

W199 Novel arena/object test to assess housing related stress in gestating sows housed in stalls and in pens with electronic sow feeders (ESF). L. Anil*¹, S. Anil¹, S. K. Baidoo², and J. Deen¹, ¹*Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, St. Paul*, ²*Southern Research and Outreach Center, University of Minnesota, Waseca*.

Novel object/ arena test was conducted on day 108 of gestation among sows housed in stalls (29 sows) and in pens with ESF (36 sows) to assess the fearfulness of sows when exposed to a novel arena and/or novel object as a measure of the housing-related stress experienced by the sows. A completely enclosed rectangular pen (4.78 m X 2.4 m) was divided into 10 equal segments and numbered one through 10. In the middle, opposite from the side of entrance a semicircle of radius 0.5 m was marked off (area A) for placement of the novel object, a fluorescent orange safety cone. The sows were moved into the pen, one at a time directly from their daily environment. The sow was observed for the first two minutes for the areas it entered within the arena. The sow was considered to be in an area if the snout entered the area. The novel object was placed in area A for the next three minutes and the sow was observed. Data on areas entered, time to approach the object, total time spent in the area A, time to first interaction with the object and number of interactions were recorded. The results of the test were compared using independent sample T-test and Kruskal-wallis ANOVA. More stall-housed sows (16) entered the area with novel object than sows housed in pens with ESF (13). Stall-housed sows took significantly less time (72.5 s) to enter the area with novel object than sows from pens with ESF (112.6 s). There was no significant difference among sows from both systems in terms of number of squares entered, time to have the first interaction and number of interactions with the novel object. The results were inconclusive as there was no possibility to account for the excitement in stall-housed sows when they were permitted to have a short walk and in a larger area during the test and the individual differences among sows.

Key Words: Novel Arena/Object Test, Pens with ESF, Gestation Stall

W200 The effect of cold draft on behavior of newly weaned piglets. A. Bruni* and T. M. Widowski, *University of Guelph, Ontario, Canada*.

Adverse barn environments resulting from poor ventilation or improper temperature control are often blamed for the development of vices in pigs. Behavior problems that can develop at weaning include ear biting, navel sucking and belly nosing. While it is evident that cold, drafty conditions can lead to reduced performance and health problems, any relationship with oral/nasal behavior has never been explored. The objective of this study was to determine the effect of cold draft on oral/nasal behavior in piglets weaned at 18-22 d of age. Sixteen Yorkshire piglets were used in each of 5 trials (n=80) comprising 2 pens per treatment and 4 piglets per pen. Piglets were housed in an environmental chamber in which half of the pens could be exposed to cold draft while the other half maintained at recommended temperature and air velocity. Treatment piglets were kept at 27.9 (+0.58)°C except when subjected to 2-one h periods of time-unpredictable draft each day during which temperature was decreased 3°C and air velocity increased to 0.8 m/s at

pig level. Control pigs were kept at 28.1 (+0.63)°C with minimal air movement of <0.3 m/s. Behaviors were observed on d 3, 5, 7, 9, 12 and 15 using scan sampling every 5 minutes for 6 h per day. Overall, piglets exposed to draft spent significantly less time engaged in belly-nosing behavior (0.59 + 0.18%) and more time at the feeder (12.46 + 0.68%) compared to controls (1.32 + 0.34% and 9.46 + 0.69%, respectively; P<0.05). Yet, overall feed intake and growth rates did not differ for the two groups (P>0.05). During periods of cold draft, treatment piglets were more active (17.7 + 0.02%) and spent more time nosing and chewing their pen-mates' ears and tails (1.6 + 0.01%) compared to controls (14.3 + 0.01% and 1.1 + 0.01%, respectively; P<0.05). These results show that exposure to cold draft stimulates nosing and chewing pen-mates' ears and tails but not belly nosing. Adverse environmental conditions may contribute to some oral/nasal behaviors but not others.

Key Words: Piglet Behavior, Belly Nosing, Cold Draft

W201 Analysis of euthanasia and death in swine breeding herds. S. S. Anil*, L. Anil, and J. Deen, *Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, St. Paul*.

The pattern of sow deaths and euthanasia and the factors influencing the likelihood of sows to be euthanized or to have a natural death among the removed sows in commercial swine breeding herds were analyzed retrospectively, involving 24,017 records of death and euthanasia from 17 herds from 1999 to 2003. Logistic regression models were fitted to analyze the association of euthanasia with production variables, season and remove day. Of all the females died and euthanized, 23.6 % were euthanized and 16.3 % of females were euthanized for painful conditions. Among the sows and gilts those experienced painful conditions, 67.28% and 58.38% respectively were euthanized. The percentage of euthanized sows (5.2) was higher than that of death (3.4) on farrowing day. The euthanasia to death ratio was lower up to 15 days post-farrowing (0.27 on day 15) and then increased with the peak (0.63) during 31 to 35 days post-farrowing. The proportion of deaths was lower during week-ends. As average number of stillborn/litter increased, the likelihood for euthanasia increased among sows (OR 1.067). Sows of parity 1 and 2 were more likely to be euthanized compared to sows of parity >5 (OR 1.121). The odds of euthanasia was less for lactating sows (OR 0.410) than for non-lactating sows. In sows and gilts, the likelihood for those that were never served to be euthanized was higher (OR 2.423 and 1.686 respectively) compared to those served once. The likelihood was lower (OR 0.86) for sows that were served more than once compared to those served once. The likelihood for euthanasia was higher during weekdays (OR 2.824). The farm had a significant influence on the odds for euthanasia. Average number of litters farrowed / year, average number of non-productive days / parity, average number of pigs born alive / litter, average number of mummies / litter and born alive, mummies and stillborn in the removal parity were not significantly (P>0.05) associated with likelihood for euthanasia among sows. The results indicated that sows were at different likelihoods of euthanasia, depending on stage of production. An effort should be made to ensure that care and pain amelioration are available at all stages of production.

Key Words: Euthanasia, Death, Sow

ADSA Growth and Development

W202 Effects of weaning and ionophore on selected blood metabolites and growth in dairy calves. J. L. Klotz* and R. N. Heitmann, *Department of Animal Science, The University of Tennessee, Knoxville*.

Dairy calf weaning is associated with elevated ketone levels in excess of measured rates of utilization in adults and excess concentrations excreted in urine present a potential energy loss. Lasalocid is frequently supplemented as an anticoccidial in calf starters, but in adults is also known to alter molar ratios of ruminal VFA. Jersey bull calves (n = 24) were blocked in groups of two according to birth date and weight and randomly assigned to receive either a commercial pelleted starter (C), or the same diet containing lasalocid (T; 83 mg/kg DM) to examine effects of weaning transition on weight (BW), gain (ADG), and blood glucose, β -hydroxybutyrate (BHBA), non-esterified fatty acids (NEFA), volatile fatty acids (VFA), insulin, and glucagon (GLN) concentrations over 16 wk. From d 3 - 34 all calves were fed milk replacer twice daily, d 35 - 48

received replacer and C or T, and d 49-112 received *ad libitum* C or T. Repeated measures of BW and metabolite concentrations from jugular samples were recorded weekly. Postweaning intake (2.35 vs. 2.34 kg/d; \pm 0.07), ADG (0.78 vs. 0.75 kg/d; \pm 0.03), and feed:gain (3.10 vs. 3.19; \pm 0.11) did not differ between C and T. Glucose and NEFA concentrations did not differ between C and T, but declined with age. Insulin and GLN concentrations did not differ between C and T, but GLN increased with weaning. Total VFA significantly increased following introduction of solid feed at d 35, but there was a 1-wk lag period with T. Acetate and butyrate concentrations were greater in C than T during wk 7 (P < 0.05). Propionate concentrations and acetate : propionate ratios did not differ between C and T. Blood BHBA concentrations were greater in C than T (P < 0.05) during wk 8 and 9 (1.0, 1.1 vs. 0.7, 0.8 mmol/L; \pm 0.1). Consumption of starter with lasalocid delayed peak acetate and

butyrate and lowered peak BHBA concentrations, but did not appear to significantly influence post-weaning growth or efficiency.

Key Words: Weaning, Growth, Ionophore

W203 The effects of feeding chlortetracycline on the performance of breeding age dairy heifers. E. D. Reid* and P. S. Erickson, *University of New Hampshire, Durham.*

Chlortetracycline (CTC) is a broad spectrum antibiotic that is used to increase profitability in a variety of animals by increasing weight gain, feed efficiency, carcass grades, and conception rates. The use of CTC for this purpose, however, remains controversial, in part because little is known about the mode of action of this antibiotic. The current study was designed to test the effects of CTC on rate of gain, wither and hip height, feed efficiency, body condition score, systemic thyroxine (T4) and glucose levels, and conception rates of breeding age Holstein heifers. Forty 12-mo old Holstein heifers (initial BW = 363 kg) were housed in a free stall with ad libitum access to feed and water for 104 d (transition period starting at 14 d prior to age of 12 mo and 90 d treatment period starting at 12 mo of age). The CTC-fed group (n = 20) received 350 mg of top-dressed CTC/head/d. Measurements for weight, wither and hip height, body condition score, and health score were recorded weekly. Dry matter intake was monitored daily. Blood samples were obtained every 4 d to determine systemic T4 and glucose concentrations. There was no effect of CTC on weight gain, feed efficiency, height, body condition score, blood glucose concentrations, general health or conception rate. There was an interaction (P < 0.03) between treatment and time for systemic T4 concentration. In the beginning of the experiment, systemic T4 concentration was lower in animals supplemented with CTC. There was no difference in systemic T4 concentrations between treatments at the end of the experiment.

Key Words: Chlortetracycline, Dairy Heifer, Thyroxine

W204 The effect of feeding three milk replacer regimens preweaning on heifer intake, prepubertal and pubertal growth parameters and reproductive performance. C. S. Ballard*¹, H. M. Wolford¹, C. J. Sniffen², T. Sato³, K. Uchida³, and Y. Yabuuchi³, ¹W.H. Miner Agricultural Research Institute, Chazy, NY, ²Fencrest LLC, Holderness, NH, ³Zen-Noh National Federation of Agricultural Co-operative Associations, Tokyo, Japan.

As previously reported, sixty Holstein heifer calves at two farms were blocked at birth and randomly assigned to one of three treatments formulated on DM basis: 1) 27% CP/20% Fat fed at 1.5% BW for first week, 2.25% BW from 8 days through 5 weeks, and 1.25% BW from 6 weeks to weaning; 2) 27% CP/20% Fat fed at 200g 2x/day for 2 weeks, 250g 2x/day through weaning; or 3) 27% CP/15% Fat fed at 1.5% BW for first week, 2.25% BW from 8 days through 5 weeks, and 1.25% BW from 6 weeks to weaning. The calves fed milk replacer as a % of body weight had a greater rate of growth for all parameters measured. Calves fed milk replacer at a fixed rate were weaned at an earlier age and had fewer days treated for illness. The objective of this study was to continue to measure the performance of these heifers from 10 to 20 weeks of age for intake and 10 weeks to 18 months of age for growth and reproductive performance. Individual dry matter intakes were measured weekly on a subset of 39 total animals from 10 to 20 weeks of age. Heifer growth was measured monthly from 10 weeks to 18 months. The calves fed as a % of body weight during the wet phase of their life had higher growth rates, resulting in larger framed animals from 2 weeks through 7 months of age. No significant differences between treatments for growth were found after 7 months.

Item	Treatment			SEM	P
	1	2	3		
Wt, kg, Mo 18	507.54	501.55	520.59	10.54	0.471
WH ¹ , Mo 18	138.17	136.21	136.91	0.58	0.073
S-P ² , Mo 18	164.65	162.78	166.66	0.78	0.071
Chest ³ , Mo 18	72.18	71.07	72.33	0.57	0.238
DMI, kg/d, 15wk	3.09 ^b	3.40 ^a	2.84 ^b	0.10	0.003
DMI, kg/d, 20wk	2.52	2.51	2.41	0.05	0.292
Age at FS ⁴ , d	444	435	432	10	0.330
Height at FS, cm	135.73	134.16	134.61	0.75	0.336
Weight at FS, kg	444.33	442.32	451.10	10.76	0.915

¹Wither height,cm,

²Shoulder to pin,cm,

³Chest depth,cm,

⁴First Service,

^{a,b}Means within a row differ (P < 0.05).

Key Words: Milk Replacer, Heifer Growth

W205 Effects of intake, selection for milk yield, and bST administration on hepatic expression of insulin receptors and components of the somatotrophic axis in growing Holstein heifers. S. H. Wu*, W. J. Weber, H. Cheser-Jones, L. B. Hansen, and B. A. Crooker, *University of Minnesota, St. Paul.*

Hepatic gene expression was determined in heifers from an unselected (since 1964) stable milk yield line (control, CL) and a contemporary line (select, SL) to assess effects of intake, selection for milk yield, and bST. During the 37 d study, heifers (CL: n = 6, 120 ± 5 d old, 116 ± 10 kg BW; SL: n = 7, 124 ± 7 d old, 157 ± 12 kg BW) were fed 150% (d 1 to 18), 100% (d 19), 75% (d 20 to 21), 50% (d 22 to 26), 75% (d 27), 100% (d 28) and 150% (d 29 to 37) of their maintenance energy needs. Heifers received 30 µg bST/kg BW (IM) on d 4 to 10. Liver biopsies were collected on d 1, 8, 23, 26, 30, and 33 and mRNA for insulin receptor isoforms A and B (INSRA and INSRB), total and type-1A growth hormone receptor (GHR-t, GHR-1A), total and class-2 insulin-like growth factor-I (IGF-t, IGF-c2), and IGF-I binding proteins (IGFBP-2, -3, and -5) determined by real-time PCR. Expression, relative to hypoxanthine phosphoribosyltransferase (HPRT) was reported as relative units (ru). Results from a repeated measures analysis (PROC MIXED of SAS) differed when P < 0.05. HPRT was similar between lines but was less on d 33 (23.2^a, 23.2^{ab}, 23.3^a, 23.2^a, 23.2^a, 23.0^b ± 0.1 ru). Line had no effect on expression of any gene measured. Relative to d 1, bST decreased GHR-1A (24%), IGFBP-2 (32%), and IGF-c2/IGF-t ratio (19%) and increased INSRA (25%). Relative to d 1, feed restriction decreased GHR-1A (49%), GHR-t (40%), GHR-1A/GHR-t (22%), IGF-c2 (83%), IGF-t (58%), and IGF-c2/IGF-t (62%) and increased IGFBP-2, -3, and -5 (136, 31, 169%). INSRB and INSRB were increased (163, 121% of d1) on d 23 but similar to d 1 on d 26. There were line by day interactions for GHR-1A and for INSRB. Relative to d 1, GHR-1A decreased more in CL (66%) than SL (31%) during feed restriction. Results suggest mechanisms in the growing heifer that regulate adaptation of the somatotrophic axis to feed deprivation may be affected by genetic potential for subsequent milk yield.

Key Words: Selection, Liver, Somatotrophic Axis

W206 Effect of implant program on somatotropin (ST) response to growth hormone releasing factor (GRF) in finishing Holstein steers. B. A. Crooker*¹, W. J. Weber¹, C. Cheatham², L. H. Baumgard², and G. C. Duff², ¹University of Minnesota, St. Paul, ²University of Arizona, Tucson.

Steers (n=19) were randomly assigned to one of four implant schemes of Ralgro (R), Synovex-S (S), or Synovex-Plus (P) and used to determine effects of implants on ST response to GRF. On d 1, 84, and 168, steers received no implants (controls, CON; n = 5) or implants in the sequence RSS (n = 5), RSP (n = 5), RPP (n = 4). On d 228, steers received 5 µg/100 kg BW of human GRF (1-29) analog (Hoffman-LaRoche, Ro23-7863) at 0 min (FLUSH) and 4 µg/100 kg BW GRF 150 min later (CHALL). Blood samples were obtained at -30, -20, -10, -5, 0, 10, and 20 min relative to FLUSH and at -30, -20, -10, -5, 0, 2.5, 5, 7.5, 10, 15, 20, 30, 45, and 90 min relative to CHALL. Mean pre- (-30 to 0 min;

PCST) and post-GRF administration (10 and 20 min; MNST) ST concentrations in serum were determined by RIA. Data were transformed to natural logarithms. Area under the ST response curve for CHALL was quantified (0 to 60 min; AUC60) by trapezoidal summation after subtracting PCST. Effects of implant scheme, GRF, and their interactions were assessed using GLM of SAS. Means differed when $P < 0.05$. Steers averaged 189 ± 4.3 kg BW on d 1. Body weight increased throughout the study, did not differ among implant schemes but was greater for implanted than CON steers by d 112 (370 vs 403 kg), and remained greater throughout the study. At 228 d, BW of implanted and CON steers was 546 and 478 kg. Natural logarithm of PCST was greater for CON than implanted steers ($1.15a, 0.51b, 0.99ac, 0.67bc \pm 0.16$ ng/ml for CON, RSS, RSP and RPP, respectively) and greater for FLUSH than CHALL ($1.00, 0.66 \pm 0.11$ ng/mL). Natural logarithm of MNST was similar among schemes (5.17 ± 0.66 ng/mL) and greater for FLUSH than CHALL ($5.67, 4.28 \pm 0.47$ ng/mL). AUC60 for CHALL did not differ among schemes ($244, 462, 609, 116 \pm 226$ ng x min/mL). Sixty days after the terminal implantation, ST concentrations were less in implanted steers but ST response to GRF did not differ from non-implanted steers.

Key Words: GRF, Implant, Holstein Steer

W207 Analysis of in vivo body composition of new born calves using dual energy x-ray absorptiometry (DXA). J. Hampe*, S. Nueske, A. M. Scholz, and M. Foerster, *University Munich, GE*.

The basis of this study is a comparison of body composition among new born calves of different genetic origins. A number of 167 calves of purebred German Fleckvieh (FV), German Holstein (GH), F1 hybrids (FV x GH and GH x FV) and "F2 hybrids" (GH x F1 - mother and FV x F1 - mother) have been examined within the first week after birth. The calves were sedated with a Ketamin - Xylazin mixture, weighed on a bar scale and scanned in the whole body mode (adult normal) on a GE Lunar DXA scanner (DPX-IQ). The evaluation showed a significant genotype influence on bone mineral density (BMD) and bone mineral content (BMC). Bone mineral percentage (BMPC) is significantly affected by the mothers breeding line. In contrary, soft tissue composed of lean tissue and fat is significantly influenced by the fathers breeding line. BMD and BMC from purebred GH is significantly lower than from calves with FV father or mother. Purebred GH calves have a significantly lower BMPC than crossbred calves with GH father. Purebred GH calves reach in tendency higher values than the other genotypes with regard to the lean tissue percentage (LeanPC). However, the main difference in LeanPC and fat percentage (FatPC) exists between male and female calves with 91.24% to 91.6% lean and 4.86% to 4.52% fat. FV x GH calves reach a significantly higher FatPC than GH x FV calves showing a clear position effect in the crossbreeding program.

Breeding Line	BMC (g)	BMD (g/cm ²)	BMPC (%)	Lean PC (%)	Fat PC (%)	n
GH x GH	1605.7 ± 64.7^a	$.881 \pm .018^a$	$3.64 \pm .08^a$	$91.75 \pm .26$	$4.61 \pm .23^{cd}$	29
FV x FV	1791.9 ± 63.0^b	$.943 \pm .017^b$	$3.87 \pm .08^b$	$91.49 \pm .25$	$4.64 \pm .23^{cd}$	33
GH x FV	1804.3 ± 63.7^{bc}	$.961 \pm .017^b$	$4.02 \pm .08^b$	$91.55 \pm .25$	$4.43 \pm .22^{ac}$	36
FV x GH	1789.9 ± 62.8^b	$.945 \pm .017^b$	$3.84 \pm .08^b$	$91.17 \pm .25$	$4.99 \pm .22^{bd}$	35
GH x F1	1763.3 ± 76.8^{ac}	$.946 \pm .021^b$	$4.02 \pm .09^b$	$91.28 \pm .30$	$4.70 \pm .27^{cd}$	22
FV x F1	1888.1 ± 98.9^b	$.967 \pm .027^b$	$3.93 \pm .12^b$	$91.29 \pm .39$	$4.78 \pm .36^{cd}$	12

Significance ($p < .05$) among Least Squares Means is characterized by different superscripts

Key Words: Dual Energy X-Ray Absorptiometry, Calves, Body Composition In Vivo

W208 Updating growth standards for Canadian Holstein and Ayrshires. D. M. Lefebvre*¹ and R. Lacroix^{1, 1} Dept. of R&D, PATLQ - Quebec DHI, Quebec, ²Dairy Information Systems Group, McGill University, Ste-Anne-de-Bellevue, Quebec, Canada.

Average postcalving weight of primiparous Canadian Holstein and Ayrshire cows has increased by 10% in the last 10 years. The objective of this work was to update reference growth curves for evaluating growth of dairy heifers. Growth data were collected on 24191 heifers in 851 Quebec herds. There were 69131 weight observations (estimated by heart girth) from Holstein and 4309 from Ayrshire heifers (3.1 weight observations per heifer). Height at the withers was also collected (64192 observations

for Holsteins, 3654 for Ayrshires). Average body weight by age was compared to growth standards currently used and approximated the value for the 90th percentile ranking until 20 months of age, indicating the need to update the references for calculating percentile ranking. The observed mean growth rate declined after 20 mos, consistent with average age after calving being 28 mos. The observed mean could therefore not be used as an optimal growth curve. Median body weight after calving (HO: 580 kg, AY: 500 kg) of heifers calving between January 2001 and October 2003 (167,651 observations) was used as the target post-calving BW for percentile 50. Pre-calving BW was estimated as 110% of post calving BW, such that the median target pre-calving BW was established as 638 kg for Holsteins and 550 kg for Ayrshires. Values for percentile rank 90 were calculated ($1.2975 * SD, SD = 11.553 + 2.295 * Age$ for Holsteins, $8.73884 + 2.67656 * Age$ for Ayrshires) as 725 kg for Holsteins and 645 kg for Ayrshires. Birth weight was estimated using the regressions equations fitted on the observed body weights (42.9 and 39.6 kg for HO and Ay, respectively). Constant weight gain from birth to pre-calving at 24 mos. of age was assumed for the entire growth period. Resulting average daily gain for percentile ranks 50 and 90 were 0.81 and 0.91 kg*d⁻¹ for Holsteins and 0.70 and 0.81 kg d⁻¹ for Ayrshires. Standard curves for height at the withers were also established, using a second degree polynomial fitted on the average height by age. Height at the withers for percentiles 50 and 90 at 24 months of age are 141 and 147 cm for Holsteins and 130 and 137 for Ayrshires. The proposed standards should be used as reference to benchmark heifer growth.

Key Words: Dairy Heifer Growth, Growth Standards

W209 Identifying ruminal drinking by measurement of respiratory quotient and methane production in preruminant calves. J. J. G. C. van den Borne*, S. J. J. Alferink, and W. J. J. Gerrits, *Animal Sciences Group, Wageningen University and Research Centre, Wageningen, The Netherlands*.

In preruminant calves, milk is bypassing the rumen by closure of the oesophageal groove and flows directly into the abomasum. Leakage from the oesophageal groove or backflow of milk from the abomasum into the rumen, however, leads to fermentation of the milk replacer and results in reduced performance, meat quality and increased mortality. Several studies have elucidated the mechanism and aetiology of groove closure. In this study (originally not designed to study ruminal drinking) the diurnal pattern of the respiratory quotient (RQ) and methane production in a bloating calf was compared with that of normal calves. Individually housed calves were studied during two, 9-day periods using indirect calorimetry. Milk replacer was fed at $1.5 \times \text{MEM}$ and no roughage was supplied. A clinical case of ruminal drinking spontaneously developed in one of the six calves. The calf was bloating and faeces were clay-like. Nutrient digestibility and gas exchange measurements were compared between this calf and five normal calves. Apparent digestibility of crude protein (86% vs 91%) and crude fat (82% vs 92%) was depressed in the bloating calf compared with the other calves. Marked differences in RQ and methane production were observed at 1.5 h postprandially. RQ increased from 0.78 to 1.13 in the bloating calf and from 0.80 to 0.88 in the normal calves. This can be ascribed to anaerobic fermentation of the milk replacer in the rumen, which theoretically results in an infinite RQ and a concomitant production of methane. Methane production, at the same time, increased from 73 mL/kg^{0.75}/d before feeding to 428 mL/kg^{0.75}/d at 1.5 h after feeding in the bloating calf, and from 25 mL/kg^{0.75}/d to 65 mL/kg^{0.75}/d in normal calves. Based on these observations, it is hypothesised that measurement of O₂, CO₂ and CH₄ in breath 1-2 h post-feeding may provide a sensitive indicator for identification of ruminal drinking. The sensitivity of this methodology, however, needs further study.

Key Words: Calves, Ruminal Drinking, Bloating

W210 Cloning the genomic sequence and proximal promoter of bovine pyruvate carboxylase. S. M. Rodriguez*, C. A. Bidwell, and S. S. Donkin, *Purdue University, West Lafayette, IN*.

Pyruvate carboxylase (PC) catalyzes a pivotal reaction in gluconeogenesis and lipid metabolism in liver. We previously identified six unique alternative splice variants in the 5 untranslated region (UTR) of PC mRNA. These splice variants may have a role in translational regulation of PC protein abundance. The objectives of this experiment were to clone and sequence the bovine PC gene, to determine the intron/exon

organization of the 5'UTR and to identify PC promoter elements. The RPCI-42 Bovine Bacterial Artificial Chromosome (BAC) library was screened with oligonucleotide sequences corresponding to specific elements of the 5'UTR sequence of bovine PC and to a region of the coding sequence. Two BACs that hybridized to all probes were selected for further analysis. A partial restriction map of the BACs was made with oligonucleotides corresponding to the coding region and the 89 and 110 bp elements of bovine PC 5'UTR. The BAC fragments that hybridized to the oligonucleotide probes were isolated and sequenced. The sizes of the cloned genomic PC 5'UTR fragments were verified by PCR, using genomic DNA from four cows. Sequencing data confirms the existence of a 178 bp exon that contains the 68 and 110 bp sequence elements

of the 5'UTR for PC mRNA. The 178 bp exon appears to be the first transcribed exon in PC and the 68 and 110 bp 5'UTR sequences are most likely generated by alternative transcription start sites. Genomic sequence data also confirms that the 3' end of the 89 bp element is a discrete 41 bp exon. Regions within the genomic sequence adjacent to the 178 and 41 bp exons of the PC 5'UTR contain binding sites for TBP, Sp1, Ap1 and/or CEBP transcription factors. These data provide information about the arrangement of exons in the 5'UTR of PC and about putative promoter regions.

Key Words: Pyruvate Carboxylase Gene, Liver, Promoter

Physiology and Endocrinology: Reproductive Technologies and Management

W211 The effect of day six or day seven prostaglandin F_{2α} (PGF_{2α}) injections and using a disinfectant lubricant with Controlled Internal Drug Release (CIDR) inserts for estrus synchronization in dairy heifers. W. M. Graves^{*1}, A. K. McLean¹, R. C. Smith¹, J. B. Rosenberg², and B. C. Beachnau³, ¹University of Georgia, Athens, ²Fort Dodge Animal Health, IA, ³Pfizer Animal Health, Portland, MI.

Our objective was to compare d-6 versus d-7 prostaglandin F_{2α} (PGF_{2α}) injections and the effect of using a disinfectant lubricant with CIDR inserts (Eazi-Breed CIDR, Pfizer Animal Health, New York, NY) placed intravaginally for 7 d. A total of 164 heifers at two locations received PGF_{2α} (Lutalyse, Pfizer Animal Health, New York, NY, 5 mg; i.m.) on either d 6 or d 7 at the time CIDR inserts were removed. Two different types of lubricants, Safe Lube (H&W Products, Inc, Salem, OH) and Nolvalube (Fort Dodge Animal Health, Fort Dodge, IA) with Nolvasan disinfectant (0.1% chlorhexidine acetate) were used to measure effects on discharge at removal and conception. Insertion devices were dipped in Nolvasan solution (29.57mL per 3.785 L), excess fluid was shaken off, then dried with a paper towel prior to using Safe Lube for application. Insertion devices were just wiped and more Nolvalube added between heifers using the disinfectant lubricant. Data were analyzed by Chi-Square. Twenty-nine of 81 (35.80%) heifers treated with Safe Lube showed signs of vaginal discharge versus 18 of 83 (21.69%) treated with Nolvalube (P<.05). Sixty-six (81.48%) of those treated with Safe Lube were in estrus and 29 (43.94%) pregnant versus 76 (91.57%) in estrus and 40 (52.63%) pregnant for the Nolvalube heifers (NS, P=.11). Seventy-one of 82 (86.59%) heifers that were injected on d 6 were in estrus and 33 (46.48%) pregnant versus 71 of 82 (86.59%) injected on d 7 that were in estrus and 43 (47.89%) pregnant (NS). Day-6 heifers came into estrus in tighter synchrony. A total of four (5.63%) of the d-6 heifers were in estrus on d 8, 52 (73.24%) on d 9 and 15 (21.13%) on d 10. A total of four (5.63%) of the d-7 heifers were in heat on d 8, 45 (63.38%) on d 9, 18 (25.35%) on d 10 and four (5.63%) on d 11. Few discharges were seen using the disinfectant lubricant. The number of heifers in estrus and pregnant were similar for the d-6 and d-7 PGF_{2α} injections.

Key Words: CIDR, PGF_{2α} Synchronization, Disinfectant Lubricant

W212 Development of a boar semen mobility assay. A. A. Olivera, D. L. Fernandez*, and E. S. Fonda, *Department of Animal and Veterinary Sciences, California State Polytechnic University, Pomona.*

Eighteen ejaculates from six mature boars were used to develop a porcine sperm mobility assay that could be performed under field conditions. A modified densimeter was used to determine an index representing the changes in light absorbance after spermatozoa penetrated a resistance medium. The control values were subtracted from the experimental values to create the Net Mobility Index (NMI). Variables used in this experiment were incubation time (5, 10, 15 or 20 min), extender (Modena, X-Cell, MR-A or VSP), sperm concentration (1, 2, or 3 x 10⁸) cells/ml and Accudenz Resistance Media concentration (3%, 6% or 9%). Inactivated sperm cells were used as controls. NMI values were lower (P<.01) for inactivated sperm (3.16±0.22 vs 25.044 ± 0.39). NMI values increased (P<.05) with incubation time (5 min, 13.78±0.39; 10 min, 23.806±0.37; 15 min, 29.00±0.38; 20 min, 32.31±0.37). However, sperm penetration tended to stabilize over time. NMI differed (P<.05) among extenders (X-Cell, 31.42±0.37; Modena, 26.70±0.37; MR-A, 23.91±0.39; VSP, 17.53±0.39). Increasing sperm concentration

increased (P<.05) NMI (1 x 10⁸), 19.20±0.33; 2 x 10⁸), 25.28±0.33; 3 x 10⁸), 30.19±0.33), however, neat ejaculate NMI (29.511±0.39) was similar to (P>.05) NMI for 3x10⁸ cells/ml. NMI differed (P<.05) among the three concentrations of resistance media (3%, 28.71±0.33; 6%, 24.23±0.33; 9%, 21.73±0.33). We conclude that the changes in the light absorbance of the resistance media are an expression of the sperm mobility. Moreover, this technique has a potential application, under field conditions, to assess objectively sperm mobility and categorize males based on a Sperm Mobility Index.

Key Words: Sperm, Boar, Mobility

W213 In vitro production of Holstein embryos using Beltsville method sex-sorted sperm. R. D. Wilson*¹, K. A. Weigel¹, P. M. Fricke¹, M. L. Leibfried-Rutledge², D. L. Matthews¹, J. J. Rutledge^{1,2}, and V. R. Schutzkus¹, ¹University of Wisconsin Madison, ²BOMED Inc, Madison, WI.

Our objective was to explore the impact of sperm sorting on the efficiency of in vitro embryo production in Holstein cattle. Cull cows were used as donors, and ovaries were collected via colpotomy or at the time of slaughter. Oocytes were aspirated from the ovaries, and embryos were produced using sex-sorted semen from three Holstein sires. Embryos were transferred into recipient Holstein cows and heifers on the donors farm. Seven Wisconsin herds participated, and 365 embryos were produced from 104 donor cows. Only 272 were transferred, due to limited availability of recipients. On average, 3.5 ± 0.4 transferable embryos were produced per donor, including 1.4 ± 0.2 grade one embryos and 1.5 ± 0.2 grade two embryos. Individual farms averaged from 1.6 to 5.8 transferable embryos per donor. On average 43.7 ± 4 oocytes were collected per donor. The number of usable oocytes averaged 33.9 ± 3.4 and percent embryo cleavage (52.1 ± 1.9) were significant predictors of the number of blastocysts and number of transferable embryos. Preliminary pregnancy results show strong farm and sire effects. Overall conception rate was 36 percent for heifer recipients and 18 percent for milking cow recipients (P<.05). To test the effect of sperm sorting on the percentage of embryos developing to blastocyst stage, oocytes were recovered from anonymous donors at a slaughterhouse and fertilized using non-sorted sperm or sex-sorted sperm from these sires. Oocytes (n=3312) fertilized using non-sorted sperm produced (P<.05) more embryos developing to blastocysts than oocytes (n=1577) fertilized using sex-sorted sperm (20.1 ± 2.9 percent vs. 12.2 ± 2.3 percent, respectively). These results suggest that sexing sperm using the Beltsville method (fluorescence-activated cell sorting) method may have adverse effects on embryo development and conception rates in in vitro production systems.

Key Words: Sexed Semen, In Vitro Production, Dairy Cattle

W214 Induction of bilateral double ovulation to promote twinning in beef cattle. M. Hogue¹, A. Bor², Y. Lavon¹, M. Maman¹, S. Jacoby², and D. Wolfenson*¹, ¹The Hebrew University, Rehovot, Israel, ²Agricultural Research Organization, Bet Dagan, Israel.

Beef cattle producers gain substantial economic benefits from cows that produce twins. Calf survival and birth weight are greater and incidences of abortion and dystocia are less in bilateral than unilateral twin pregnancies. A major objection to using gonadotropins to induce twins is the wide variation of ovarian response. The present study examined induction of bilateral-double or triple ovulation by stimulating follicle