

Beef Species

W39 Survey of beef quality assurance on California dairies. S. Aly¹, H. Rossow¹, G. Acetoze*², T. Lehenbauer¹, M. Payne³, D. Meyer², J. Maas⁴, and B. Hoar³, ¹*Veterinary Medicine Teaching and Research Center, School of Veterinary Medicine, University of California-Davis, Tulare*, ²*Department of Animal Science, University of California-Davis, Davis*, ³*Western Institute of Food Safety and Security, University of California-Davis, Davis*, ⁴*Veterinary Medicine Extension, School of Veterinary Medicine, University of California-Davis, Davis*.

In October 2010 a mail and internet survey of California's dairy industry was implemented to assess the Dairy Animal Care and Quality Assurance (DACQA) program. The DACQA program, which involves cattle of all ages, benchmarks practices on the dairy that affect the use of dairy cattle for beef. The survey was mailed to a random sample of 1071 California dairies (65%) stratified by county with allocation proportional to density of dairies in each of the state's 32 counties with dairies. Data from the 173 (16%) responses from 19 counties received which represented 10% of the state's milking herd, showed that 90% of culled cows on California dairies were sold for beef. Survey results also showed that personnel from 45% of California's dairies preferred injecting drugs subcutaneously if possible, 97% kept track of withdrawal periods and 49% maintained a form of drug inventory. Personnel who maintained a drug inventory were 3 times more likely to test for drug residues compared with those who didn't (P value 0.02). Furthermore, 44% of personnel of California's dairies reported knowledge of their culled cows' hot carcass weight or USDA carcass grade. In addition to the estimated 34% of California dairies that supported a beef quality assurance certification program, approximately 45% would specifically request more information on such a program. Although few dairies were familiar with the DACQA website, approximately half requested more information on the program. The likelihood that the DACQA certification program would be applied on California dairies is favorable given the interest support for it.

Key Words: beef quality, DACQA, survey

W40 Effects of stabilizing oxidative balance through dietary means on growth performance, antioxidant metabolites and fertility factors in bulls. T. J. Wistuba,* M. Becker, S. Court, and G. I. Zanton, *Novus International Inc., St. Charles, MO*.

One of the most important factors of farm profitability in Australian beef herds is fertility. Numerous factors can influence oxidative balance in livestock (environmental, dietary, health, etc.) and thus fertility, especially in young bulls. Nutritionally Cu, Mn and Zn have been shown to affect superoxide dismutase activity (SOD), Se has an important role in glutathione peroxidase activity (GPX), and dietary antioxidants have been shown to improve overall immune status. The objective of this study was to improve oxidative balance in young bulls through nutrition and measure the response in antioxidant metabolites, semen quality and morphology and animal performance. Two hundred-one Droughtmaster bulls (614.6 ± 35.61 kg) were tested for semen morphology 19 d pre-treatment. Animals were then blocked into pen groups by age, average sperm morphology and BW for apparent maturity and physiological status. The control ration was balanced to meet or exceed NRC (1996) requirements, the treatment diet was the control ration plus 2-hydroxyl-4-methyl-thio butanoic acid (MHA), Agrado Plus dietary antioxidant, Mintrex-Cu, -Mn and -Zn as well as Zorien SeY (Novus

International) and was fed for 59 d. The ANOVA was generated utilizing the GLM procedure of STATA version 11 (College Station, TX); model included treatment, date and the interaction between treatment and date. Results indicated no benefit to sperm morphology or performance when compared with control. However, SOD/g Hemoglobin was reduced in both treatment and control. Semen concentrations of GPX increased significantly for treatment when compared with the control ($P = 0.025$). Rectal temperature increased to a greater degree ($P = 0.001$) for control compared with treatment ($P = 0.014$). Additionally, radiant temperature at the testicular surface increased significantly in control during the trial ($P = 0.008$). This study indicates feeding dietary antioxidants, hydroxy methyl analog, chelated trace minerals, and organic selenium can encourage maintenance of antioxidant metabolites.

Key Words: bull development, oxidative balance, semen quality

W41 Phenotypic correlations of the residual intake and gain with ultrasound carcass traits and other feed efficiency measures in Nellore cattle. R. C. Gomes*¹, S. L. Silva², M. H. A. Santana², J. B. S. Ferraz², P. Rossi Jr.³, and P. R. Leme², ¹*Department of Animal Science, State University of Londrina, Londrina, Parana, Brazil*, ²*College of Animal Science and Food Engineering, University of Sao Paulo, Pirassununga, Sao Paulo, Brazil*, ³*Federal University of Parana, Curitiba, Parana, Brazil*.

The residual feed and gain (RI&G) was recently reported as an alternative feed efficiency trait in beef cattle; however, associations of RI&G with carcass traits have not been described. The aim was to evaluate the phenotypic correlations of RI&G with ultrasound carcass traits in Nellore bulls and steers. Individual dry matter intake (DMI) and average daily gain (ADG) were computed in Nellore steers ($n = 267$, 20-month old; 346 ± 30 kg initial BW) and bulls ($n = 277$, 22-month old; 391 ± 40 kg initial BW) in performance tests that were carried out from 2005 to 2011. Ultrasound backfat thickness (UBFT), rump fat thickness (URFT) and rib eye area (UREA) were measured at the beginning and at the end of each test and the daily gain of each trait was calculated. Residual feed intake (RFI), residual gain (RG) and RI&G were computed using test as a contemporary group effect in the model. Pearson correlation analyses were carried out separately for steers or bulls. Coefficients of correlation of RI&G with feed conversion ratio (FCR), RFI and RG were respectively -0.79 ; -0.86 and 0.86 for steers and -0.70 ; -0.87 and 0.87 for bulls ($P < 0.0001$). RI&G, RFI and RG were not correlated with mid-test body weight ($P > 0.05$). For steers, RI&G was not correlated with final UBFT (0.00 , $P > 0.05$), final URFT (-0.03 , $P > 0.05$) and with the daily gain of both traits (-0.03 and 0.01 , respectively, $P > 0.05$). Positive low correlations were observed between RI&G and final UREA (0.13 , $P < 0.05$) and with UREA gain (0.14 , $P < 0.05$). In bulls, RI&G was not correlated with UREA gain (0.00 , $P > 0.05$), final UBFT (-0.06 , $P > 0.05$), final URFT (-0.04 , $P > 0.05$) and with the gain of both traits (0.08 and 0.02 , respectively, $P > 0.05$). A low positive correlation was observed between RI&G and final UREA (0.17 , $P < 0.05$). In the same data set, RFI and RG were correlated with UBFT and URFT gains in steers, whereas RG was also correlated with final UREA in both genders. Residual intake and gain is highly correlated with other feed efficiency traits and seems independent of subcutaneous fat deposition, but not rib eye area.

Key Words: beef, *Bos indicus*, gain to feed

W42 Estimation of genetic parameters for carcass and image analysis traits of Japanese Black (Wagyu) in Australia. S. Maeda^{*1}, J. Grose², and K. Kuchida¹, ¹Obihiro University of A&VM, Obihiro, Hokkaido, Japan, ²Wagyu Genetics Pty Ltd., Brisbane, QLD, Australia.

Japanese Black (JB) is the major breed of beef cattle in Japan and is known for high marbling (intramuscular fat). JB were introduced into Australia in the 1990's with importation of embryos and live JB from USA. Similar to Japan, improvement in marbling is rewarded in some domestic and export beef markets in Australia. The AUS-MEAT marbling score (MS) grading system was designed for rating relatively lean meat. The AUS-MEAT MS system has problems in adequately describing the relatively higher marbling that occurs in JB. The objectives of this study were to estimate genetic parameters for carcass and image analysis traits and to investigate an effective indicator of improving marbling of JB in Australia. Australian bred and raised JB (n = 414) were used for this study. All animals were fed in Australian feedlots and shipped to an Australian abattoir and processed from August 2010 to July 2011. Image analysis traits were collected with a Mirror Type camera taking digital images at the 5th-6th rib cross section. The mathematical model for genetic analysis included sex and month of kill data as fixed effects and slaughter age as covariate. Heritabilities and genetic correlations were estimated by the AIREMLF90 program. The peak of frequency distribution of AUS-MEAT Marbling Score with the range from 1 to 9 was 9. Estimated heritabilities for grading and image analysis traits were 0.23 for MS, 0.59 for HCW, 0.44 for rib eye area, 0.54 for marbling percent (intramuscular fat) (MP), 0.37 for coarseness index of marbling (CIM), 0.55 for fineness index of marbling, 0.32 for minor-major axes ratio of rib eye, 0.08 for complexity of rib eye shape, 0.57 for average luminance of lean, respectively ($P < 0.05$). Heritability of MS was less than MP. These results show that MS is an unsuitable evaluation value for JB, when compared with Image analysis traits for the effective genetic improvement of marbling in Australian JB. However, genetic correlation between MP and CIM was positive (0.33). Thus, marbling improvement using selection for MP may also increase the negative attribute of CIM.

Key Words: Australian Japanese Black (Wagyu), heritability, image analysis

W43 Effect of different feeding system on the fatty acid and lipid oxidation of raw and cooked meat of Sarda-Bruna young bulls. S. P. G. Rattu, R. Boe, R. Rubattu, A. Mazza, G. Pulina, and A. Nudda,* *Dipartimento di Agraria, Sezione di Scienze Zootecniche, Università di Sassari, Sassari, Italy.*

Fatty acid composition, nutritional quality and oxidative stability was determined in raw (RW) and cooked (CK) samples of Longissimus dorsi (LD) of 10 Sardo-Bruna young bulls from 2 different feeding systems. After weaning (mean = 8.5 mo of age) bulls were divided into 2 groups: 5 animal reared on pasture during the daylight (5 - 6 h/d) and supplemented with a mixture of concentrate and of meadow hay (P), and 5 confined in stable (NP). Young bulls were slaughtered at about 500–550 kg live weight. Five days after slaughtering, the LD, between 5th and 7th rib, were removed and split into 2 pieces: 50 g of each sample was RW and 50 g was CK in a microwave at 650 W for 45 s to a final internal temperature of 75°C. Lipid oxidation was measured as mg of malondialdehyde (MDA) per kg of meat. Data were analyzed using a model including feeding system, cooking and their interaction. Fat content did not differ between P (1.42%) and NP (1.50%) groups in RW samples ($P = 0.68$), whereas it tended to be greater in CK samples ($P = 0.07$) of both groups (2.86% and 2.06 in P and NP, respectively). The RW samples of P group showed a lower content of PUFA n6 (12.7 vs 15.1;

$P = 0.07$), and a greater proportion of PUFA n3 (1.7 vs 1.1; $P = 0.08$), with a more favorable n6/n3 ratio (7.6 vs. 14.5; $P < 0.01$) compared with NP group. In particular, the RW samples of P group had higher content of C18:3n3, C18:1t11, CLA c9t11 isomer and odd-branched fatty acids and a lower content of C20:2n6, C20:4n6 and C22:4n6 fatty acids than NP group ($P < 0.05$). The microwave cooking did not change the relative proportion of fatty acid in both feeding system treatment ($P = 0.23$). Lipid oxidation was not influenced by feeding, but was markedly increased by cooking ($P < 0.01$) in P (from 0.07 to 0.52) and NP (from 0.23 to 0.56). The results showed that grazing for few hours per day influenced positively the fatty acid profile of meat from young bulls. Research funded by Associazione Melina, Sardinia, Italy.

Key Words: beef meat, feeding system, fatty acid

W44 Analysis of twin births, calf stillbirth, abortion and calf death before 28 days of age in Irish Charolais and Limousin populations. A. M. Doyle^{*1}, R. D. Evans², and A. G. Fahey¹, ¹School of Agriculture and Food Science, University College Dublin, Ireland, ²Irish Cattle Breeding Federation, Bandon, Co. Cork, Ireland.

Twinning in beef cattle provides an opportunity for improvements in production efficiency. However, twinning may also have adverse effects on animal welfare and management. A greater understanding of factors associated with twinning will help us to formulate management strategies that will increase twinning while minimizing adverse effects. The objective of this study was to analyze the incidence of twin births in Irish Charolais (CH) and Limousin (LM) herds and potentially associated factors of calf stillbirth, abortion, and calf death before 28 d. Incidence of stillbirth, abortion and calf death before 28 d was analyzed through a comparison between single and twin births. Calving records of CH (n = 110,401) and LM (n = 138,416) herds from 2004 to 2009 were used for the analysis. The mean twinning, calf stillbirth, abortion, and calf death before 28 d was 4.5%, 1.84%, 0.32%, and 1.73% for CH and 1.5%, 1.35%, 0.25%, and 1.45% for LM respectively. Twinning increased as the parity increased (Odds Ratio (OR) = 1.77 for CH parity 5 vs. parity 1; OR = 1.80 for LM parity 5 vs. parity 1). The greatest odds of twinning occurred for calves born in summer for each of the breeds. Calf stillbirth was higher for twin births than for single births in CH (OR = 3.78 twin vs. single birth) and LM (OR = 2.38 twin vs. single birth). Calving difficulty greatly influenced the odds of stillbirth occurring, particularly in twin births, where CH (OR = 16.30 calving score 4 vs. calving score 1) and LM (OR = 33.74 calving score 4 vs. calving score 1). Abortion is also more likely for twin pregnancies than single pregnancies in LM animals (OR = 4.14 twin vs. single birth). Season of birth, year or birth and dam parity also affected the odds of abortion occurring. The odds of calf death before 28 d was increased for twin births when compared with singles and were also affected by parity, season, sex of calf and year of calving. This research shows that twinning rate may be affected by breed and age of the dam, and can affect calving difficulty and mortality. Twinning rates are affected by breed and age of the cow and management strategies are therefore required to reduce calving difficulty and mortality where cows are pregnant with twins.

Key Words: twinning, abortion, stillbirth

W45 The effect of limiting feed intake on visceral organ mass and performance in the pregnant beef cow. K. M. Wood^{*1}, C. J. Fitzsimmons^{2,3}, S. P. Miller¹, I. B. Mandell¹, B. W. McBride¹, and K. C. Swanson⁴, ¹Dept. of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada, ²Agriculture and Agri-Food Canada, Edmonton, AB, Canada, ³Dept. of Agriculture, Food and Nutritional

Science, University of Alberta, Edmonton, AB, Canada, ⁴Dept. of Animal Sciences, North Dakota State University, Fargo.

Twenty-two multiparous pregnant beef cows were used to investigate the effect of dietary restriction on the visceral organ mass and cow performance. Cows were fed a haylage-based total mixed ration containing 20% wheat straw at either 85% (n = 35; LOW) or 140% (n = 34; HIGH) of NEM. Cows were blocked by date of parturition and were slaughtered at approximately 250 d of gestation, after 83 d on dietary treatment and every wk thereafter for 6 wks. Visceral organs were removed of digesta, trimmed of fat and weighed. Statistical analysis was conducted using Proc Mixed in SAS and included the fixed effect of dietary treatment, cow age, block and the random effect of pen. Cows fed HIGH consumed 10.9 kg DM per d and LOW consumed 6.8 kg DM per d ($P < 0.001$). Cows fed HIGH had a greater ($P = 0.003$) ADG than LOW. Cows fed HIGH had a greater final BW than LOW ($P = 0.04$), even though initial BW did not differ ($P = 0.9$). There were no differences ($P \geq 0.32$) between treatments for grade fat, ribeye area or marbling score, while HCW tended to be greater ($P = 0.07$) in HIGH. Rumen weight was greater ($P = 0.02$) in HIGH and liver weight tended to be greater ($P = 0.07$) in HIGH, however these variables expressed relative to HCW were not ($P \geq 0.40$) different. Weights (actual or relative to HCW) of kidney, lungs, heart, pancreas, spleen and lower GI (large + small intestine + cecum) did not differ ($P \geq 0.14$) between treatments. Total visceral fat was numerically greater in HIGH ($P = 0.2$) however large variation was observed. This data indicates that restricted dietary intake impacted the performance of the cow during late gestation, but did not affect visceral organ mass. This data will further the understanding of feed efficiency and maintenance energy requirements in the pregnant beef cow.

Key Words: beef cows, visceral organ mass, feed intake

W46 Whole cottonseed can promote as much rumination activity as barley straw when incorporated in TMR fed beef heifers at finishing period. S. P. Iruira,* J. L. Ruíz de la Torre, M. Rodríguez-Prado, X. Manteca, S. Calsamiglia, and A. Ferret, *Universitat Autònoma Barcelona, Bellaterra, Spain.*

Eight Simmental heifers (initial BW 313 ± 13.2 kg) were randomly assigned to one of 4 experimental treatments in a 4×4 double Latin square design. The experiment was performed in 4 28-d periods. Treatments tested were a control diet in which barley straw was used as a fiber source (BS), and 3 diets where the main difference was the non-forage fiber source used: soybean hulls (SH), beet pulp in pellets (BP) and whole cottonseed (WCS). Fiber ingredients were incorporated at 10, 17, 17 and 16% (on DM basis) in BS, SH, BP and WCS, respectively. All diets were offered ad-libitum as TMR and designed according to NRC (1996) to be isoenergetic (2.95 Mcal/kg DM) and isonitrogenous (15% on DM). Animals were individually housed in roofed pens. Intake was recorded over 7 d in the last week of each experimental period. Behavior was recorded for 24-h on d 2 and d 6 of each experimental week using a digital video-recording device. A digital color camera was set up in front of each pen. Recorded activities were registered together with their beginning and ending times. Data for each activity is presented as the total time, expressed in minutes per day, in which the animal showed the specific activity. An observation was defined as eating when the animal had its muzzle in the feedbunk or was chewing or swallowing food with its head over it. Ruminating included regurgitation, mastication and swallowing of the bolus. Intake of DM was statistically analyzed using the MIXED procedure of SAS. To test treatment effect for each behavioral activity, analysis was performed by using the GLIMMIX procedure of SAS. DM intake was higher in WCS than in the remaining treatments (7.9 vs 7.3 kg/d; $P = 0.05$). Time

spent eating tended ($P = 0.10$) to be higher in WCS and BP (93 min/d) than in BS and SH (76 min/d). Time spent ruminating was not different between BS and WCS (294 and 249 min/d) but was lower ($P = 0.001$) in SH and BP (168 and 166 min/d). In conclusion, WCS can promote ruminating behavior as much as BS.

Key Words: cattle behavior, concentrate diet, whole cottonseed

W47 Protein supplementation of low-quality forage: Effects of amount and frequency on cow performance and intake and nutrient digestibility by steers. D. W. Bohnert¹, R. F. Cooke¹, B. I. Cappellozza¹, D. L. McGuire*¹, and S. J. Falck², ¹Eastern Oregon Agricultural Research Center, Oregon State University, Burns, ²Eastern Oregon Agricultural Research Center, USDA-ARS, Burns.

Two experiments were conducted to determine the effects of supplement amount and supplementation frequency (SF) on performance, DMI, and nutrient digestibility by cattle consuming low-quality forage. Treatments were arranged in a 2×3 factorial design (2 levels of CP and 3 SF; CON = unsupplemented; D = supplemented daily; 5D = supplemented once every 5 d; 10D = supplemented once every 10 d; 1/2 D = supplemented at 50% of D; 1/2 5D = supplemented at 50% of 5D; 1/2 10D = supplemented at 50% of 10D). In Experiment 1, 84 cows in the last third of gestation were used in a randomized complete block design to evaluate treatment effects on BW and BCS change while in Experiment 2, 7 steers were used in a 7×4 incomplete Latin square to evaluate nutrient intake and digestibility. Soybean meal (SBM) was used as the source of supplemental CP. Full CP refers to D, 5D, and 10D (each full CP treatment received the same amount of CP over a 10 d period) and half CP refers to 1/2 D, 1/2 5D, and 1/2 10D dietary treatments. In Exp. 1, precalving BCS change was more positive ($P = 0.03$) for supplemented treatments. We did note a linear effect of SF \times amount of CP for precalving BCS ($P = 0.06$), with full CP treatments decreasing more as SF decreased from D to 10D compared with half CP (0.1 to -0.3 and -0.2 to -0.3, respectively). Straw and total DMI were increased with supplementation ($P < 0.03$) in Experiment 2; however, we observed a linear effect of SF \times amount of CP for both variables ($P = 0.02$); DMI with full CP decreased a greater amount as SF decreased compared with minimal change for half CP. Apparent total tract DM, OM, and NDF digestibility was not affected by supplementation ($P > 0.10$), while DM and OM digestibility responded quadratically to SF with lower digestibility occurring on 5D treatments ($P < 0.05$). Plasma urea was greater with supplementation ($P < 0.001$) and for full compared with half CP ($P < 0.001$). Reducing the amount of supplemental CP provided to ruminants consuming low-quality forages, when supplementation intervals are greater than 5 or 6 d, can be a management tool to maintain acceptable levels of DMI, digestibility, and performance while reducing supplement cost.

Key Words: cattle, frequency, supplementation

W48 Using corn stover and DDGS to conserve stockpiled forages and improve reproductive performance and progeny growth in fall-calving beef cows. P. J. Gunn*¹, R. P. Lemenger¹, and G. A. Bridges², ¹Department of Animal Sciences, Purdue University, West Lafayette, IN, ²North Central Research and Outreach Center, University of Minnesota, Grand Rapids.

Angus-cross, fall-calving beef cows (n = 153; BCS = 5.4 ± 0.5) were used to determine if incorporating a period of corn stover and dried distillers grains with solubles (DDGS) feeding into a preexisting nutritional program that included grazing stockpiled fescue affects reproductive

performance and progeny growth. Calving began on Julian d 243. On Julian d 267, cows were stratified and allotted by BW, BCS, and calving date (if calved) to receive 1 of 2 isocaloric dietary treatments through timed-AI (TAI): stockpiled fescue (CON) or corn stover and DDGS (DG; DDGS at 0.7% BW per d). Following TAI, CON cows were fed grass hay, and DG cows were placed on stockpiled fescue until grass was exhausted (Julian d 20) and then fed grass hay. Cow BW and BCS were assessed every 28 d during supplementation. Estrous cycling status was determined by evaluation of progesterone in 2 blood samples taken at and 10 d before estrous synchronization, and on Julian d 336, TAI was conducted. Pregnancy determination was done by transrectal ultrasonography 35 d after TAI and the end of the breeding season. Calf weights were recorded at 62 ± 16 and 146 ± 16 d of age and again at weaning (steers and heifers were weaned at 144 ± 16 and 208 ± 18 d of age, respectively). Categorical and continuous data were analyzed with the GLIMMIX and MIXED procedures of SAS, respectively. Cow BW and BCS did not differ during the supplementation period. The proportion of cows cycling at breeding season initiation tended ($P = 0.06$) to be greater in CON (92.2%) than DG (80.6%) treated cows. TAI pregnancy rates did not differ between the CON (42.4%) and DG (50.0%) treatment. However, breeding season pregnancy rates were greater ($P = 0.03$) in the DG (89.6%) than CON (74.2%) treatment. DG progeny were heavier at 62 d of age and at weaning and had a greater 205 d adjusted weaning wt ($P \leq 0.03$) than CON progeny. In summary, including a dietary period of corn stover and DDGS to a traditional management practice of grazing stockpiled fescue and feeding hay resulted in greater breeding season pregnancy rates and heavier progeny.

Key Words: beef cow, DDGS, fertility

W49 Meta-analysis on the effects of supplementing distiller's grains to beef cows during early lactation on reproductive efficiency and pre-weaning progeny growth. P. J. Gunn^{*1}, J. P. Schoonmaker¹, R. P. Lemenager¹, and G. A. Bridges², ¹Department of Animal Sciences, Purdue University, West Lafayette, IN, ²North Central Research and Outreach Center, University of Minnesota, Grand Rapids.

Three independent studies using Angus-cross beef cows ($n = 284$) at Purdue University assessed the effects of feeding dried distiller's grains with solubles (DDGS) as a primary dietary energy source during various phases of production on performance, reproduction, and progeny development. The purpose of this meta-analysis was to determine the effects of DDGS supplementation during early lactation on reproductive performance and progeny growth. In all studies, cows were stratified and allotted by BW and BCS to 1 of 2 isocaloric dietary treatments initiated either at 192 d of pregnancy or during calving. Diets were: 1) corn silage and haylage, or stockpiled forage (CON); or 2) low quality forage with DDGS (DG) supplementation. DG supplementation concluded at either timed-AI or at ultrasonography pregnancy diagnosis approximately 30 d after timed-AI. All cows were synchronized for estrus using the 5 d CO-Synch + CIDR protocol. BW and BCS were assessed throughout the supplementation periods. Categorical and continuous data were analyzed with the GLIMMIX and MIXED procedures of SAS, respectively. Meta-analysis demonstrated that days postpartum, BW, and BCS at estrous synchronization, as well as the proportion of male offspring born did not differ ($P \geq 0.53$) between treatments. However, the meta-analysis revealed that timed-AI pregnancy rates were greater (64.1 vs. 50.0%; $P = 0.02$), and overall breeding season pregnancy rates tended to be greater (91.5 vs. 84.9%; $P = 0.10$) in DG than CON treatments. Although DG progeny were heavier than CON at birth (36.2 ± 0.5 vs. 34.4 ± 0.5 kg; $P = 0.01$), DG progeny had greater pre-weaning ADG (0.99 ± 0.01 vs. 0.95 ± 0.01 kg; $P = 0.009$), weaning weights (236 ± 3.1

vs. 228 ± 3.0 kg; $P = 0.04$), and 205 d adjusted weaning weights (230 ± 2.5 vs. 222 ± 2.4 kg; $P = 0.009$) than CON progeny. In conclusion, using a meta-analysis to combine 3 independent studies demonstrated that utilization of DDGS as a primary dietary energy source during early lactation appears to result in improved fertility and accelerated progeny growth.

Key Words: DDGS, developmental programming, fertility

W50 Effects of water stress and plant population on corn plant yields and composition. S. Soderlund, C. J. Fagan, A. T. Hassen, and F. N. Owens,* Pioneer Hi-Bred International, a DuPont Business, LaSalle, CO.

Higher plant densities and adequate irrigation typically increase corn silage yield, but their effect on quality remains uncertain. Four elite commercial Pioneer corn hybrids (109–116 d CRM) planted in 4 rows 76 cm apart and 4.6 m long were thinned to 59, 89, and 119 thousand plants per hectare in quadruplicate subplots. In addition to 17 cm rain, sub-subplots received 65 cm (full), 34 cm (moderate), or 18 cm (limited) of subsurface irrigation water by irrigating at each, alternate, or every third cycle during the growing season. Whole plants were chopper harvested when kernels were fully dented (one-third milk line); hybrids averaged 30.4 to 33% DM. Harvest weight was measured and chemical components were determined for the 144 sub-subplots. Main effects are described only when interactions were not significant ($P > 0.05$). Although DM yield and calculated milk per acre were least ($P < 0.05$) with the lowest plant population, milk per ton of DM (Milk 2006) was reduced ($P < 0.05$) at the highest plant population. Limiting the water supply linearly reduced ($P < 0.05$) plant height, DM yield, and milk per acre. However, NDF digestibility increased linearly ($P < 0.05$; from 50 to 55%) as water supply was restricted; severe water restriction reduced milk per ton. NDF digestibility was greater ($P < 0.05$) for Pioneer BMR hybrid P1376XR than for the other 3 hybrids (55 vs. 50 to 52%). Averaged across hybrids, limiting the water supply decreased yield and concentration of starch but increased plant protein, sugar, and NDF; in vitro DM digestion and milk per ton was greatest when water supply was moderate. As plant population increased, DM yield increased but starch content and NDF digestibility decreased; in vitro DM digestion and milk per ton was greatest with the lowest plant population. Although hybrid rankings generally remain similar, local and yearly differences in both yield and quality of corn silage can be ascribed partially to differences in water availability and plant population.

Key Words: corn silage, irrigation, plant population

W51 Prediction of preweaning ADG in beef calves from milk fatty acid methyl esters. Z. Deng^{*1}, M. A. Brown², Y. Peng³, S. Coleman², and R. G. Mateescu¹, ¹Oklahoma State University, Stillwater, ²USDA-ARS, Grazinglands Research Laboratory, El Reno, OK, ³Xi'an Vertex Electronics Technology Co. Ltd., Xi'an, Shaanxi, China.

Research has shown milk yield (MWT) has an important influence on calf preweaning ADG (PRWADG), but MWT accounts for only a moderate amount of variation in PRWADG. The objective of this study was to determine if milk fatty acid methyl esters (FAME), alone and in combination with MWT, could improve accuracy of prediction of PRWADG. Forty-five beef cows sired by Bonsmara, Brangus, Charolais, Gelbvieh, Hereford and Romosinuano bulls were used in a 2 yr study. Spring-calving cows were milked 6 times per year every 28 d beginning late May, and milk samples were analyzed for milk fat and protein. Milk samples collected in May, July and September each year were

analyzed for FAME. Percentages of 42 FAME in each milk sample were acquired using a gas chromatograph flame ion detector. Milk weights, quality data, and FAME were averaged over collection dates before analyses. Stepwise regression was used to identify linear models to predict PRWADG using MWT, age of dam (AOD), and percent FAME. The R^2 and associated condition index (CI, an indicator of collinearity) were used in model evaluation. Condition indexes less than or close to 30 were considered to have low collinearity. Regression of PRWADG on MWT resulted in an R^2 of 0.35 with a CI of 9.4 while inclusion of AOD gave an R^2 of 0.4 and a CI of 21.6. A regression equation using 8 FAME accounted 54% of the variation in calf ADG with a CI of 33. When MWT and AOD were included with FAME as predictors, a prediction equation with 8 FAME, MWT, and AOD accounted for 69% of the variation in PRWADG with a CI of 29. Partial least squares regression (PLS) was also used to predict PRWADG from FAME, MWT, and AOD. Results from PLS analyses yielded a dependent variable R^2 of 0.61 using all 42 FAME with 7 extracted factors and a dependent variable R^2 of 0.78 when MWT and AOD were included with the 42 FAME with 7 extracted factors. Results from these preliminary analyses suggest that FAME composition of milk influences calf ADG and that data on percent FAME in combination with MWT and AOD can improve the accuracy of prediction of calf PRWADG compared with MWT and AOD alone.

Key Words: beef cattle, milk fatty acids, preweaning ADG

W52 Correlation of IGF-1, growth hormone, and leptin to breeding beef heifer productivity. C. J. Mueller*¹, D. Keisler², H. DelCurto¹, and T. DelCurto¹, ¹Eastern Oregon Agricultural Research Center, Oregon State University, Union, ²University of Missouri, Columbia.

The use of metabolic parameters associated with growth and tissue development may aid in predicting productivity of beef heifers, thus reducing potential production inefficiencies. Dam and offspring production variables were collected on 84 Angus-based crossbred heifers retained from the 2006 (n = 40 heifers; 3.42 parities/heifer) and 2007 (n = 44 heifers; 2.64 parities/heifer) calf crops. Blood samples were obtained at approximately 1 yr of age and analyzed for IGF-1, GH, and Leptin concentrations. Data within each hormone category were grouped (GROUP) into upper 25% (HIGH), middle 50% (MID), and lower 25% (LOW) of hormone concentrations using univariate analysis. Production variables within hormone category were analyzed as a one-way ANOVA with GROUP as the main effects and heifer birth year as a covariate. Experimental unit was heifer and the error term was residual error. Pearson correlation coefficients were determined between production variables and hormone concentrations. Pregnancy interval was correlated ($r = -0.273$; $P = 0.020$) with IGF-1, with higher concentrations associated with shorter intervals (-5 d/yr). Pregnancy interval was 5.9 d less ($P = 0.045$) for HIGH vs. MID IGF-1, 9.9 d less ($P = 0.013$) for HIGH vs. LOW GH, and tended ($P = 0.082$) to be 4.2 d greater for MID vs. LOW leptin. Number of parity was not associated ($P > 0.10$) with hormone concentrations or GROUP within hormone

categories. Percentage of calves weaned/born tended ($P = 0.086$) to be less for HIGH (94.7%) vs. MID leptin (99.4%). No correlations ($P > 0.10$) between hormone concentrations and percent calves weaned/born were observed. Offspring carcass weights (HCW), ratio of ribeye area-to-HCW, and marbling scores were not affected ($P > 0.10$) by heifer hormone concentrations within any hormone category. Yield grade (YG) of offspring was correlated ($r = 0.256$, $P = 0.057$) with heifer IGF-1 concentrations; with MID (2.74) tending ($P = 0.073$) to have lower YG vs. HIGH (3.01). These data indicate that concentrations of IGF-1, GH, and Leptin at time of replacement heifer selection have limited value as prediction tools of female productivity.

Key Words: hormones, beef heifers, productivity

W53 Exposure of prepubertal beef bulls to cycling females does not enhance sexual development. N. Miller* and K. Fike, *Kansas State University, Manhattan.*

The objectives of the study were to determine if continuous, long-term, fenceline exposure of prepubertal beef bulls to cycling beef females affects bull age at puberty and ability to pass their first breeding soundness examination (BSE). Angus, Simmental, and Hereford bulls (n = 77) within breed were stratified by age and assigned to treatment (average age of 196 ± 22 d). Exposed bulls (EXP) had continuous fenceline contact with cycling females for the duration of the study while control (CON) bulls were penned a minimum of 42 m from cycling females without visual or physical contact. Estrous cycles were synchronized, such that 2 to 5 females were in estrus each week. Body weights (BW) and scrotal circumference (SC) were measured every 28 d. When bulls achieved a ≥ 26 cm SC, semen samples were obtained monthly via electroejaculation until puberty was reached. Bulls were considered pubertal when sperm concentration was $\geq 50 \times 10^6$ /mL and motility was ≥ 10 percent. Homosexual mounting behavior (MB) of bulls was assessed twice/mo during diestrus (D) and estrus (E) stages of females. BSEs were conducted when bulls averaged 364 ± 22 d of age. Normal sperm morphology of $\geq 70\%$ and sperm motility of $\geq 30\%$ were considered passing. Age and SC at puberty and MB were analyzed using PROC MIXED in SAS, with fixed effect of treatment and random effect of pen; mo and stage of estrous were included as fixed effects for MB. BSE data were analyzed using PROC GLIMMIX in SAS with fixed effect of treatment. Age and SC at puberty were similar for EXP and CON ($P > 0.10$; 323 d and 311 d, respectively; 34.6 cm and 34.9 cm, respectively). Treatment and female estrous stage interacted to affect bull MB ($P < 0.01$). EXP bulls had more MB when females were in E as compared with D ($P < 0.01$). Similar MB were observed for EXP bulls when females were in E compared with CON bulls during both E and D ($P > 0.10$). A similar percentage of bulls passed their first BSE ($P > 0.10$; EXP = 87.8% and CON = 74.4%). In conclusion, continuous, fenceline exposure of developing bulls to cycling beef females does not reduce age at puberty nor influence ability to pass first BSE.

Key Words: bulls, puberty, breeding soundness examinations