow observed in estrus was AI on the same day. Ovaries were examined and blood was sampled for progesterone concentration (P4) on day of first GnRH and PGF of Ovsynch56. Pregnancy was diagnosed at 31 and 66 d after resynchronized AI. Fewer EGGPG ($P < 0.01$) and more OV ($P < 0.01$) cows were re-inseminated in estrus (EGGPG = 23.7, GGPG = 49.0, EOV = 41.6 and OV = 57.6%). Treatment did not affect ($P > 0.66$) P/AI at 31 or 66 d for cows re-inseminated in estrus. Cows re-inseminated in estrus, however, had greater ($P < 0.01$) P/AI at 31 (40.0 vs. 27.5%) and 66 d (36.0 vs. 23.9%) than cows that received TAI. Among cows completing the TAI protocols, EOV reduced ($P < 0.03$) P/AI at 31 d (EOV = 22.2, EGGPG = 30.3, GGPG = 28.3, OV = 28.7%). Overall P/AI at 31 d after AI was reduced ($P < 0.01$) in EOV (29.3%) compared with other treatments (OV = 34.6, EGGPG = 33.3, and GGPG = 34.3%). However, treatment did not affect ($P = 0.11$) P/AI 66 d after re-insemination (EOV = 26.1, EGGPG = 29.4, GGPG = 30.4, OV = 30.4%). On day of first GnRH of Ovsynch56, more EGGPG and GGPG cows had CL (EGGPG = 83.8, GGPG = 88.8, EOV = 76.6, OV = 73.2%, $P < 0.01$) and P4 > 1ng/mL (EGGPG = 63.1, GGPG = 76.3, vs. EOV = 50.0, OV = 59.0%, $P < 0.01$). However, percentage of cows ovulating to first GnRH of Ovsynch56 was not affected ($P = 0.91$) by treatment. In conclusion, early start of resynchronization and presynchronization with GnRH reduced number of cows re-inseminated in estrus. Neither the timing nor the resynchronization protocol affected overall P/AI.

Key words: dairy cows, GGPG, resynchronization

M172 Antimicrobial usage on large herds in Wisconsin. L. Oliveira* and P. L. Ruegg, *University of Wisconsin, Madison.*

The objective of this study was to describe the antimicrobial usage on dairy herds in Wisconsin. A survey was conducted (March to August, 2010) in 50 dairy herds with >200 lactating animals. The questions included information about inventory and expansion, production, clinical and subclinical mastitis, dry-off therapy, pre-calving heifers, respiratory disease, uterine infections, foot problems, diarrhea, calves, and feeding. A total of 33,935 lactating cows were included, herd size ranged from 170 to 2,728 lactating cows, and daily milk production per cow was 33 kg. Occurrence of mastitis, respiratory diseases, and uterine infection were reported for all participants, but only 36% (n = 18) reported occurrence of diarrhea in adult cows. Dry cow therapy was used in all herds and 46% (n = 23) of the herds had used the same treatment over the last 5 years; preferred drugs were penicillin and streptomycin (n = 37 farms). Internal teat sealant was used in 84% (n = 42) of farms but only 16% (n = 8) use external sealant. Eight intramammary antimicrobials were used to treat mastitis and the most common were ceftiofur (n = 45 farms) and pirlimycin (n = 29 farms). Almost all farms use systemic antimicrobial to treat clinical mastitis, and the preferred drug was ampicillin (n = 20 farms). On 14% (n = 7) of the dairy herds, sulfadimethoxine was used to treat mastitis. On 40% (n = 20) of the herds, pre-calving heifers were treated with antimicrobials to treat or prevent mastitis. For respiratory disease in adult cows, farmers used from 1 to 5 drugs, and preferred drugs were ceftiofur and florfenicol. For uterine infection and foot problems, the preferred drugs were ceftiofur and ampicillin. For disease in calves such as respiratory disease and diarrhea, the preferred drug used was tulathromycin. On 22% of farms, calves were fed with medicated milk replacers; on 50% of farms, calves were fed with medicated calf starter. Results showed that antimicrobials were used extensively on dairy herds and ceftiofur was the most widely used. Further investigation will quantify antimicrobial drug usage on farms.

Key words: antimicrobial usage, dairy farm, disease

M173 Milk production, milk composition and first service pregnancy rate in lactating Holstein cows fed a lipid-encapsulated supplement containing *trans*-10, *cis*-12 and *cis*-9, *trans*-11 conjugated linoleic acids. C. L. Bailey*, R. G. Morell, B. L. Fisher, B. F. Jenny, G. T. Gentry, K. R. Bondioli, R. A. Godke, and C. F. Hutchison, *Louisiana State University Agricultural Center, Baton Rouge.*

Primiparous (n = 15) and multiparous (n = 24) Holstein females were randomly allotted to experimental diets after stratification by previous (cows) or expected (heifers) milk production, lactation number and expected date of parturition. Cows received a corn silage based TMR enriched with either a lipid-encapsulated supplement containing trans-10, cis-12 and cis-9, trans-11 conjugated linoleic acids (CLA) or a rumen-protected calcium salts of palm oil. Diets were formulated to be isoenergetic and isonitrogenous and to provide 100 g per hd/d supplement to respective treatment diets from parturition through 118 ± 14 DIM. Milk yield was assessed at each of 2 daily milkings by electronic meters and milk composition was analyzed weekly from consecutive AM and PM milk samples. Cows were estrous synchronized for fixed-time artificial insemination (FTAI; 98 ± 8 DIM) using a modified Double Ovsynch protocol. Pregnancy status was assessed at 34 ± 5 d of gestation by transrectal ultrasound or return estrus was recorded. Milk yield, milk composition and BW were analyzed using the GLM procedure and pregnancy status was analyzed using chi-squared (SAS). Body weight was similar between treatment groups ($P \geq 0.76$) at 12 ± 2 DIM (610 ± 16 kg) and 94 ± 2 DIM (620 ± 17 kg). Mean weekly milk yield was greater ($P = 0.002$) for cows fed CLA (38.5 ± 0.5 kg) compared with cows fed Ca salts (36.3 ± 0.5 kg). Percent milk fat ($P < 0.001$) and milk fat yield ($P = 0.002$) were reduced in cows fed CLA compared with cows fed Ca salts (3.25 vs. 3.92 ± 0.05%; 1.33 vs. 1.53 ± 0.04 kg, respectively). Percent protein ($P = 0.24$), protein yield ($P = 0.35$), energy corrected milk ($P = 0.98$) and 3.5% fat corrected milk ($P = 0.08$) were not influenced by dietary treatment. First service pregnancy rate was similar ($P = 0.30$) between cows supplemented CLA (n = 8/16, 50.0%) and Ca salts (n = 5/17, 29.4%), respectfully. The lipid-encapsulated CLA appears to be a viable supplement for lactating cows and deserves further investigation.

Key words: dairy cows, dietary fat supplementation, milk production

M174 A hoof biopsy procedure of front and rear claws for gene expression analysis and its relation to locomotion in dairy cows. J. S. Osorio*, E. F. Garrett, B. C. Fraser, D. E. Graugnard, J. K. Drackley, and J. J. Loor, *University of Illinois, Urbana.*

Lameness represents a significant health problem and one of the main causes of death in dairy cows in the USA. Impacts of environmental and dietary factors such as floor system hoof trimming, and dietary carbohydrate overload have been assessed through behavioral indicators including time budgets and locomotion scores, as well as hoof appearance and incidence and severity of hoof diseases. Evaluation of post-mortem corium tissue has generated important information at the molecular level on these effects. The current experiment was conducted to evaluate a biopsy procedure to extract tissue specimens through the hoof wall between the epidermis and pedal bone of dairy cows via regional anesthesia. The aims of the experiment were to: 1) determine the feasibility of performing hoof biopsies without impairing locomotion or inducing pathological alterations of affected tissues; 2) evaluate the feasibility of using biopsied tissue for RT-PCR by analyzing quantity and purity of extracted RNA; and 3) compare relative expression by claw position of genes involved in cell differentiation, proliferation, inflammation, and keratin formation. Biopsies were performed on 6 Holstein cows yielding 2 tissue specimens per cow from front and hind limbs. Cows were monitored for lameness daily for 7 d after biopsy and then weekly for 8 wk. Total RNA yield from tissue was within acceptable ranges (4.64–23.84 ug). Preliminary analysis by claw position showed that the transcription regulator NFKB1 had greater expression ($P = 0.02$) in front than rear claws. Also, within medial and lateral hind claws there was a tendency ($P = 0.09$) for greater expression of NFKB1 in lateral claws. Other genes of interest included SOD2, KLF10, NR3C1, SAA3, STAT3, MYD88, and TLR4. Lameness assessment after biopsies did not reveal difficulty in the cow's locomotion. Overall, results suggest that this hoof biopsy procedure was suitable to obtain and analyze laminar corium tissue at the molecular level. Further research using this procedure on peripartal cows is warranted, for example to assess the effects of prepartal plane of nutrition on hoof transcriptomics.

Key words: laminitis, gene expression, biopsy

M175 Variation in failure of passive transfer and growth rates of calves on 38 farms in British Columbia. G. B. Bond, M. A. G. von Keyserlingk, G. Zobel*, and D. M. Weary, *Animal Welfare Program, University of British Columbia, Vancouver, BC, Canada.*

Two basic indicators of success in calf rearing programs are failure of passive transfer (FPT) of immunoglobulins from colostrum, and growth rates, but little data are available to producers to benchmark their performance against industry norms. The aim of this study was to describe variation among farms in FPT, calf weight gains during the milk-feeding period (<8 wk of age), and weight gains of older heifers (11 to 20 mo of age). Thirty-eight farms were randomly selected in the lower Fraser Valley region of British Columbia within the criteria that herds were registered Holsteins, using the DHI recording system, and with a minimum of 50 heifer calves born per yr. Blood was sampled from 10 calves (2 wk old or less) per farm, and FPT defined as age corrected serum protein < 5.5 g/dL. Heart girth tapes were used to estimate BW (using 14 ± 5 pre-weaned calves and 17 ± 6 older heifers per farm); gains were estimated using the within-farm slope from the line equation, BW = age. Serum protein averaged 5.9 ± 0.4 g/dL. FPT averaged 31 ± 25%; 7 of the 38 farms had 100% success, but on 10 farms more than 50% of the calves failed. ADG pre-weaning averaged 0.7 ± 0.2 kg/d, but was highly variable (among farm range 0.4 to 1.2 kg/d). ADG for older heifers averaged 0.8 ± 0.1 kg/d, and was less variable (among farm range 0.6 to 1.0 kg/d). These results provide benchmarking data for producers, and illustrate that low rates of FPT and gains averaging 1 kg/d are achievable for farms in this region.

Key words: calf welfare, benchmarking, on-farm assessment

M176 Comparisons of udder health and milk quality in North Carolina organic and conventional pasture-based dairy herds. K. Mullen*, L. Gentry, R. Lyman, S. Washburn, and K. Anderson, *North Carolina State University, Raleigh.*

This observational study compared milk quality and herd health management of 7 organic and 7 conventional dairies in North Carolina. Published comparisons between organic and conventional dairy systems with regard to milk quality are sparse for the southeastern region of the United States. Management practices vary between organic and conventional dairies because of differences in farming philosophy and in government regulations. Organic dairies are prohibited from using certain drugs and antibiotics that are commonly used on conventional dairies. The objective of this study was to elucidate the relationship between management type and milk quality. To assess milk quality, milk samples were aseptically collected from each quarter of each cow in the milking herd at the time of sampling and somatic cell scores were obtained for individual cows. A total of 4988 quarter milk samples (2608 conventional, 2380 organic) were collected from 1247 cows (652 conventional, 595 organic). Milk samples were cultured and bacterial growth was identified using protocols consistent with those of the National Mastitis Council. The proportion of cows with positive microbiological results did not differ ($P > 0.10$) between organic (56.1%) and conventional (52.9%) dairies. However, differences in species present in positive cultures were observed: conventional herds had significantly more (22.4% vs. 15.3%, $P < 0.01$) coagulase-negative staphylococci infections per cow whereas organic herds had more *Corynebacterium* sp. (12.9% vs. 4.1%, $P < 0.01$) and *Staphylococcus aureus* (12.6% vs. 8.1%, $P < 0.01$) infections per cow. Conventional herds did have a lower proportion of infected quarters (27.0% vs. 36.3%, $P < 0.001$). Somatic cell scores did not differ between organic (3.0 ± 0.1) and conventional (3.0 ± 0.1) herds. Despite differences in herd management, milk culture results and SCS measurements were remarkably similar between organic and conventional NC dairies compared for this study.

Key words: mastitis, comparison, organic

M177 Effect of conjugated linoleic acid supplementation on in vitro bovine embryo production and cryopreservation. V. A. Absalón Medina*[1], S. J. Bedford Guaus[1], R. O. Gilbert[1], L. C. Siqueira[2], G. Esposito[3], A. Schneider[4], S. H. Cheong[1], and W. R. Butler[1], *[1]Cornell University, Ithaca, NY, [2]Universidade Federal de Santa Maria, Santa Maria, RS, Brasil, [3]Università degli Studi di Napoli Federico II, Portici, Napoli, Italia, [4]Universidade Federal de Pelotas, Pelotas, RS, Brasil.*

Conjugated linoleic acid isomers (CLAs) and other polyunsaturated fatty acids can affect the membrane lipid profile and signaling in cells thereby altering their function. The objectives were systematic evaluation of in vitro supplementation of CLA isomers (c9,t11 and t10,c12) on bovine oocytes or parthenotes (experiment 1) and fertilized preimplantation embryos (experiment 2 and 3) and to assess the optimal dose(s), and/or developmental stages during culture. The effects of CLAs on

embryonic survival after vitrification (experiment 4) were also evaluated. A total of 6267 oocytes were used in this project. Higher doses (50, 100, 200 μM) of CLA during in vitro maturation (IVM), or during the entire in vitro embryo culture (IVC) were compared with lower doses (15, 25, 50 μM) for effects before and after activation on subsequent development of bovine parthenotes. Low doses of both isomers tested the effect of CLAs on performance of fertilized embryos during IVM/IVC. Experiment 3 examined lowest doses (15, 25 μM) of CLA at specific stages during culture (i.e., IVM vs. IVC only) and finally, resistance to cryopreservation viz. post thaw survival rates of vitrified embryos supplemented with CLA was assessed. Overall, parthenotes and preimplantation embryo blastocyst rates (~35%) were not different among low CLAs levels ($P > 0.05$). Although low CLA resulted in better blastocyst rates for fertilized embryos, higher CLAs concentration (≥100 μM) reduced blastocyst rates to 7–15%. Vitrifying embryos after supplementation with 100 μM c9,t11 for a short period of time resulted in high survival rates comparable to the vitrified control (38 and 35%, respectively), but importantly the development of thawed embryos was comparable to control embryos not undergoing cryopreservation (total cell count equaled 161 ± 43 vs. 174 ± 39 [$P > 0.05$], respectively). In conclusion, no beneficial effect of supplemental CLA was found on embryo performance, however, inclusion of 100 μM c9,t11 before vitrification improved post thaw survival and development of bovine embryos.

Key words: CLA, parthenogenetic activation, bovine in vitro fertilization