

Production, Management and the Environment: Management and Methods I

379 Single nucleotide polymorphisms of lactate dehydrogenase B and body condition effects on beef cow productivity. T. L. Devine*, O. T. Alaamri, D. Philipp, M. L. Looper, and C. F. Rosenkrans, Jr., *Division of Agriculture, Department of Animal Science, University of Arkansas, Fayetteville.*

Lactate dehydrogenase (LDH) catalyzes the conversion of pyruvate to lactate (forward; LDHf) or lactate to pyruvate (reverse; LDHr). Objectives were to determine effects of promoter and coding sequence of single nucleotide polymorphisms (SNP) of the LDH B gene on serum concentrations of metabolites and calving rate in beef cows. Primers were designed for PCR amplification of a 457- and 452-base pair fragment of the bovine LDH B promoter and coding sequence, respectively. Four SNP were detected (G-348A, A-261G, N-222D, and C541A). Deletion of 6 nucleotides (GGCCGC) was detected at base N-222D. Brahman-influenced cows ($n = 99$) were managed to achieve either low (BCS = 4.3 ± 0.1) or moderate (BCS = 6.4 ± 0.1) body condition (BC). Cows grazed stockpiled and spring growth, endophyte-infected tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh] pastures to obtain desired BC. Serum samples were collected 35 d before the breeding period to quantify concentrations of LDH, IGF-I, and NEFA. Concentrations of IGF-I tended ($P < 0.08$) to be influenced by a BC \times genotype interaction. Cows in low BC and heterozygous at base position -348 had decreased IGF-I (50 ± 9 ng/mL) compared with all other cows (89 ± 7 ng/mL). Cows heterozygous at SNP A-261G and N-222D had greater ($P < 0.05$) LDHf activity than homozygous cows. Concentrations of NEFA were increased ($P < 0.02$) in heterozygous cows (267 ± 14 μ Eq/L) than homozygous cows (206 ± 14 μ Eq/L) at base position C541A. Cows that were heterozygous (GA) at base position -348 had a lower calving rate than homozygous cows with the primary allele (53 vs. 79%, respectively). Polymorphisms of the promoter and coding region of the LDH B gene were associated with blood metabolites that mediate nutritional status of cattle; polymorphisms of the promoter region also were related to calving rate. Identification of cows with specific genotypes within the promoter and coding region of the LDH B gene may assist beef producers in selecting cattle that may have enhanced productivity.

Key Words: beef cows, lactate dehydrogenase B, single nucleotide polymorphism

380 Production traits of spring- and fall-calving Senepol cows in the tropics. R. W. Godfrey* and A. J. Weis, *University of the Virgin Islands, St Croix, Virgin Islands.*

This study was conducted to evaluate production traits of Senepol cows calving in the spring or fall on St. Croix. Cows were bred by natural service for a 60-d period each year starting in June or December and calved in the spring of 2009, 2010, 2011 and 2012 ($n = 332$ data points) or the fall of 2009, 2010 and 2011 ($n = 93$ data points). Data collected at breeding, calving and weaning was cow BW, hip height (HHT) and condition score (CS; 1 = thin, 9 = fat). Calf data ($n = 190$ data points) included birth (BRWT), weaning weight (WWT) and 205-d adjusted weaning weight (AWWT). Data were analyzed using GLM procedures with season and year as main effects and CHISQ for proportional data. At breeding, fall calving cows were heavier ($P < 0.0001$) than spring calving cows (624 ± 9 vs. 562 ± 5 kg, respectively) and had higher ($P < 0.0001$) CS (7.3 ± 0.1 vs. 6.8 ± 0.1 , respectively). At calving, fall calving cows were heavier ($P < 0.0002$) than spring calving cows (628 ± 9 vs. 586 ± 6 kg, respectively). Calving rate was similar ($P > 0.10$)

between fall and spring (49.5 and 50.8%, respectively). At weaning fall calving cows were heavier ($P < 0.001$) and had greater HHT ($P < 0.0001$) than spring calving cows (616 ± 10 vs. 561 ± 6 kg, 138.1 ± 0.7 vs. 134.5 ± 0.4 cm, respectively) but there was no difference ($P > 0.10$) in CS (6.2 ± 0.1 vs. 6.3 ± 0.1 , respectively). There was no difference ($P > 0.10$) in BRWT or AWWT between spring and fall herds (40 ± 0.4 vs. 40 ± 0.6 kg, and 223 ± 3 vs. 230 ± 5 kg, respectively). Cow efficiency, measured as the ratio of WWT to cow BW at weaning, was greater ($P < 0.008$) in spring than in fall calving cows (42.7 ± 0.9 vs. $38.4 \pm 1.4\%$, respectively). The percentage of calves born that survived to weaning was higher ($P < 0.05$) in the spring herd than in the fall herd (89.5 vs. 78.9%, respectively). Calving interval was similar ($P > 0.10$) between fall and spring herds (408 ± 22 vs. 445 ± 13 d, respectively). The larger cows were not as efficient as smaller cows and Senepol cattle managed to calve in the spring had better productivity than fall calving cows under the conditions on St. Croix.

Key Words: cattle, calf, tropics

381 Evaluation of hair coat, tick burden and production traits of Senepol cows in the tropics. R. W. Godfrey* and A. J. Weis, *University of the Virgin Islands, St Croix, Virgin Islands.*

The Slick hair gene found in Senepol cattle has been reported to contribute to their heat tolerance and tropical adaptation. This study was conducted to evaluate the relationship between hair coat, tick burden and production traits of Senepol cows under tropical conditions. Multiparous ($n = 141$) and primiparous ($n = 19$) Senepol cows calving in the fall of 2010 and 2011 and the spring of 2011 and 2012 on St. Croix were evaluated for hair coat phenotype, tick burden, BW and condition score (CS; 1 = thin, 9 = fat) at weaning. Hair coat was scored using 1 = slick, 2 = rough and 3 = hairy. Tick burden was scored using 1 = clean, 2 = light, 3 = moderate and 4 = heavy. Data were analyzed using GLM procedures with season and year as the main effects. The proportion of cows scored as hairy, rough or slick was 1.3, 17.1 and 89.6%, respectively. The proportion of cows that had clean, light, moderate or heavy tick burden scores was 32.5, 10.6, 37.5 and 19.4%, respectively. Tick score was correlated with hair score in primiparous but not multiparous cows ($r = 0.606$, $P < 0.02$ vs. $r = -0.063$, $P > 0.10$, respectively). Tick or hair score was not different ($P > 0.10$) between primiparous and multiparous cows (1.7 ± 0.2 vs. 2.1 ± 0.1 or 1.3 ± 0.1 vs. 1.2 ± 0.1 , respectively). Lactating cows had a higher ($P < 0.0005$) tick score than nonlactating cows (2.4 ± 0.1 vs. 1.8 ± 0.1 , respectively) but there was no difference ($P > 0.10$) in hair score (1.2 \pm 0.1). There was no difference ($P > 0.10$) in hair score or tick score between pregnant and non-pregnant cows (1.2 ± 0.1 and 2.1 ± 0.1 , respectively). Slick cows were heavier ($P < 0.09$; 607 ± 8 vs. 575 ± 17 kg, respectively) and had higher CS ($P < 0.08$; 6.9 ± 0.1 vs. 6.5 ± 0.2 , respectively) than non-slick (rough or hairy) cows. There was no difference ($P > 0.10$) in BW or CS between cows with (tick score 2, 3 or 4) or without (tick score 1) ticks (602 ± 9 vs. 599 ± 13 kg or 6.7 ± 0.1 vs. 6.9 ± 0.2 , respectively). Tick burden had no influence on BW or CS, but slick cows were heavier and had higher CS than non-slick cows further supporting the hypothesis that slick cattle are more suited to the tropical environment.

Key Words: cattle, hair coat, tick

382 Evaluation of hair coat, tick burden and production traits of Senepol calves in the tropics. R. W. Godfrey* and A. J. Weis, *University of the Virgin Islands, St Croix, Virgin Islands.*

The Slick hair gene found in Senepol cattle has been reported to contribute to their tropical adaptation. This study was conducted to evaluate the relationship between hair coat, tick burden and growth of Senepol calves in the tropics. Senepol calves born in fall 2010 and 2011 and spring 2011 and 2012 on St. Croix were evaluated for BW, hip height (HHT), hair coat phenotype and tick burden at weaning (n = 80) and as yearlings (n = 50). Hair coat was scored using 1 = slick (SL) or 2 = non-slick (NSL). Tick burden was scored using 1 = clean, 2 = light, 3 = moderate and 4 = heavy. Data were analyzed using GLM procedures with season, year and hair coat as the main effects. The proportion of calves scored as SL or NSL was 39 and 61%, respectively. The proportion of calves with clean, light, moderate or heavy tick burden scores was 43.3, 37, 12.6 and 7.1%, respectively. Tick score was lower ($P < 0.03$) at weaning than as yearlings (1.7 ± 0.1 vs. 2.1 ± 0.1 , respectively) but there was no difference ($P > 0.10$) in hair score (1.5 ± 0.1 vs. 1.5 ± 0.1 , respectively). There was no difference ($P > 0.10$) in tick score at weaning between SL and NSL calves (1.6 ± 0.2 vs. 1.8 ± 0.1 , respectively) but NSL calves had higher ($P < 0.05$) tick scores than SL calves as yearlings (1.7 ± 0.2 vs. 2.3 ± 0.2 , respectively). At weaning SL calves were heavier ($P < 0.009$) than NSL calves (241 ± 6 vs. 219 ± 5 kg, respectively) but not ($P > 0.10$) as yearlings (308 ± 8 vs. 292 ± 6 kg, respectively). Weaning weight was higher ($P < 0.04$) in clean calves than it was in calves with a high tick burden (233 ± 6 vs. 188 ± 20 kg, respectively). Clean calves had a greater ($P < 0.06$) ADG at weaning than did calves with a high tick burden (0.89 ± 0.03 vs. 0.72 ± 0.09 kg/d, respectively). There was no difference ($P > 0.10$) in yearling BW between calves that were clean or had a high tick burden (308 ± 9 vs. 319 ± 14 kg, respectively). Clean calves had a greater ($P < 0.04$) ADG at yearling than did calves with a high tick burden (0.45 ± 0.03 vs. 0.34 ± 0.09 kg/d, respectively). Tick burden can have a greater influence than hair coat phenotype on Senepol calf weights up through yearling age.

Key Words: cattle, hair coat, tick

383 Effects of conventional and natural production programs on carcass characteristics and retail meat attributes. C. L. Maxwell*¹, B. K. Wilson¹, B. T. Johnson¹, B. C. Bernhard¹, C. F. O'Neill¹, K. J. Winn¹, K. R. McCullough¹, T. A. Harlan¹, M. M. Kinna¹, B. D. Bloomberg¹, D. L. VanOverbeke¹, C. J. Richards¹, D. L. Step³, E. A. DeVuyst², C. R. Krehbiel¹, ¹*Department of Animal Science, Oklahoma State University, Stillwater*, ²*Department of Agriculture Economics, Oklahoma State University, Stillwater*, ³*Department of Veterinary Clinical Sciences, Oklahoma State University, Stillwater*

The objective of this study was to evaluate conventional and natural production programs through annual pasture and finishing with 2 roughage levels on carcass characteristics and retail meat attributes. Beef steers (n = 180; initial BW = 250 ± 19.1 kg) were randomized to one of 2 treatments in the pasture phase. Steers were implanted with 40 mg of TBA, 8 mg estradiol, and 29 mg tylosin tartrate (Conventional; CONV) or received no implant (Natural; NAT). The 2 treatments grazed winter annual pasture for 109 d. Steers (160 steers; 5 steers/pen; 8 pens/trt) were assigned to a 2 × 2 factorial RCBD during finishing. The first factor was production program (NAT vs. CONV), and the second 7 vs. 12% roughage (DM basis; LOW vs. HIGH.) During finishing, CONV steers were given 120 mg of TBA, 25 mg estradiol and 29 mg tylosin tartrate, fed monensin and tylosin for the entire feeding period, and fed zilpaterol hydrochloride for the last 20 d of the trial. At harvest, 17–18 strip loins/treatment were collected for retail meat attribute analysis.

There were no effects of treatment on 12th rib-fat thickness ($P \geq 0.16$). Hot carcass weight was increased by 62 kg (424 vs. 362 kg; $P < 0.01$), dressing percentage increased 1.6% units (64.9 vs. 63.3%; $P < 0.01$), and ribeye area was increased by 16.9 cm² (100.9 vs. 84.0 cm²; $P < 0.01$), decreasing USDA Yield grade (3.09 vs. 3.54; $P < 0.01$) for CONV compared with NAT. Natural steers had a higher percentage grading Premium Choice (48.7 vs. 18.7%; $P < 0.01$), a higher percentage of USDA Yield grade 4 and 5 (25.4 vs. 9.3%; $P < 0.01$), and a higher percentage of abscessed livers (39.6 vs. 10.5%; $P < 0.01$) compared with CONV. Conventional had increased slice shear values (21.27 vs. 18.00 kg; $P < 0.01$) and Warner-Bratzler shear force (3.89 vs. 3.41, kg; $P < 0.01$) compared with NAT, resulting in lower initial tenderness and connective tissue scores in a trained taste panel (6.8 vs. 7.1 and 6.9 vs. 7.1, $P < 0.01$, respectively.) The results of this study indicate conventionally raised cattle produce more total product with a minimal decrease in consumer detectable retail product quality.

Key Words: cattle, feedlot, conventional

384 Effects of conventional and natural production programs on winter annual pasture and feedlot performance. C. L. Maxwell*¹, B. K. Wilson¹, B. T. Johnson¹, B. C. Bernhard¹, C. F. O'Neill¹, D. L. VanOverbeke¹, D. L. Step³, E. A. DeVuyst², C. J. Richards¹, and C. R. Krehbiel¹, ¹*Department of Animal Science, Oklahoma State University, Stillwater*, ²*Department of Agriculture Economics, Oklahoma State University, Stillwater*, ³*Department of Veterinary Clinical Sciences, Oklahoma State University, Stillwater*.

The objective of this study was to evaluate conventional and natural production programs through annual pasture and finishing with 2 roughage levels. Beef steers (n = 180; initial BW = 250 ± 19.1 kg) from a single ranch in Oklahoma were randomized to one of 2 treatments in the pasture phase. Steers were implanted with 40 mg of TBA, 8 mg estradiol, and 29 mg tylosin tartrate (Conventional; CONV) or received no implant (Natural; NAT). The 2 treatments were comingled and grazed winter annual pasture for 109 d. During pasture grazing, CONV steers had an 18.5% improvement in ADG (1.22 vs. 1.03 kg/d; $P < 0.01$), and a heavier final BW (385 vs. 366 kg, $P < 0.01$), compared with NAT steers. Steers (160 steers; 5 steers/pen; 8 pens/trt) were assigned to a 2 × 2 factorial RCBD in the feedlot phase. The first factor was production program (NAT vs. CONV), and the second factor was 7 vs. 12% roughage (DM basis; LOW vs. HIGH). During finishing, CONV steers were given 120 mg of TBA, 25 mg estradiol and 29 mg tylosin tartrate at processing, were fed monensin and tylosin for the entire feeding period, and fed zilpaterol hydrochloride for the last 20 d of the trial. Both groups were fed 135 d. There were no program × roughage level interactions ($P \geq 0.07$). Conventional steers ate 6.9% more feed (11.8 vs. 11.0 kg/d; $P < 0.01$), gained 28.4% faster (1.90 vs. 1.48 kg/d; $P < 0.01$), and were 24.2% more efficient (0.164 vs. 0.132; $P < 0.01$), compared with NAT. There was a trend for LOW steers to eat less feed (11.3 vs. 11.5 kg/d; $P = 0.13$) and gain faster (1.73 vs. 1.66 kg/d; $P = 0.09$), resulting in an improvement in feed efficiency (0.153 vs. 0.144; $P < 0.01$) compared with HIGH. There was a 26% improvement in estimated daily carcass weight gain (1.55 vs. 1.23 kg/d), 17.8% improvement in carcass efficiency (0.132 vs. 0.112; $P < 0.01$), and 14.0% improvement (1.30 vs. 1.14 Mcal/kg; $P < 0.01$) in calculated NE_g retained for CONV vs. NAT. The results of these data show that the technologies used in CONV production result in significant improvement in efficiency and performance.

Key Words: cattle, conventional, natural

385 Effects of suckling restriction, flushing and body condition score at calving on metabolic and endocrine profiles of primiparous beef cows grazing native pasture. P. Soca*¹, M. Carriquiry², M. Claramunt³, G. Rupprechter⁴, and A. Meikle⁴, ¹Departament of Animal Production and Pastures, EEMAC, School of Agronomy, Universidad de la Republica, Paysand, Uruguay, ²Department of Animal Production and Pastures, School of Agronomy, Universidad de La Republica, Uruguay, Montevideo, Uruguay, ³Department of Animal Production, School of Veterinary, Universidad de La Republica, Uruguay, Paysand, Uruguay, ⁴Laboratory of Nuclear Techniques, School of Veterinary, Universidad de La Republica, Uruguay, Montevideo, Uruguay,

The objective was to analyze the effect of type of suckling restriction, flushing and body condition score (BCS) at calving on metabolic-endocrine profiles and reproduction of primiparous beef cows at grazing. Primiparous cows (n = 56) in anestrus were assigned randomly to a 2x2 factorial arrangement of suckling management and flushing and classified by BCS at calving (low $\leq 3.5 = L$, moderate $\geq 4 = M$; 1–8 visual scale). Suckling-restriction treatments started at 55 ± 10 d postpartum (DPP)(0 = initiation of the treatment) and consisted of applying nose plates to calf for 12 d (i.e., TS treatment) or 5 d of isolation of the cow-calf pair followed by nose plates for 7 d as calves were reunited with their mothers (i.e., IS treatment). Nutritional treatments (flushing = F vs. control = NF) started immediately after suckling restriction with cows receiving or not 2 kg/d of whole-rice middling for 22 d. Repeated variables and probability of early (EP) and total (TP) pregnancies were analyzed using a time repeated measure analysis and lineal model respectively. Cortisol was reduced after the suckling treatments. BCS evolution and ADIP were affected by the interaction among BCS at calving and Days ($P < 0.06$). Moderate BCS cows had greater BCS than L cows. Low BCS cows presented a reduction in ADIP, while M maintained them. Cholesterol, insulin and IGF-I were affected by interaction among Days, BCS at calving and flushing ($P < 0.03$). F increased cholesterol in both BCS at calving ($P < 0.001$), while insulin and IGF-I increased during F only in M BCS at calving ($P < 0.01$). IGF-I increased in all BCS groups during suckling. Moderate BCS reduced postpartum anestrus interval (PPI) (L = 123 vs. M = 98 d $P < 0.0004$). The EP was affected by BCS at calving (L = 0.5 vs. M = 0.8 $P < 0.008$). TP was affected by F (F = 1 vs. NF = 0.6 $P < 0.02$) and BCS at calving (L = 0.6 vs. M = 1 $P < 0.0001$). Results confirmed the value of tactical intervention and BCS at calving relevance as a link between nutrition-metabolic and reproduction processes in primiparous cows.

Key Words: flushing, suckling restriction, primiparous cow

386 Effects of metabolic imprinting on growth performance of early-weaned beef steers. P. Moriel*¹, S. E. Johnson³, M. Hersom², M. McCann³, D. E. Gerrard³, P. G. Martins¹, J. M. B. Vendramini¹, and J. D. Arthington¹, ¹University of Florida, Ona, ²University of Florida, Gainesville, ³Virginia Tech University, Blacksburg.

A 2-yr study evaluated the effects of calf management system after early-weaning (EW) on growth performance of beef steers. On d 0, Brahman \times British steers (n = 40 in yr 1 and 38 in yr 2; mean BW = 95 ± 15 kg; age = 74 ± 14 d) were stratified by age and BW, and randomly assigned to a control treatment that was normally weaned (NW) on d 180, or 1 of 3 EW treatments: (1) EW and grazed on ryegrass pastures for 60 d (yr 1) or 90 d (yr 2) then on bahiagrass pastures until NW (EWRYEG), (2) EW and fed a high-concentrate (3.5% of BW) diet in drylot until d 180 (EW180), or (3) EW and metabolically imprinted by feeding a high-concentrate diet (3.5% of BW) for 90 d then grazed on bahiagrass pastures until d 180 (EW90). Steers were assigned to 1 of 2 pens per treatment. Steers on pastures were supplemented with concentrate (69%

TDN and 20% CP) at 1.0% BW until d 180. Treatment \times year effect was detected ($P = 0.02$) for ADG from d 0 to 90, but not ($P = 0.18$) from 90 to 180. From d 0 to 90 of yr 1, EW90 and EW180 steers had greater ($P < 0.0001$) ADG than NW and EWRYEG, which did not ($P = 0.37$) differ (0.99, 1.00, 0.63 and 0.57 ± 0.043 kg/d, respectively). In yr 2, NW steers tended ($P = 0.09$) to have greater ADG from d 0 to 90 than EWRYEG steers (0.87 vs. 0.75 ± 0.046 kg/d). Thus, EW90 and EW180 steers were heaviest ($P < 0.0001$) on d 90 of yr 1 and 2, whereas NW steers had similar ($P = 0.30$) BW in yr 1, but greater ($P = 0.02$) BW in yr 2 than EWRYEG steers (149 and 174, 187 and 191, 188 and 188, and 153 and 163 ± 3 kg for NW, EW180, EW90 and EWRYEG in yr 1 and 2, respectively). From d 90 to 180, ADG was greatest for EW180 steers, intermediate for NW, and least for EW90 and EWRYEG steers ($P \leq 0.01$; 1.29, 0.90, 0.65 and 0.68 ± 0.039 kg/d, respectively). On 180 of yr 1 and 2, EW180 steers were ($P \leq 0.08$) heaviest and EWRYEG lightest, whereas EW90 and NW steers had ($P = 0.19$) similar BW (295 and 300, 202 and 229, 239 and 247, and 226 and 250 ± 7 kg for EW180, EWRYEG, EW90 and NW steers in yr 1 and 2, respectively). Thus, different nutritional management systems for EW steers result in significant differences on BW at the time of normal-weaning.

Key Words: metabolic imprinting, beef steer, high-concentrate

387 Effects of metabolic imprinting on growth performance of early-weaned beef heifers. P. Moriel*¹, S. E. Johnson³, M. Hersom², P. G. Martins¹, J. M. B. Vendramini¹, and J. D. Arthington¹, ¹University of Florida, Ona, ²University of Florida, Gainesville, ³Virginia Tech University, Blacksburg.

A 2-yr study evaluated the effects of calf management system after early-weaning (EW) on growth performance of beef heifers. On d 0 (yr 1 and 2), Brahman \times British heifers (n = 40 in yr 1 and 38 in yr 2; mean BW = 87 ± 13 kg; age = 72 ± 12 d) were stratified by age and BW, and randomly assigned to a control treatment that was normally-weaned (NW) on d 180, or 1 of 3 EW treatments: (1) EW and grazed on ryegrass pastures for 60 d (yr 1) or 90 d (yr 2) then on bahiagrass pastures until NW (EWRYEG), (2) EW and limit-fed a high-concentrate (3.5% of BW) diet in drylot until d 180 (EW180), or (3) EW and metabolically imprinted by feeding a high-concentrate diet (3.5% of BW) for 90 d then grazed on bahiagrass pastures until d 180 (EW90). Heifers were assigned to 1 of 2 pens per treatment. On d 180, heifers were grouped by treatment and grazed on bahiagrass pastures until the start of breeding season (d 332). Heifers on pastures were supplemented with concentrate (69% TDN and 20% CP) at 1.0% BW until d 180 and 1.5% BW from d 180 to 332. Treatment \times time \times year effects were detected ($P < 0.0001$) for BW from d 90 to 180, but not ($P \geq 0.12$) from d 0 to 90 and d 180 to 332. On d 90, EW90 and EW180 heifers were heavier ($P \leq 0.09$) than NW and EWRYEG heifers, whereas EWRYEG heifers were lighter than NW heifers (172, 169, 143 and 149 ± 2 kg, respectively). On d 180 of yr 1 and 2, EW180 heifers were heaviest and EWRYEG lightest ($P \leq 0.01$; 267 and 270, and 184 and 208 kg for EW180 and EWRYEG in yr 1 and 2, respectively). In yr 1, NW heifers achieved similar ($P \geq 0.61$) BW compared with EW90 heifers on d 180 (217 vs. 220 ± 4 kg), whereas in yr 2, NW and EW90 heifers had similar BW on d 150 and 180 (206 and 221, and 209 and 220 ± 4 kg for NW and EW90 on d 150 and 180, respectively). On d 332, EW180 heifers were heaviest, whereas NW, EW90 and EWRYEG heifers had similar BW ($P \geq 0.09$; 362, 324, 326 and 313 ± 5 kg, respectively). Thus, heifer management systems following early-weaning result in significant differences on BW at the time of normal weaning and at the start of breeding season.

Key Words: metabolic imprinting, beef heifer, high-concentrate

388 Effect of in utero heat stress on insulin response of calves after weaning. S. Tao*, A. P. A. Monteiro, M. J. Hayen, and G. E. Dahl, *University of Florida, Gainesville*.

Heat stress during the dry period not only negatively affects subsequent lactation in the cow, but may also affect the calf postnatally. Previous studies suggest that calves born to cows heat-stressed during late gestation have lower birth weight but similar overall weight gain during the pre-pubertal period compared with normothermic conditions in utero. However, it is unclear if insulin sensitivity of peripheral tissues, and thus metabolism, of calves is altered in their postnatal life after in utero heat stress. The aim of the present study was to examine the effects of maternal heat stress during the dry period on insulin response at peripheral tissues of calves after weaning. Calves (10/treatment) were born to cows exposed to heat stress (HT) or cooling (CL) when dry. Calves were immediately separated from their dams and fed 3.8 L of high quality colostrum within 1 h after birth and then 1.9 L 12 h later. All calves were fed 1.9 L to 3.8 L pasteurized milk in the morning and afternoon from 2 to 42 d of age and then only in the morning until

weaning at 49 d. Calf starter and water were offered ad libitum starting at 2 d of age. All calves were managed in the same manner throughout the study. A glucose tolerance test (GTT) and an insulin challenge (IC) were performed on all calves at 55 d of age. Gestation length was not affected (HT: 277 ± 1.8 d; CL: 279 ± 1.8 d) by heat stress during the dry period, but HT calves were born lighter (40 ± 1.4 vs. 45 ± 1.4 kg, $P = 0.03$) compared with those cooled in utero. Both groups of calves had similar weaning weight (HT: 68 ± 3.2 kg; CL: 71 ± 3.3 kg) and body weight gain from birth to weaning (HT: 28 ± 2.2 kg; CL: 26 ± 2.3 kg). Relative to those cooled in utero, HT calves had similar insulin response to GTT and insulin clearance during IC but faster glucose clearance during GTT and stronger glucose response to IC. In conclusion, in addition to impaired fetal growth, maternal heat stress during the dry period enhances the insulin response at peripheral tissues of calves after weaning, which may suggest a possibility of accelerated lipogenesis and fat deposition in early life.

Key Words: heat stress, insulin response, dairy calf