block design with seven replicate pens/treatment and 21 pigs/pen. Pigs were allotted to one of four dietary treatments containing 0.0, 2.0, 4.0 and 6.0% supplemental fat (choice white grease), respectively. All diets contained the same inclusion of Paylean (7.2 ppm) and were formulated at a lysine:calorie ratio of 2.72 g true ileal digestible lysine/Mcal ME. The level of soybean meal (25.0%) was also held constant across the diet formulations and dietary lysine content was adjusted by adding L-lysine•HCl (0.10, 0.13, 0.17, and 0.20%, respectively) with additional synthetic amino acids supplied as necessary in order to meet the minimum amino acid profile. Growth performance was evaluated for 21 d. At d 21, pigs were transported to a commercial processing facility for carcass data collection. Fat supplementation increased (linear, $P = 0.01$) ADG (1,061, 1,093, 1,134, and 1,139 g/d, respectively) and improved (linear, $P < 0.001$) G/F (0.328, 0.341, 0.355, and 0.361, respectively). There was no effect on ADFI ($P > 0.20$). Based on linear regression analysis, for each one percentage unit increase in supplemental fat addition there were 1.30% and 1.72% improvements in ADG ($r^2 = 0.93$) and G/F ($r^2 = 0.98$), respectively. Fat supplementation slightly increased 10th rib backfat (20.0, 19.3, 20.8, 20.6 mm, respectively) and decreased carcass percent lean (54.1, 54.5, 53.5, and 53.7%, respectively). There was no effect on loin depth ($P > 0.74$) or carcass yield ($P > 0.45$). Based on the economic analysis, the optimum level of fat when feeding 7.2 ppm Paylean is 4.0%.

Key Words: Pigs, Ractopamine HCl, Growth

68 The effects of a carbohydrate- and protein-based feed supplement on sow and litter performance. W. Browning*, C. Fontenot, R. Guillory, M. Leger, and F. LeMieux, *McNeese State University*, *Lake Charles, LA*.

An experiment was conducted to determine the effects of a carbohydrate-and protein-based feed supplement on sow and litter performance. Fifty-two first parity and multiparous sows and their pigs were used to evaluate the effects of a novel carbohydrate-and protein-based feed ingredient (Nutri-Pal) on sow and litter performance during lactation. The dietary treatments were a corn-soybean meal control and a corn-soybean meal plus Nutri-Pal top-dress fed from farrowing to weaning. Top-dress was fed at a rate of 113 g per feeding, and sows were fed twice daily during lactation. Sows were allotted to treatment at random. There were 24 and 28 sows for the corn-soybean meal and corn-soybean meal plus Nutri-Pal treatments, respectively, over two farrowing groups. Farrowing months were March, April, July, August, and September, 2004. Within the first 3 d after birth, pigs were cross-fostered to equalize litter size. Pigs were cross-fostered only among litters of the same diet. Pigs were weighed within 1 d of farrowing and pigs were weaned at an average age of 20 d. Sow response variables (pigs born alive, and litter and average pig birth weight) were not affected ($P > 0.10$) by the diet. There were no effects ($P > 0.10$) of the diet on litter performance response variables (pigs weaned, litter and average pig weaning weight and gain, and percentage survival). The Nutri-Pal feed ingredient did not affect sow or litter productivity.

Key Words: Lactation, Litter Traits, Sows

Physiology and Endocrinology I

69 A comparison of progestin-based protocols to synchronize ovulation prior to fixed-time artificial insemination in postpartum beef cows. D. J. Schafer*[1], J. F. Bader[1], J. P. Meyer[1], J. K. Haden[2], M. R. Ellersieck[1], M. F. Smith[1], and D. J. Patterson[1], [1]*University of Missouri*, *Columbia*, [2]*MFA Inc.*, *Columbia, MO*.

The experimental objective was to compare pregnancy rates after fixed-time AI in postpartum beef cows following administration of two protocols to synchronize ovulation. Cows (n = 650) at four locations (n = 210, 158, 88, 194) were stratified by age, BCS and days postpartum (DPP) to one of two treatment protocols. The MGA Select treated cows (MGA Select; n = 327) were fed melengestrol acetate (MGA; 0.5mg•hd^{-1}•d^{-1}) for 14 d, GnRH was injected 12 d after MGA withdrawal (100 µg, i.m. Cystorelin; d 26), and PG was administered 7 d after GnRH (25 mg i.m. Lutalyse; d 33). Cows assigned to the CO-Synch + CIDR protocol (CO-Synch + CIDR; n = 323) were fed carrier for 14 d, were injected with GnRH (100 µg, i.m. Cystorelin) and equipped with a CIDR insert (1.38g progesterone) 12 d after carrier removal (d 26), and CIDRs were removed 7 d later at the time PG (25 mg i.m. Lutalyse) was administered (d 33). Artificial insemination was performed at fixed-times (72 or 66 h after PG for MGA Select and CO-Synch + CIDR groups, respectively), and all cows were injected with GnRH (100 µg, i.m. Cystorelin) at AI. Blood samples were collected 8 d and 1 d prior to MGA or carrier to determine pre-treatment estrous cyclicity [progesterone ≥ 0.5 ng/ml; (MGA Select, 185/327, 57%; CO-Synch + CIDR, 177/323, 55%); $P = 0.65$]. There was no treatment by location interaction ($P > 0.10$) for age, DPP, or BCS, and the results were therefore pooled for the respective treatments. Pregnancy rates resulting from fixed-time AI did not differ between treatments [$P = 0.20$; (MGA Select, 201/327, 61%; CO-Synch + CIDR, 214/323, 66%)], among sires ($P = 0.11$) or technicians ($P = 0.20$). There was no difference ($P = 0.36$) between treatments in pregnancy rate resulting from fixed-time AI based on pretreatment estrous cyclicity status, and no difference ($P = 0.25$) between treatments in final pregnancy rate. Both protocols provide opportunities for beef producers to use AI and eliminate the need to detect estrus.

Key Words: Estrus Synchronization, Beef Cow, Progestin

70 Resynchronizing estrus with a progesterone (P4) insert and estradiol cypionate (ECP) in cows of unknown pregnancy status. K. N. Galvao*[1], R. L. A. Cerri[1], H. M. Rutigliano[1], R. G. S. Bruno[1], R. C. Chebel[1,2], and J. E. P. Santos[1], [1]*University of California*, *Tulare*, [2]*University of Idaho*, *Caldwell*.

Holstein cows, 488, were randomly assigned to one of three treatments: Control, enrollment on the Heatsynch protocol (d0 GnRH, d7 PGF2a, d 8 ECP, and d10 timed AI) upon diagnosis of nonpregnancy on d 32 after AI; CG, intravaginal P4 (CIDR) inserted from d 14 (12 to 15) to d 21 (19 to 22) after AI, with cows observed for estrus from d 21 to 25 after AI and initiation of the timed AI on d 25 in those not in estrus, followed by pregnancy diagnosis on d 32 and completion of the timed AI in nonpregnant cows; CEG, same treatment as CG but with the an injection of 1.0 mg of ECP at the time of CIDR removal. Cows were continuously re-enrolled in the same treatment until diagnosed pregnant, which resulted in a total of 1001 AI. Blood was sampled on d 14, 21, and 25 after AI for P4 determination. Ovaries were scanned on d 21, 25 and 32 to monitor responses to treatments. Pregnancy was presumed based on P4 > 1.0 ng/mL on d 14, 21, and 25 and diagnosed by ultrasonography on d 32 and 60 after AI. The pregnancy rate (PR) was similar for Control, CG, and CEG on d 32 (34.6 vs 32.8 vs 34.2%; P = 0.93) and 60 (30.2 vs 30.7 vs 30.3%; P=0.96). The pregnancy loss (PL) based on a drop in P4 below 1 ng/mL was not affected by treatment between d 14 and 21 or between d 25 to 32, but was greater for CEG compared to Control or CG between d 21 and 25 (32.4 vs 25.4 vs 23.9%; P=0.02). Nevertheless, PL from d 32 to 60 was not affected by treatment (Control = 10.3%, CG = 5.5% and CEG = 9.9%; P=0.43). Survival analysis of the cows remaining pregnant from 14 to 60 d after AI showed no effect of treatment on embryonic and fetal survival. Re-insemination interval for nonpregnant cows was similar for the Control compared to CG and CEG groups (29.3 vs 29.6 vs 28.1 d; P=0.13), but for cows receiving CIDR, ECP tended to reduce the interval (P = 0.06) because of increased estrous detection after insert removal (56.4 vs 47.1%; P=0.01). Treatment did not affect interval from study enrollment to pregnancy. Resynchronization of non-pregnant cows with CIDR or CIDR and ECP did not affect reproductive performance of dairy cows.

Acknowledgements: NRICGP USDA

Key Words: Resynchronization, CIDR, Dairy Cows

71 Synchronization of ovulation for timed AI (TAI) in Bos indicus-influenced cattle using CIDR-based, GnRH-prostaglandin combinations I: ovarian follicular, luteal and hormonal events associated with suboptimal reproductive outcomes. J. Saldarriaga*[1], D. Cooper[1], J. Cartmill[1], R. Stanko[1,2], and G. Williams[1], [1]*Texas A&M University*, *Beeville*, [2]*Texas A&M University*, *Kingsville*.

Initial objectives (Exp. 1) were to evaluate TAI conception and overall reproductive performance of Bos indicus-influenced females managed with the CO-Synch + CIDR (COS-C) synchronization regimen compared with traditional management (TM). Secondary objectives (Exp. 2) sought to evaluate follicular, luteal and hormonal events associated with COS-C and COS (CO-Synch without CIDR). All females had a minimum BCS of 4.8 (1-9 scale) and if suckled, were at least 50 d postpartum. For Exp. 1, 266 predominantly Braford and Brangus females were utilized. COS-C included insertion of an Eazy-Breed CIDR and i.m. injection of 100 µg GnRH (GnRH-1; Cystorelin) on d 0, removal of CIDR and i.m. injection of 25 mg PGF (Lutalyse) on d 7, and GnRH (GnRH-2) plus TAI 48 h later (d 9). Bulls of proven fertility were utilized for 60 d beginning 7 d after TAI. Conception rates to TAI averaged 39 ± 0.03 % and were not affected by location, replicate, BCS, d postpartum, parity, sire or AI technician. Cumulative pregnancy rates in 170 of the COS-C females available for comparison were greater ($P < 0.05$) than in TM females (n = 165) after 30 (74.1 vs 61.8%) and 60 d (95.9 vs 89.7%). In Exp. 2, cycling (78%) and non-cycling (22%) Braford cows (n = 100) were divided into four replicates (n = 25/replicate), with half receiving COS-C and half COS. Ultrasonography and blood sampling were utilized to intensively evaluate ovarian and hormonal events and revealed no differences between treatments. Percentages of cows ovulating to GnRH-1, developing a synchronized follicular wave, exhibiting luteal regression, and ovulating in response to GnRH-2 were 40, 60, 93, and 72%, respectively. TAI conception rates averaged 33%. Ovulation rate and TAI conception after GnRH-2 were greater ($P < 0.01$) in cows that developed a synchronized follicular wave (43%) than not (17%) after GnRH-1. TAI produced low conception rates in part because up to 28% of cows did not have an ovulatory follicle on d 9.

Acknowledgements: Supported by TAES and Pfizer Animal Health

Key Words: Bos Indicus, Synchronization, Timed AI

72 Synchronization of ovulation for timed AI (TAI) in Bos indicus-influenced cattle using CIDR-based, GnRH-prostaglandin combinations II: Assessment of estrual and ovulatory distributions with Select Synch + CIDR to optimize TAI with Co-Synch + CIDR. J. Saldarriaga*, J. Zuluaga, J. Cartmill, D. Cooper, and G. Williams, *Texas A&M*, *Beeville*.

Objectives of this experiment were to characterize estrual and ovulatory distributions after treatment of Bos indicus-influenced females with the Select Synch + CIDR in order to develop optimal timing for TAI using CO-Synch + CIDR (COS-C). The Select Synch + CIDR regimen includes insertion of an Eazy-Breed CIDR and i.m. injection of 100 µg GnRH (Cystorelin) on d 0, removal of the CIDR and i.m. injection of 25 mg PGF (Lutalyse) on d 7. Extension of this protocol to include a second GnRH injection (GnRH-2) and TAI at a predetermined time (48-66h) defines the COS-C regimen. Fifty postpartum, primiparous (n =32) and pluriparous (n =18) Braford (F1) females were used. All cows had a minimum body condition score (BCS) of 4.8 (1-9 scale) and were at least 50 d postpartum. Cow-calf pairs (5 pairs/pen) were maintained in pens (25.6 x 9.6 m) after CIDR removal and observed for estrus based on homosexual behavior at 3-h intervals for 120 h. AI was performed approximately 12 h after detected estrus. Transrectal ultrasonography was performed every 12 h until ovulation, and blood samples were collected on d -21, -11, 0, 7, 8 and 9 to estimate ovarian cyclicity and incidence of corpus luteum (CL) regression after PGF. Mean BCS and d postpartum averaged 5.6 ± 0.1 and 61 ± 1.1, respectively. Neither cycling status nor parity affected the number of cows exhibiting estrus (54%) or ovulating (56%). Percentage of cows exhibiting CL regression was 97%. The majority (75%) of estrual events was observed between 60 and 72 h after CIDR removal and none by 48 h. Mean intervals from CIDR removal to estrus and ovulation were 70 ± 2.9 and 99 ± 2.8 h, respectively. Conception rates to AI in cows that displayed standing estrus and ovulated were 59.3 and 60.7 %, respectively. Results of this and an accompanying study demonstrate that GnRH-2 and TAI at 48 h after CIDR removal/PGF in the COS-C protocol is inappropriate for optimal fertility.

Acknowledgements: Supported by TAES and Pfizer Animal Health

Key Words: Bos Indicus, Synchronization, Timed AI

73 Effect of artificial insemination (AI) protocol on fertilization and embryo quality in high-producing dairy cows. R. L. A. Cerri*[1], H. M. Rutigliano[1], R. G. S. Bruno[1], R. C. Chebel[1,2], and J. E. P. Santos[1], [1]*University of California*, *Tulare*, [2]*University of Idaho*, *Caldwell*.

Objectives were to determine the effect of AI protocol on fertilization and embryo quality in dairy cows. Lactating cows, 396, were subjected to AI after one of four protocols: Detected estrus (DE), GnRH on d 6 of the estrous cycle (EC), followed by PGF2a 7 d later, and AI upon estrus; Ovsynch (GnRH, 7d PGF2a, 2d GnRH, 12h timed AI) as OV3, OV6 and OVE, which corresponded to injection of the first GnRH on d 3, 6, and 6 of the EC, respectively, but OVE also received an injection of 0.5 mg of estradiol cypionate 36 h before the timed AI. The same technician inseminated all cows with semen from a single sire. Ovarian responses were evaluated by ultrasonography, blood was analyzed for progesterone and estradiol, and uteri were flushed on d 6 after AI. Data were analyzed by the LOGISTIC and GLM procedures of SAS (2001). Ovulation to the GnRH was less ($P<0.001$) for cows receiving it on d 3 (OV3=7.1%) than on d 6 of the EC (DE=79.2%, OV6=87.3%, OVE=85.2%) because of smaller dominant follicle (9.5 vs 14.2 vs 15.4 vs 15.0 mm; $P<0.001$). A new follicular wave was observed after the GnRH in 7.1% of OV3, which differed ($P<0.001$) from DE (81.2%), OV6 (88.6%) and OVE (88.9%). Diameter of the ovulatory follicle at AI differed ($P<0.001$) and it was 20.7, 19.7, 18.1 and 19.7mm for OV3, DE, OV6 and OVE, respectively. Synchronization at AI (luteolysis and ovulation) was greater for DE (96.9%) than the timed AI treatments (84.1%). Fertilization rate was similar ($P=0.96$) and averaged 86.3% across groups. OV3 reduced embryos of excellent and good quality as proportion of fertilized ($P<0.01$) and total structures ($P<0.02$) compared with DE, OV6, and OVE. Embryos from OV3 had fewer ($P<0.01$) blastomeres than DE, OV6 and OVE (32 vs 49 vs 42 vs 45), and both OV3 and DE resulted in embryos with a lower ($P=0.09$) proportion of live blastomeres than OV6 and OVE. Insemination upon DE did not improve fertilization or embryo quality, but timed AI compromised embryo quality when the protocol was designed to reduce ovulation to the first GnRH (OV3) resulting in prolonged dominance of the ovulatory follicle at AI.

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Key Words: Embryo Quality, Dairy Cows, AI

74 Effect of pre-synchronization and resynchronization with CIDR on reproductive performance of lactating dairy cows. R. C. Chebel*[1,2], H. M. Rutigliano[2], R. L. A. Cerri[2], R. G. S. Bruno[2], and J. E. P. Santos[2], [1]*University of Idaho*, *Caldwel*, [2]*University of California*, *Tulare*.

Objectives were to evaluate the effects of pre-synchronization protocols on cyclicity, estrous detection (ED), pregnancy rate (PR), and pregnancy loss (PL), and the effects of re-synchronization on re-insemination rate (RIR) of non-pregnant cows prior to pregnancy diagnosis (PD). Holstein cows, 1019, were blocked by parity and body condition at calving (study d 0) and assigned to one of 3 pre-synchronization protocols: CON (PGF2a d35±7 and 49±7, AI upon ED from d49±7 to 62±7), CED (PGF2a d35±7 and 49±7 + CIDR from d42±7 to 49±7, AI upon ED from d49±7 to 62±7), or CTAI (same as CED, but 100% of cows subjected to timed AI on d72±7 after Ovsynch). Cows in CON and CED groups not inseminated by d62±7 were initiated on the Ovsynch and were timed AI on d72±7. Blood collected on days 35±7, 49±7, and 62±7 was analyzed for progesterone (P4) and cows were classified as anovulatory if P4 < 1.0 ng/mL in the first 2 samples. On d62±7, anovulatory cows with P4 > 1.0 ng/mL were classified as responsive to pre-synchronization. On d 14±1 after AI cows were assigned to resynchronization with CIDR for 7d (RES) or no treatment (RCON).

Pregnancy was diagnosed at 31±3 and 60±3 d post-AI. Data were analyzed using the LOGISTIC procedures of SAS (2001). Greater proportion of anovular cows receiving CIDR became cyclic on d62±7 (CTAI = 48.4; CED = 44.9; CON = 31.6%; P=0.01). Pre-synchronization affected PR at 31d post-AI (CTAI = 38.3, CED = 31.6, CON = 27.9%; P<0.02), but PR at 60d post-AI (P=0.15) and PL from 31 to 60d post-AI (P=0.44) were not affected. Re-synchronization did not affect RIR prior to PD (P=0.43), but fewer RES cows experienced PL (14.8 vs. 24.7%; P<0.05), and RES increased PR at 31 and 60d after first AI (P<0.05). Second AI PR was affected by pre-synchronization (P=0.02) and resynchronization methods (P=0.03). Pre-synchronization with CIDR increased cyclicity by d62 postpartum, improved PR on d31, but not on d60 post-AI. Resynchronization with CIDR on d14 post-AI did not improve RIR, but increased PR at first and second AI.

Acknowledgements: NRICGP USDA, NAAB, and Pfizer Animal Health

Key Words: Pre-Synchronization, Resynchronization, Dairy cows

75 Effect of GnRH or CIDR inserts administered early after first timed insemination on fertility of lactating dairy cows. R. A. Sterry*[1], M. L. Welle[2], and P. M. Fricke[1], [1]*University of Wisconsin*, *Madison*, [2]*Miltrim Farms, Inc.*, *Athens, WI*.

In two experiments, lactating Holstein cows received their first postpartum (PP) timed AI (TAI) after a Presynch/Ovsynch protocol using 25 mg $PGF_{2\alpha}$ (PG) and 100 µg GnRH (G) as follows: PG (d 32±3 and 46±3 PP); G (d 60±3 PP); PG (d 67±3 PP); G+TAI (d 69±3 PP). Cows lacking a CL >10 mm at the first injection of G were classified as anovular. Cows (n=674) in Experiment 1 were randomized to each of three treatments to receive: 1) no treatment (C; n=226), 2) 100 µg G 5 d after TAI (G5; n=228), or 3) CIDR from 5 to 12 d after TAI (CIDR; n=220). For pregnant cows, number of CL 33 d after TAI was greater (P<0.01) for G5 (1.8±0.1) than for C (1.3±0.1) or CIDR (1.3±0.1) cows. Treatment did not affect conception rate (CR) 33 d after TAI (50, 55, and 47%, respectively) or pregnancy loss (PL) from 33 to 61 d (8%, overall). Overall, 23% of cows were anovular, and CR at 33 d was greater (P<0.01) for cycling (54%) vs. anovular (40%) cows, whereas PL from 33 to 61 d was greater (P<0.01) for anovular (16%) vs. cycling (8%) cows. Cows in Experiment 2 (n=485) were randomized to each of three treatments to receive 1) C (n=163), 2) G5 (n=158), or 3) 100 µg G 7 d after TAI (G7; n=164). For pregnant cows, number of CL 33 d post TAI was greater (P<0.01) for G5 (1.6±0.1) and G7 (1.7±0.1) than for C (1.2±0.1) cows. Treatment did not affect CR 33 d after TAI (51, 49, and 53%, respectively). Overall, 26% of cows were anovular, and CR at 33 d was greater (P<0.05) for cycling (55%) vs. anovular (43%) cows, whereas pregnancy loss from 33 to 61 d was greater (P<0.01) for anovular (13%) vs. cycling (8%) cows. When C (n=389) and G5 (n=386) cows from Experiments 1 and 2 were combined and analyzed, treatment did not affect CR 33 d after TAI (50 vs. 53%, respectively) or PL from 33 to 61 d. Although administration of GnRH or CIDR inserts early after first PP TAI did not affect CR or PL in lactating Holstein cows, cyclicity status before TAI affected fertility with cycling cows yielding higher CR and lower PL than anovular cows.

Key Words: CIDR, GnRH, Pregnancy Loss

76 The effect of a progesterone releasing intravaginal device (PRID) on estrus activity and pregnancy rate in non-cycling postpartum dairy cattle. R. B. Walsh*[1], S. J. Leblanc[1], T. F. Duffield[1], D. F. Kelton[1], P Gadbois[2], and K. E. Leslie[1], [1]*University of Guelph*, *Guelph, Ontario, Canada*, [2]*Vetoquinol N.A Inc*, *Lavaltrie, Quebec, Canada*.

A randomized, double-blind clinical trial was conducted in four Ontario dairy herds to examine the effect of supplemental progesterone on cows with no detected estrus at the start of the breeding period. Estrus was monitored continuously by pedometry and was defined as a 90% increase in activity above a rolling 10-day average. Animals not bred at 63 ± 3.5 DIM received a PRID (silastic coil; 1.55g progesterone; n=214) or a placebo device (n=190) for 7 days and all animals received 500mg of cloprostenol IM at device removal. Animals inseminated during the treatment period were excluded. Device retention and vaginitis score were recorded. The outcomes were first service pregnancy risk (analyzed with logistic regression), and the intervals from insertion to insemination and from calving to pregnancy (survival analysis). The retention rate was 93% for both treatment and control devices. Estrus during treatment was 5.4 times more likely in control than in PRID animals (P = 0.001). PRID treatment did not influence first service pregnancy risk (27.8 vs. 28%), but tended to improve pregnancy risk at second service (36.4 vs. 28.9%; P = 0.18). Median time to first insemination was 13 days shorter in PRID-treated cows than controls (12 vs 25 days after device removal, respectively).

Cox's proportional hazard model was used to investigate the effect of treatment on pregnancy rate. PRID significantly increased the speed at which cows became pregnant (Hazard Ratio = 1.36; P = 0.0001). Accounting for parity, season, and herd clustering, median time to pregnancy was decreased by 19 days in PRID treated animals vs. control (135 vs. 154 days, respectively). In conclusion, among animals that had not displayed estrus before enrolment, PRID treatment shortened time to pregnancy beyond the improvement in time to first insemination.

Key Words: Progesterone, Intravaginal, Non-cycling

77 Effect of addition of a CIDR insert prior to a timed AI protocol on pregnancy rates and pregnancy losses in dairy cows. R. G. S. Bruno*, H. M. Rutigliano, R. L. A. Cerri, and J. E. P. Santos, *University of California*, *Tulare*.

Holsteins cows, 898 (575 multiparous and 323 primiparous), not observed in estrus after 2 injections of PGF2a for a pre-synchronization protocol at 37±3 and 51±3 d in milk (DIM) were blocked by parity and DIM and randomly assigned to one of the two treatments. A Control group in which no progesterone insert was used; and a CIDR group, in which a CIDR (1.38 g of progesterone) was inserted at 58±3 DIM and removed on day 65±3 DIM, when the Heatsynch (GnRH, 7 d PGF2a, 1 d estradiol cypionate, 2 d timed AI) protocol was initiated. Cows were inseminated if observed in estrus during the Heatsynch or timed inseminated at 75 DIM. Ovaries of 560 cows were examined by ultrasonography at 37±3 and 51±3 DIM for multiparous and at 51±3 and 58±3 DIM for primiparous cows to determine cyclicity. Presence of a corpus luteum in one of the two examinations indicated cyclicity. Pregnancy was diagnosed at 31, 38, and 66 d after AI. Data were analyzed by the LOGISTIC procedure of SAS (2001). Of the 560 cows evaluated by ultrasonography that were not observed in estrus after the PGF2a at 51±3 DIM, only 10.2% were anovular and the proportion was similar for Control and CIDR cows (P=0.87). Of the 443 CIDR cows, 15 (3.4%) lost their inserts. An interaction between treatment and parity was observed (P<0.05) and CIDR improved pregnancy rates in primiparous at 31 (52.7 vs 41.6%), 38 (49.3 vs 38.7), and 66 (46.0 vs 38.0%) d after AI, but not in multiparous cows, and pregnancy rates at d 66 after AI were 34.2 and 37.9% for multiparous CIDR and control cows, respectively. Cyclic had greater pregnancy rates (P<0.02) than anovular cows at 31 (43.5 vs 27.1%), 38 (39.5 vs 18.8%) and 66 (38.2 vs 18.8%) d after AI. Furthermore, anovulation increased (P=0.05) pregnancy loss from 31 to 66 d of gestation (25.0 vs 9.7%), but treatment with CIDR prior to the timed AI protocol did not affect embryonic and fetal survival. Treatment with a CIDR insert in cows that did not display estrus or were anovular after a pre-synchronization with PGF2a improved pregnancy rates of primiparous, but not multiparous cows.

Acknowledgements: NRICGP USDA and Pfizer Animal Health

Key Words: CIDR, Synchronization, Dairy Cows

78 Prevalence and risk factors for postpartum anestrus in dairy cattle. R. Walsh, J. Walton, K. Leslie, and S. LeBlanc*, *University of Guelph*, *Guelph, Ontario, Canada*.

We present preliminary results from an ongoing field study on the prevalence and explanatory variables for prolonged postpartum anestrus. Milk samples were

collected at 46 and 60 (± 7) DIM for progesterone (P4) analysis. Anestrus was defined as P4 < 1ng/ml in both de-fatted milk samples. Data were available from 550 cattle in 18 herds from February through October 2004, and were analyzed with contingency tables and logistic regression. Overall, the prevalence of anestrus was 24.4% (95% confidence interval = 20.8 to 27.9%). The estimated herd specific prevalence varied from 9% to 56%. The prevalence of anestrus was not different among parities (27%, 28%, and 23% in parity 1 (34.2% of animals), 2 (32.3%), and ≥ 3 (33.4%), respectively). Anestrus was 1.7 times more likely in animals calving in March through May than in animals calving in June through August. In a representative subset of 321 animals, milk β-hydroxybutyrate (BHBA) was measured once in each of the first two weeks after calving. Among these, 33% had subclinical ketosis (≥ 100 mmol/ml BHBA) in the first week (range among herds, 6 to 80%) and 28% (range, 8 to 52%) in week 2 of lactation. Cattle with ketosis in week one were 1.4 times more likely (P=0.06) than non-ketotic animals to be classified as anestrus, but ketosis in the second week of lactation was not associated with anestrus. Accounting for season, parity and ketosis in week 1, anestrus tended to be less likely in animals with first DHI test projected 305ME > 10,000 kg than in animals projected to produce < 10,000 kg (odds ratio =0.65, 95% CI 0.4 - 1.1, P = 0.13). Time to first insemination was not significantly different between cycling and non-cycling animals (mean ± SD, 73 ± 20 vs. 78 ± 23 DIM); approximately half the cows in the study received timed AI for first insemination. The probability of pregnancy at first service was 30% and 20% (P = .04) in cyclic and anestrus cattle, respectively. The prevalence of anestrus varies considerably among dairy herds and has a negative effect on the probability of pregnancy at first insemination.

Key Words: Reproduction, Estrus Cycle, Anestrus

79 Endometrial thickness affects ovulation rate and conception rate in lactating Holstein cows. A. H. Souza*, A. Gümen, E. P. B. Silva, A. P. Cunha, J. N. Guenther, D. Z. Caraviello, and M. C. Wiltbank, *University of Wisconsin, Madison*.

The objective of this study was to test the association of endometrial thickness (ET) with ovulation rate (OR) and conception rate (CR) in dairy cows. Holstein cows (n=726) underwent a modified Ovsynch protocol: GnRH on d 0, PGF2α on d 7, GnRH 58 h later, and timed AI (TAI) 16 h after the 2nd GnRH. Half of the cows received 1 mg of estradiol-17β (E2) at 8 h before the second GnRH injection. Endometrial thickness was measured with ultrasound at about one inch after the uterine bifurcation 48h after the PGF2α injection. Ovulation was confirmed by ultrasonography 7 d after TAI. Data were analyzed with the Generalized Linear Mixed Effects Models with dependent variables assumed to follow binomial distribution and cow treated as a random effect. Primiparous had smaller mean ET (9.5mm±1.9 vs. 10.1mm±2.0; P<0.05). Although parity did not alter OR (95%, primiparous n=267 vs. 94%, multiparous n=459; P>0.10), primiparous cows had greater CR (44% vs. 38%; P<0.01). Regardless of parity, cows with ET ≤ 7mm had lower (P<0.01) OR (74%, n=82) than cows with ET>7mm (98%, n=644). Similarly, CR were lower (15%, n=80 vs. 43%, n=644; P<0.01) for cows with ET ≤ 7mm compared to cows with greater ET, respectively. The logistic regression model indicated that CR increased as ET increased up to 10 mm and this effect was independent of E2 treatment. Uterine tone grade (scale 1-min to 5-max) was highly associated with mean ET within each class of uterine tone (r=0.94; P<0.01) and CR increased as uterine tone increased from 1 to 3, remaining constant when uterine tone was > 3. No interaction between BCS and ET was found (P>0.10). A single uterine ultrasound evaluation of ET in Holstein cows 48 h after PGF administration in a TAI program was a surprisingly good predictor of ovulation failures (ET ≤7 mm) and pregnancy success (ET >10 mm).

Key Words: Endometrial Thickness, Ovulation Rate, Conception Rate

Ruminant Nutrition: Dairy—Protein and Amino Acids

80 A review of the 2001 dairy cattle NRC protein and amino acid model - A European perspective. P. Huhtanen*, *MTT Agrifood Research, Finland.*

NRC 2001 protein and amino acid model was tested using data from eight production experiments with dairy cows conducted using change-over designs. The experiments included a total of 72 selected to represent a wide range in feed intake, milk production and strategies to manipulate metabolizable protein (MP) intake (e.g. forage to concentrate ratio, level and type of CP supplementation). Grass silage, rolled barley and rapeseed feeds were the most typical forage, energy and protein supplements; i.e. the test data consisted of diets not typically used in the USA. The other protein systems evaluated were INRA, AFRC (1992), German and two versions [Danish (DK) and Finnish (FIN)] of the Scandinavian AAT/PBV system. The supply of MP was estimated according to different systems. For the NRC 2001 system EAA supply was also computed. A mixed model regression analysis with a random study effect was used to investigate the relationship between estimated MP or AA supply and milk protein yield (MPY). Scandinavian systems predicted MPY more accurately compared with NRC 2001 (RSME for adjusted for random study effect 16.9, 18.6 and 28.0 g/d for the FIN, DK and NRC 2001). Prediction accuracy of the NRC 2001 model was markedly increased, when a bivariate model with MP from microbial CP and RUP were used as independent variables (RSME 21.8 g/d). The slope was much higher for microbial MP compared to MP derived from RUP suggesting that NRC 2001 overestimates the range in RUP supply. Digestible Lys and Met in MP were not significantly associated to MPY supporting the conclusions from infusion studies that these AA are not limiting in dairy cows fed grass silage-based diets. However, MPY increased significantly (P<0.001) with increased digestible His in MP confirming the findings from infusion studies that His is the first limiting AA with these diets. It is concluded that the NRC 2001 amino acid model is a significant step forward in achieving a more precise feeding for N. Methodological aspects in determination parameters used to estimate MP supply will be discussed.

Key Words: Protein Evaluation, Metabolizable Protein, Dairy Cow

81 Use of NRC (2001) to examine the relationships between predicted supplies of metabolizable protein (MP), MP-methionine (MP-Met), and MP-lysine (MP-Lys) and actual yields of milk and milk protein. R. Ordway*, N. Whitehouse, and C. Schwab, *University of New Hampshire, Durham.*

The NRC (2001) predicts passage of MP-amino acid (AA) flows to the small intestine, but does not predict responses to changes in supplies of individual AA. To determine if milk and milk protein yields can be predicted more accurately from predicted supplies of MP-Met and MP-Lys than MP, results from over 300 diets published in the Journal of Dairy Science were entered into the NRC (2001) model. Results from the Summary and Duodenal Amino Acid Supply Reports were used to generate plots of measured milk and milk protein yields vs. predicted supplies of MP, MP-Met, and MP-Lys. Plots derived from predicted supplies of MP were restricted to include diets in which NE-allowable milk was greater than MP-allowable milk and NE-allowable milk was within ±6 kg of measured milk yield to ensure that MP was more limiting than NE and that factors other than MP or NE were not limiting performance, respectively. To generate plots of measured yields of milk and milk protein vs. predicted supplies of MP-Met and MP-Lys, diets were restricted to those in which MP balance was within -250 and +100 g/d of zero. To generate plots from predicted MP-Met supplies, diets were restricted to those having a Lys/Met ratio in MP greater than 3.0/1. To generate plots from predicted MP-Lys flows, diets were restricted to those having a Lys/Met ratio in MP less than 3.25/1. The following regression equations describe the relationship between measured milk yields and MP, MP-Met and MP-Lys supplies, respectively: MP (n=146): $y=-0.000004x^2+0.034x-20.56$, $R^2=0.65$; MP-Met (n=98): $y=-0.0226x^2+2.7383x-40.796$, $R^2=0.76$; and MP-Lys (n=28): $y=-0.0013x^2+0.6174x-26.37$, $R^2=0.90$ and between milk protein yields and MP, MP-Met and MP-Lys, respectively: MP (n=146): $y=0.4524x-62.063$, $R^2=0.74$; MP-Met (n=98): $y=-0.3497x^2+55.631x-732.68$, $R^2=0.81$; MP-Lys (n=98): $y=-0.0195x^2+13.098x-457.31$, $R^2=0.92$. Results indicate that yields of milk and milk protein are more accurately predicted by supplies of the first limiting AA rather than by supplies of MP.

Key Words: Methionine, Lysine, Metabolizable Protein