850 Evaluation of beef cow and calf separation systems to improve reproductive performance of first-calf cows. P. G. M. A. Martins*, D. B. Araujo, and J. D. Arthington, *University of Florida, Range Cattle Research and Education Center*, *Ona*.

Our objectives were to compare the effects of a traditional 48-h calf withdrawal to early-weaning and repeated 48-h calf withdrawals on time to first postpartum ovulation and measures of cow and calf performance. Sixty-four primiparous, Brahman x British crossbred cow-calf pairs were randomly allotted to 3 treatments: EW (early weaned; cows and calves permanently separated); IW (interval weaned; cows and calves separated for 48 h on 4 occasions at 20 d intervals); and CON (control; cows and calves separated a single time for 48 h). Treatments were initiated at the start of a 90-d breeding season (average days postpartum = 97 ± 19 d). Blood samples were collected on 10 d intervals over 100 d for determination of progesterone concentrations. Resumption of cyclicity was defined as 2 consecutive samples with concentrations of progesterone ≥1.5 ng/mL. Cow and calf BW was determined at the start (d 0), middle (d 50), and end (d 100) of the study. Pregnancy was diagnosed by transrectal ultrasonography at 44 d after the end of the breeding season. By d 30 of the breeding season, there were more EW cows cycling than IW and CON cows ($P = 0.03$; 90.9, 61.9, and 66.7% cycling for EW, IW, and CON cows, respectively). Calf BW did not differ at the beginning of the breeding season (average BW = 96 ± 4.1 kg) but was greater ($P < 0.001$) for EW vs. IW and CON calves at the end of the study (d 100; 142, 143, and 142 kg for EW, IW, and CON calves, respectively; SEM = 5.3). In the first year of this experiment, early calf weaning improved cow and calf BW gain and hastened the time to first postpartum ovulation compared with cows subjected to single or repeated 48-h calf withdrawals.

Key Words: cow, calf, weaning

851 Comparison of RFI evaluated as heifers with RFI reevaluated again as mature cows. S. L. Morgan*[1,2], D. A. Neuendorff[1], A. W. Lewis[1], J. P. Banta[1], T. D. A. Forbes[3], A. L. Loyd[2], and R. D. Randel[1], [1]*Texas AgriLife Research*, *Overton,* [2]*Texas AgriLife Research*, *College Station,* [3]*Texas AgriLife Research*, *Uvalde.*

Although the idea of residual feed intake (RFI) was introduced over 45 yrs ago, it is only recently that this topic has acquired great interest. Many studies have investigated the creditability of RFI evaluated in weaned cattle and their subsequent performance in the areas of reproduction, meat science and genetics. However, relatively few studies have evaluated the repeatability of this post–weaning RFI in mature cattle. This study was designed to examine the correlation between post–weaning and mature RFI in *Bos indicus* cows. After the breeding season, 37 multiparous Brahman cows (3–7 yrs of age) with previous RFI data and palpated to be in the first trimester of gestation, were retrained to eat from a Calan gate system. Cows were fed twice daily (0800 and 1600) a 2.5% BW/d diet for 70d with body weight and body condition scores recorded weekly and feed adjusted accordingly. Using the past and present data, RFIs for the initial (RFI1) and repeat (RFI2) trials were calculated. Females were classified according to their RFI values, with a negative RFI = efficient and positive RFI = inefficient. Chi-squared test revealed that 62.2% remained in the same classification, while 37.8% changed, $P = 0.04$. To further investigate repeatability, cows were sorted into High (>0.5 SD), Intermediate (<0.5 SD >) and Low (<0.5 SD) RFI groups. The change in classification groups were determined to be (±0) 51.35%, (±1) 43.24% and (±2) 5.41%, $P < 0.001$. A positive Pearson correlation ($r = 0.51$, $P < 0.001$) was also observed between RFI1 and RFI2 value rankings within yr cohorts, concluding that post-weaning RFI may be a moderately accurate predictor of mature feed efficiency.

Key Words: RFI, repeatability, cow

852 Level of maternal winter supplement and feed restriction during postweaning development influences circulating concentrations of IGF-I in heifers during the peripartum and rebreeding period. A. J. Roberts*, R. C. Waterman, T. W. Geary, L. J. Alexander, and M. D. MacNeil, *USDA-ARS, Fort Keogh Livestock and Range Research Laboratory, Miles City, MT*.

Objective of this research was to evaluate effects of 2 levels of supplemental feed provided to cows during late gestation and 2 levels of feed provided to their daughters during postweaning development on circulating concentrations of IGF-I in the daughters before calving, after calving and before breeding. Heifers were produced over a 3-yr period from dams that were fed levels of harvested feed from mid and late gestation (Dec to March) that were expected to provide marginal (MARG) or adequate (ADEQ) nutrition while grazing dormant winter forage through this period. After weaning, heifers were fed to appetite (CON) or restricted (REST) to 80% of that consumed by CON on common BW basis during a 140-d period ending 1-mo before breeding. Heifers were managed together through breeding to Dec when they were separated so CON could be fed like ADEQ cows and REST could be fed like MARG cows up to 2 to 3-wk before start of calving in March. Concentrations of IGF-I (determined by RIA) in serum samples (n = 828) obtained 8 to 12-d before start of calving, 2 to 4-wk after calving and 0 to 18-d before start of breeding were analyzed by the MIXED procedure of SAS using a model for repeated measures. Concentrations of IGF-I were influenced by interaction of dam and heifer treatments, being greater ($P < 0.05$) in CON heifers from ADEQ or MARG fed dams and REST heifers from MARG dams than in REST heifers from ADEQ dams. Concentrations of IGF-I were greater ($P = 0.05$) in heifers that gestated male than female calves, and in heifers that subsequently became pregnant than those that did not ($P < 0.001$). Results provide support that the dietary treatments imposed on cows resulted in a uterine programming effect in their heifers, as was evident by differences in circulating concentrations of IGF-I in heifers that were restricted fed during postweaning development.

Key Words: heifer development, IGF-I, uterine programming

853 Winter grazing system and supplementation of beef cows during late gestation influence heifer progeny. R. N. Funston*, D. M. Larson, A. F. Summers, J. L. Martin, and D. C. Adams, *University of Nebraska West Central Research and Extension Center*, *North Platte*.

A 2 × 2 factorial study evaluated effects of cow winter grazing system and last trimester supplementation on heifer progeny. Composite cows (yr 1 n = 109; yr 2 n = 114; yr 3 n = 116) grazed either range (WR) or corn residue (CR) during winter and within grazing treatment received 0.45 kg/d (DM) 28% CP cubes (PS) or no supplement (NS). Heifer calves (yr 1 n = 56; yr 2 n = 56; yr 3 n = 54) grazed dormant pasture for 114 d post-weaning and were individually fed for 87 d before natural service breeding (45 d). Dam PS reduced ($P = 0.04$) heifer birth date and CR increased ($P = 0.07$) heifer birth BW. Both PS and CR increased ($P \leq 0.05$) heifer weaning BW, however, adjusted weaning BW was only lower ($P = 0.03$) if the dam grazed WR with NS. Heifer ADG during

the individual feeding period was greater ($P = 0.03$) in heifers from CR NS dams. Heifers from PS dams were younger ($P = 0.09$) at puberty and more tended ($P = 0.11$) to be pubertal by breeding if the dam grazed WR with PS. Heifers from WR NS dams weighed less ($P \leq 0.09$) at breeding and pregnancy diagnosis than WR PS. Pregnancy rate tended ($P = 0.13$) to be greater for heifers born to PS dams. Individually fed heifer DMI was not affected ($P = 0.17$) by treatment, however, heifers from dams that grazed CR with PS gained the least ($P = 0.03$) during individual feeding and had the lowest ($P = 0.04$) G:F. In contrast, there were no differences ($P > 0.10$) in efficiency when expressed as RFI. The heifer's first calf production was unaffected ($P > 0.10$) by dam treatment. Heifers from dams that grazed WR with NS had lower ($P = 0.01$) BW before the second breeding season but similar ($P = 0.97$) pregnancy rates. Cows grazing CR with NS produced the most valuable heifer calf at weaning, however, heifers from cows that grazed WR with NS cost the least to develop per pregnant heifer. Winter grazing system and late gestation supplementation impacted heifer progeny BW, feed efficiency, and reproduction.

Key Words: fetal programming, maternal nutrition, supplementation

854 Gastrointestinal nematode egg shedding rates in temperate adapted Angus and tropically adapted Brahman and Romosinuano calves at weaning. C. C. Chase, Jr.*[1], L. C. Gasbarre[2], S. W. Coleman[1], D. G. Riley[1], and E. E. Connor[2], [1]*USDA-ARS-STARS*, *Brooksville, FL,* [2]*USDA-ARS-BFGL*, *Beltsville, MD*.

Gastrointestinal nematode egg shedding rates were determined at weaning for 3 years in temperate adapted *Bos taurus* (Angus, n = 107), tropically-adapted *Bos taurus* (Romosinuano, n = 126), and tropically-adapted *Bos indicus* (Brahman, n = 87) calves in the subtropics (Florida). Each year, fecal samples were obtained from purebred calves on the day of weaning and the next day. Purebred calves were born and raised at 2 locations (i.e., 2 farms) until after weaning. Eggs per gram of feces were determined for each calf each day and the average of the 2 d was analyzed. The Proc Mixed procedure of SAS was used for statistical analyses and the model included the effects of location, year, breed, sex, and interactions. Location ($P < 0.10$), year ($P < 0.05$), breed ($P < 0.003$), and sex ($P < 0.10$) affected average eggs per gram of feces. Angus had the highest average eggs per gram of feces (179 ± 22.6); Brahman had the lowest average eggs per gram of feces (88 ± 24.0); and Romosinuano had intermediate eggs per gram of feces (compared with Angus and Brahman; 149 ± 21.6). There was however, a 3 way interaction among year by breed by sex ($P < 0.02$). Analysis by year indicated that although average eggs per gram of feces was consistently ranked from Angus > Romosinuano > Brahman over the 3 years, that only in year 2 was breed and breed by sex significant. Breed by sex ($P < 0.01$) in year 2 was due to extremely low average eggs per gram of feces in both male and female Brahman (25 ± 45.4 and 58 ± 48.4) compared with both Angus (183 ± 45.4 and 195 ± 48.4) and Romosinuano (245 ± 36.0 and 39 ± 37.4). In the subtropics, tropically-adapted *Bos taurus* (Romosinuano) and tropically-adapted *Bos indicus* (Brahman) in particular appear to offer some resistance to gastrointestinal nematodes compared with temperate adapted *Bos taurus* (Angus).

Key Words: *Bos indicus*, tropical, GI nematodes

855 Effect of calving season on net returns and risk of cow-calf production in western Canada. T. K. Sirski[1], D. G. Brewin[1], S. L. Scott*[2], A. D. Iwaasa[3], H. A. Lardner[4], and H. C. Block[2], [1]*University of Manitoba, Winnipeg, Canada*, [2]*Agriculture and Agri-Food Canada, Brandon Research Centre, Brandon, Canada*, [3]*Agriculture and Agri-Food Canada, Semiarid Prairie Agricultural Research Centre, Swift Current, Canada*, [4]*Western Beef Development Centre, Lanigan, Canada*.

Data from a 3-site study on the effects of calving season (CS) on cow-calf production in western Canada were used in a Monte Carlo simulation to evaluate net returns and risk. At each of the 3 locations (Brandon, MB (BR), Lanigan, SK (LA), and Swift Current, SK (SC)), production data were collected from crossbred cows (n = 120, BR; n = 100, LA; n = 50, SC) for 2 production cycles running from the start of one CS through to the beginning of the next CS. Cows were allocated to early calving (EC; March) or late calving (LC; June), with 2 replicates per CS per location. Each production cycle was divided into 4 feeding phases: drylot, bale grazing, swath grazing and pasture. Costs were compiled for each CS for feed and straw use, veterinary services, drugs and vaccines, equipment use, labor, land rental and fencing. Costs for mineral, salt, breeding, taxes, water, trucking, marketing and facilities were based on provincial publications for cow-calf costs of production. Revenues for each calving system were calculated using the study′s production data and prices provided by CanFax Research Services (Calgary, AB) for 2000–2009. To simulate the stochastic nature of key input variables, including weaning weight, steer and heifer price, cull cow price and days in each feeding system, 5000 iterations of the @Risk add-in (Palisade Co., Ithaca, NY) for MS Excel were used. Simulated net returns were higher ($P < 0.05$) for LC than those for EC at all 3 locations. In SC, the variance for LC was greater ($P < 0.05$) than that for EC, indicating greater risk within the system. At BR and LA, the variances were not affected ($P > 0.05$) by CS. Results indicate that CS impacts net returns at each location and the risk posed by each CS differs with location.

Key Words: calving season, risk, stochastic simulation

856 Estrous response and pregnancy rates of beef heifers exposed to bulls during an estrus synchronization protocol that included a 14-d CIDR, PGF2α, and, timed AI and GnRH. J. G. Berardinelli*[1], S. Tauck[1], J. Wilkinson[1], J. Olsen[1], T. Gibbs[1], K. C. Davis[1], J. Dafoe[2], and D. Boss[2], [1]*Montana State University*, *Bozeman,* [2]*Northern Agricultural Research Center*, *Havre, MT*.

The objective was to evaluate estrus synchronization responses and AI pregnancy rates (PR) of beef heifers exposed to bulls during a protocol that included a controlled internal drug release device (CIDR) for 14 d, PGF2α (PG), and, timed AI (TAI) and GnRH. Three trials were conducted in 2 consecutive yr (Yr 1 and 2) at 2 locations (L1 and 2). In each trial, heifers were stratified by birth date, BW, BCS, and presence of a corpus luteum and assigned randomly to be exposed (BE; n = 110) or not exposed (NE; n = 110) to bulls. Heifers were exposed to bulls on the day of CIDR insertion (D −32) and remained with bulls until PG injection (D 0). CIDRs were removed 14 d (D −18) after insertion. On D 0 heifers received PG and bulls were removed from BE heifers. Heifers were observed for estrus during the next 60 h from 0600 to 2400 h daily in 2 trials (Yr 1 and 2, L1) and am:pm in the other trial (Yr 2, L2). Heifers that showed estrus by 60 h after PG were bred by AI 12 h later. Heifers that did not show estrus by 60 h were TAI at 66 to 72 h after PG and given GnRH. Proportionate data were analyzed by chi-squared analyses and intervals to estrus after PG were analyzed by ANOVA using PROC GLM of SAS. Model included treatment, YR, location and their interactions. Fewer ($P < 0.05$) BE heifer showed estrus and had longer ($P < 0.05$) intervals to estrus in Yr 1 at L1 and than NE heifers (Yr 1, L1) or BE and NE heifers in Yr 2 at L1 and 2). Thus, more ($P < 0.05$) NE heifers in YR at L1 were bred by AI 12 h after PG than BE heifers in Yr1 at L1 and BE and NE heifers in Yr2 at L1 and 2. Overall AI pregnancy (PR) tended ($P = 0.06$) to be greater for BE (66%)

than NE (54.5%) heifers. Pregnancy rate for BE heifers was greater ($P = 0.055$) than that for NE heifers bred 12 h after estrus; whereas, PR to TAI did not differ between BE and NE heifers. These results indicate that AI PR for heifers inseminated 12 h after estrus may be improved by exposing heifers to bulls during an estrus synchronization protocol that included CIDR for 14 d, followed 18 d later with PGF2α (PG), and, TAI and GnRH.

Key Words: biostimulation, CIDR, estrus synchronization

857 The relationship of cow size to calf weaning weight in a commercial cow/calf operation in the southern Great Plains. G. L. Mourer*, C. P. McMurphy, E. Devuyst, and D. L. Lalman, *Oklahoma State University*, *Stillwater*.

Recent increases in cow/calf enterprise production costs have resulted in renewed interest in identifying critical factors that influence efficiency of production. A better understanding of the relationship of cow size and weaning weight is necessary before informed culling or selection decisions based on cow size can be made. A total of 737 individual cow and calf weaning records collected over 6 yr from a commercial Angus and Angus x Hereford commercial cowherd were evaluated. Cows calved in spring or fall seasons and grazed native tallgrass prairie or bermudagrass pasture year around with supplemental protein during winter and supplemental grass hay when ice or snow covered standing forage. Calves were weaned at 212 ± 20 d regardless of calving season. Means ± SD for cow age, cow BW at weaning, cow BCS at weaning, calf birth weight, calf BW at weaning, calf weight as a percentage of cow BW at weaning (BWW) were 4.96 ± 1.75, 581 kg ± 83, 4.71 ± 0.67, 35.61 kg ± 5.53, 211 kg ± 38.35, 0.42 ± 0.07, respectively. The mixed procedure of SAS was used with cow sire breed, calf sire breed, sex of calf and calving season declared as fixed effects and year of birth used as a random effect. Cow BW at weaning was adjusted to a constant BCS (5.0) and age (5.0 yr) before analysis. Weaning weight was influenced by direct sire, but not maternal sire. SimAngus sired calves were 29.5 kg and 21.8 kg heavier than Charolais and Angus sired calves, respectively ($P < 0.05$). For every 0.45 kg increase in birth weight, weaning weight was increased by 0.86 kg ($P < 0.05$). Spring calving cows weaned 17.7 kg heavier calves than fall calving cows ($P < 0.05$). An increase in cow BW of 45.6 kg resulted in an increase in calf weaning weight of 4.56 kg ($P < 0.05$). Further research is needed to determine if this marginal increase in calf weaning weight per 45.6 kg of increased cow weight is economical.

Key Words: cow size, weaning wt, southern Great Plains