

for collection. Spot urine and fecal grab samples were collected daily (0800, 1100, 1400, and 1700 h), and rumen pH and intake data were monitored continuously. BCP (g/d) production from allantoin excretion (BCP-A) was lower for HMC (750) versus BRAN (962; $P=0.02$) or SBM (909; $P=0.07$). Bacterial efficiency ($P=0.15$) and average pH ($P=0.13$) tended to be lower for HMC (8.8 and 5.44) than BRAN (10.3 and 5.78) and SBM (10.8 and 5.88). Dry matter digestibility ($P=0.08$) was higher for HMC (85.0) than BRAN (81.6) and SBM (80.0) with no difference in digestible DMI ($P=0.45$). Regression analyses suggest that efficiency increased with increasing pH and decreased as time below pH of 5.6 increased. Increasing digestible DMI increased BCP-A with an ef-

iciency of 13.1%. BCP-A followed NRC estimates (BCP-NRC) of BCP. These relationships suggest allantoin excretion is an effective marker of BCP production.

Dependent Variable	Independent Variable	Intercept	Slope	R ²
Efficiency	Average pH	-4.87	2.59	34.8
Efficiency	Time below 5.6	11.9	-0.003	51.7
BCP-A	Digestible DMI	-259	13.1	56.7
BCP-NRC	BCP-A	198	0.853	55.0

Key Words: Allantoin, Bacterial Crude Protein, Cattle

Graduate Student Competitive Research Papers - M.S. Division

76 The effects of dietary okara on performance of nursery pigs. J.R. Hermann* and M.S. Honeyman, Iowa State University.

Okara is the residue left from ground soybeans after the production of soymilk and tofu. Interest in okara exists because there is a need for a reliable source of high quality protein for organic pig production. Organic soymilk and tofu production is well established. The objective was to determine the effectiveness of dietary okara on performance of nursery pigs. Four replicate trials involving a total of 48 pigs (13.17 kg 0.32) were conducted at the Iowa State University Swine Nutrition Farm. The pigs and feeders were initially weighed and at 7 d intervals until the completion of each 18 d trial. Average daily gain (ADG), average daily feed intake (ADFI), and gain:feed (G:F) ratio were recorded for each pen. During each trial, three dietary treatments were fed: 1) okara 25% (25% of total diet), 2) okara 50% (50% of total diet), and control diet (composed of corn, soybean meal, oats, and essential vitamins and minerals). All diets contained 10% oats. Okara (ground pellets) was added to the diets at 25 and 50% levels by weight. Diets were isocaloric based on calculated analysis. Pigs were initially allotted by weight to one of three treatments. There were four pigs per pen for a treatment in each replication. Among pigs receiving dietary okara there were no differences in ADG, ADFI, and G:F ratio compared to pigs receiving the control diet. Pigs fed okara 25% had a higher ADG when compared to 50% okara ($P < 0.06$). Total G:F ratio was increased when diets supplemented with 25% were fed compared with 50% ($P < 0.04$). Dietary okara is a potential alternative to soybean meal in nursery pig diets. More research is needed to determine the levels at which okara can be substituted in the diet. The 50% okara rate was comparable to a conventional nursery pig diet. The 25% okara rate was equal and may be superior to a conventional nursery pig diet in growth and feed efficiency.

Key Words: Okara, Nursery Pigs, Soybean Meal

78 Anti-diabetic potentials of *Momordica charanta* and *Andrographis paniculata* and their effects on estrous cyclicity of Alloxan-induced diabetic rats. B. Reyes¹, N. Bautista^{*1}, N. Tanquilut¹, R. Anunciado², A. Leung¹, G. Sanchez¹, R. Magtoto³, S. Sajapitak⁴, H. Tsukamura⁴, and K.-I. Maeda⁴, ¹Pampanga Agricultural College, Magalang, Philippines, ²University of the Philippines, Los Banos, Laguna, Philippines, ³Iowa State University, Ames, Iowa, ⁴Nagoya University, Nagoya, Japan.

Momordica charanta and *Andrographis paniculata* are commonly used herbs by the diabetic folks in Pampanga, Philippines. While the anti-diabetic potential of *M. charanta* is well established, it is not known whether *A. paniculata* possesses anti-diabetic property. Moreover, the effects of these herbs on estrous cyclicity of diabetic rats are not known. Thus, in this experiment, we determined the anti-diabetic potentials of *M. charanta* and *A. paniculata* and their abilities to restore estrous cycle in Alloxan-induced diabetic rats. Extract and decoction of *M. charanta* and *A. paniculata*, respectively, were administered orally to Alloxan-induced diabetic rats from the day they showed diabetes through the blood and urinary glucose levels until the last day of the experiment. There were two groups of rats that served as positive (untreated Alloxan-induced diabetes) and negative controls. Rats treated with *M. charanta* and *A. paniculata* had higher body weight (BW) and lower feed and water intake compared with positive control starting from day 16 (D16) to D26 ($P < 0.05$), though lower BW and higher feed and water intake compared with negative controls ($P < 0.05$). Urinary glucose could not be detected in the *M. charanta*- and *A. paniculata*-treated rats from

D11 to D26. The blood glucose levels in *M. charanta*- and *A. paniculata*-treated rats were significantly reduced from D11 to D26 compared with positive controls ($P < 0.05$) and comparable with negative controls ($P < 0.05$). *M. charanta* and *A. paniculata* demonstrated potentials in the restoration of estrous cyclicity at about 8.4 days from the day it was disrupted. The reduction of blood glucose levels and restoration of estrous cycle in Alloxan-induced diabetic rats treated with *M. charanta*- and *A. paniculata* indicate that the herbs possess anti-diabetic potentials that could restore impaired estrous cycle.

Key Words: Diabetes, Estrous Cycle, Herbs

79 Effect of flax supplementation and a combined trenbolone acetate and estradiol implant on circulating IGF-1 and muscle IGF-1 mRNA levels in finishing cattle. J. D. Dunn*, J. P. Kayser, A. T. Waylan, E. K. Sissom, J. S. Drouillard, and B. J. Johnson, Kansas State University, Manhattan.

Combined trenbolone acetate (TBA) and estradiol (E₂) growth promotants have been reported to increase circulating IGF-1 and muscle IGF-1 mRNA levels in finishing cattle. The purpose of this experiment was to evaluate the effects of a 5% ground flaxseed (FLAX) supplement and a combined TBA/E₂ growth promotant, Revalor-S, (IMP) on both circulating IGF-1 and local muscle IGF-1 mRNA concentrations. Sixteen crossbred steers (initial BW = 397 kg) were randomly assigned to one of four treatments: 1) FLAX/IMP, 2) No FLAX/IMP, 3) FLAX/No IMP, 4) No FLAX/No IMP. Data were analyzed as a 2x2 factorial in a split-plot design (4 steers/treatment). Steers were allowed ad libitum access to a 93% concentrate diet for the entire study. Serum was harvested from blood collected via jugular venipuncture on d 0 (before implantation or FLAX addition), 14 and 28, and stored for subsequent use in analysis of circulating IGF-1 levels. Muscle biopsy samples (3.5 g) were obtained from the longissimus muscle on d 0, 14, and 28. Total RNA was isolated from the muscle samples and real-time quantitative-PCR was used to evaluate relative differences in gene expression. FLAX supplementation had no effect ($P > 0.10$) on circulating IGF-1 levels. No FLAX cattle had increased levels of muscle IGF-1 mRNA as compared to FLAX cattle on d 28 (4.4-fold, $P < 0.01$). Following implantation, sera from IMP steers had 52 and 84% greater ($P < 0.05$) IGF-1 levels as compared to sera from No IMP steers on d 14 and 28, respectively. On d 28, local muscle IGF-1 mRNA levels were increased 2.4-fold ($P < 0.01$) in biopsy samples obtained from IMP as compared to No IMP steers. These data support that the administration of a combined TBA/E₂ growth promotant increases circulating IGF-1 and local muscle IGF-1 mRNA concentrations in finishing cattle. However, this increase in muscle IGF-1 mRNA appears to be attenuated by the addition of a FLAX supplement.

Key Words: Beef Cattle, IGF-1, Trenbolone Acetate

80 Influence of weaning age, creep feeding and type of creep on steer performance and carcass traits. D. W. Shike*, D. B. Faulkner¹, D. F. Parrett¹, F. A. Ireland¹, and M. J. Cecava², ¹University of Illinois at Urbana-Champaign, ²Consolidated Nutrition, Fort Wayne, IN.

Angus x Simmental steers (n=168) were assigned to four treatments: Early Wean/High Concentrate (EW), Normal Wean/Creep (C), Normal Wean/Fiber Creep (FC) and Normal Wean/No Creep (NC) to determine the effects of weaning age, creep feeding and type of creep on calf performance and carcass traits. Steers were weaned at 63 ± 16.3 or 189

± 16.3 d of age. EW steers were fed to gain the same as the two creep-fed (CR-F) treatments during the growing period. Data were analyzed using the GLM and GENMOD procedures of SAS. There was no difference ($P > 0.05$) in gain between EW steers and CR-F steers during the growing period. However, C steers had higher ADG (1.37 kg/d) and supplemental gain/feed (0.16) than FC steers (1.29 kg and 0.12) ($P < 0.05$), but DMI was not different. During the adaptation period, EW steers had higher DMI (7.87 kg/d) and ADG (1.93 kg/d) than CR-F steers (4.89 kg/d and 1.14 kg/d) ($P < 0.05$), with no differences in feed efficiency. The NC steers had lower DMI (3.9 kg/d), ADG (0.40 kg/d) and feed efficiencies (0.10) than other treatments (5.88 kg/d, 1.40 kg/d and 0.23) ($P < 0.05$). During the finishing period, EW steers had lower DMI (7.99 kg/d) and ADG (1.36 kg/d) than CR-F steers (8.45 kg/d and 1.5 kg/d) ($P < 0.05$). Intake, ADG and feed efficiencies were not different between NC steers and other treatments or between C and FC. Overall, NC steers had lower ADG (1.28 kg/d) and were older at harvest (407 d) than other treatments (1.4 kg/d and 395 d) ($P < 0.05$). There were no differences in gain or days to slaughter between EW and CR-F steers or between C and FC. The EW steers had a higher marbling score (663), a higher percent \geq Choice^o (72.5%) and a higher percent \geq Prime⁻ (12.5%) than CR-F steers (598, 38.8% and 2.5%) ($P < 0.05$). There was no difference in yield grade. Feeding EW steers high concentrate diets improved carcass quality compared to creep feeding. Type of creep did not influence carcass quality or overall performance.

Key Words: Early Weaning, Creep Feeding, Steers

81 Effects of long-term treatment with GnRH agonist on testicular development and the attainment of puberty in bull calves. E.J. Behlke*, C.R. Burke, C.L. Gasser, M.L. Mussard, and K.E. Fike, *The Ohio State University*.

Onset of puberty in bulls is regulated by gonadotropins and testosterone (T). GnRH agonist treatment in bulls decreases LH pulse frequency but increases basal LH and testosterone secretion. Our hypothesis was that long-term treatment of prepubertal bulls with a GnRH agonist (deslorelin) will induce earlier onset of puberty and increase testicular size and function, as compared with bulls receiving GnRH or no treatment. From 164 to 360 average days of age, Angus and Angus x Simmental bull calves were treated with deslorelin (1 μ g/kg BW/d : DES, n = 7), gonadorelin (5 μ g/kg BW/d : GnRH, n = 7) or remained untreated (CON, n = 7). Treatments were administered via mini-osmotic pumps, implanted s.c., and replaced every 28 d. Scrotal circumference (SC) was measured every 2 weeks. Blood samples were collected every 20 min for 24 h at 185 and 358 d of age to determine concentrations of LH and T. When bulls attained a SC of 26 cm, they were electro-ejaculated once every 2 wks and considered pubertal when the first of three ejaculates contained $> 50 \times 10^6$ total sperm with $> 10\%$ progressive linear motility. At 421 d of age, testicles were removed and testicular size, mass and daily sperm production (DSP) were measured. The SC of bulls treated with DES was different ($P \leq 0.10$) as compared with GnRH treated bulls from 276 d of age until the end of treatments. The SC of CON bulls did not differ from that of DES or GnRH treated bulls at any time throughout the experiment. Treatment with DES decreased ($P < 0.05$) LH pulse frequency and amplitude but increased ($P < 0.05$) basal LH secretion during treatment as compared with CON bulls. Also, DES treatment increased ($P < 0.05$) basal T secretion throughout treatment as compared with GnRH treated and CON bulls. Age at puberty or testis size, mass and DSP at castration did not differ among groups. We conclude that long-term treatment with deslorelin increases basal and mean LH and T, but does not alter testicular size nor hasten the onset of puberty in bulls.

Key Words: Bull, Puberty, Testosterone

82 Fetal growth and development in the pig; nutritional implications. R. L. McPherson*¹, F. Ji¹, G Wu², and S. W. Kim¹, ¹Texas Tech University, ²Texas A&M University.

A total of 304 fetuses from 25 primiparous sows were used in this study to determine fetal growth and development during gestation. All the sows were fed equal amounts (2.0 kg/d) of the same diet and housed in crates. Sows were slaughtered in groups representing days of gestation: 45 (6-sows), 60 (4-sows), 75 (3-sows), 90 (3-sows), 100 (5-sows), and 110 (4-sows). An additional 6 primiparous sows were slaughtered on day 0 of gestation to provide baseline information. The reproductive

tracts were obtained from all the sows after slaughter and dissected to obtain the fetuses. Fetuses were dissected into individual tissues, including carcass, gastrointestinal tract (GIT), liver, lung, heart, kidney, spleen (75+days), and placenta. All the individual tissues were weighed. Regression equations were obtained to explain the weight changes of individual tissues during gestation. Based on the regressions, weight gains from the fetus, carcass, gastrointestinal tract (GIT), liver, lung, heart, kidney, spleen and placenta during gestation (d 0 to d 114) were 1,674.8, 1,437.6, 104.3, 44.2, 56.5, 14.1, 17.8, 2.5 and 34.1 g/fetus. There was a quadratic relationship between liver ($P < 0.0001$) or placental weight ($P < 0.0001$) and the fetus weight. There was a cubic relationship between heart weight ($P < 0.0001$) and fetal weight. There was a linear relationship between the gastrointestinal tract ($P < 0.0001$) or kidney ($P < 0.0001$) and fetal weight. During gestation, the proportion of the GIT increased linearly ($P < 0.0001$) with fetal weight, whereas the liver decreased linearly ($P < 0.0001$) with fetal weight. The growth of liver and the GIT occurs early in gestation (before d 70) and during late gestation (after d 70), respectively. These results may have important implications for establishing a feeding strategy for gestating sows to improve fetal growth.

Key Words: Pigs, Fetus, Growth

83 Sorting strategies for yearlings. J.C. MacDonald*, T.J. Klopfenstein, G.E. Erickson, C.N. Macken, J.D. Folmer, and M.L. Blackford¹, ¹University of Nebraska - Lincoln.

One hundred sixty medium-framed English-cross steers (244 kg; SD = 23 kg) were used in each yr of a two yr study to determine the effects of three sorting strategies on performance, carcass characteristics, and profitability in an extensive beef production system. The hypothesis was sorting yearling cattle by weight or fat depth would increase carcass weight, reduce discounts for overweight and over fat carcasses, reduce variability in carcass weight and carcass fat thickness, and improve profitability. Treatments were 1) sorting by weight prior to summer grazing with heaviest half removed midway through grazing season, i.e. pasture sort (PSTR; n = 40), 2) Sorting by weight entering feedlot (FDLT; n = 40), 3) Sorting by weight and fat thickness at end of feeding period (PEN; n = 60), and 4) control that was not sorted (CON; n = 20). All steers received two implants (Revlor-G[®] for grazing and Revlor-S[®] entering feedlot). Average days on feed were 99, 90, 87, and 83 for PSTR, FDLT, PEN, and CON, respectively. No differences were observed for winter or summer performance (0.65 and 0.78 kg/d, respectively; $P \geq 0.10$). The CON and sort groups of each treatment were marketed when fat depth of the group reached 1.14 cm. Individual steers in PEN treatment were marketed upon reaching 1.14 cm fat depth or 680 kg shrunk body weight. PSTR cattle were lighter entering feedlot ($P \leq 0.01$), consumed less feed ($P \leq 0.01$), and gained less ($P \leq 0.05$) than other treatments. There were no differences in feed efficiency ($P = 0.81$) suggesting gain differences were related to DMI. PSTR cattle also had less variation in weight upon entering the feedlot ($P \leq 0.01$), which resulted in less variation in carcass weight ($P \leq 0.05$). The PSTR treatment also resulted in increased marbling scores ($P \leq 0.01$), and was only treatment that resulted in no overweight carcasses. No differences were found in carcass weight or profitability ($P \geq 0.10$). No sorting strategy successfully accomplished all hypothesized improvements.

Key Words: Sorting, Beef Production Systems, Carcass Variability

84 Effects of adding distiller's dried grain with solubles (DDGS) to gestation and lactation diets on reproductive performance and nutrient balance in sows. J.A. Wilson*¹, M.H. Whitney¹, G.C. Shurson¹, and S.K. Baidoo², ¹University of Minnesota, St. Paul, MN, ²University of Minnesota, Waseca, MN.

A two-parity study utilizing 93 sows was conducted to determine the effects of diets containing 50% DDGS in gestation and 20% DDGS in lactation on sow reproductive performance. Nutrient balance was determined from d 100 to 105 of pregnancy using 14 sows. Sows were allotted based on parity and initial BW to a corn-soybean meal gestation diet (GC) or GC + 50% DDGS (GDG), and a corn-soybean lactation diet (LC) or LC + 20% DDGS (LDG) in a 2 x 2 arrangement of treatments. Sows were fed 1% BW plus 100 g, 300 g, and 500 g per d on d 30, 60, and 90 of gestation, respectively, and were provided *ad libitum* access to

feed during lactation. Sows remained on their respective diets through two reproductive cycles (RC1 and RC2). No differences in sow gestation weight gain, pigs born alive per litter, and litter birth weight were observed between sows fed GC and GDG. Dietary treatment combination had no effect on litter size or litter weight at weaning for RC1, but sows fed GC/LC weaned fewer pigs per litter during RC2 ($P < .05$). Pre-weaning piglet mortality was higher ($P < .05$) for sows fed GDG/LDG compared to other treatments during RC1, but dietary treatment combinations had no effect during RC2. Sows fed GC/LDG in RC1 had lower lactation feed intake ($P < .01$), which primarily occurred within the first 7 d of lactation, but this effect was not observed during RC2. Wean-to-estrus interval was higher ($P < .001$) for sows fed the GC/LC diet combination compared to sows fed the GDG/LDG and GDG/LC diet combinations (5.8 vs. 4.8 and 4.4d) during RC1, but was not observed during RC2. Sows fed GDG diet had greater N, S ($P < .05$), and P retention ($P < .1$) than sows fed the GC diet. These results suggest that feeding a gestation diet containing 50% DDGS will support satisfactory reproductive performance, but feeding a 20% DDGS lactation diet may reduce feed intake if sows were fed a corn-soybean meal diet during gestation.

Key Words: Sow, Distiller's Dried Grains with Solubles, Reproductive Performance

85 Nitrogen balance and blood urea nitrogen as response criteria to estimate protein requirement of the exercising horse. C.L. Wickens*, J. Moore, J. Shelle, C. Skelly, H.M. Clayton, and N.L. Trottier, *Michigan State University, East Lansing, Michigan/USA.*

Five mature Arabian geldings (475.55 ± 38.50 kg body weight) were used to first, determine if nitrogen (N) retention (R) and blood urea nitrogen (BUN) can be used as response criteria to estimate dietary crude protein (CP) requirement for moderate exercise and second, to determine if N balance and BUN, when used simultaneously, provide similar estimates of protein requirement. Horses were randomly assigned to 1 of 5 dietary treatments in a 5 x 5 Latin Square design. All horses consumed mixed grass hay containing 10% CP at 1% of their body weight. Total diet (hay plus concentrate) was formulated to provide 677, 790, 903, 1016 and 1129 g CP daily corresponding to a very low (VL), low (L), control (C), high (H), and very high (VH) protein diet respectively. Horses were trotted bi-directionally on a mechanical walker at approximately 3.6 meters per second for 60 minutes per day, 6 days per week. Each N balance period was 14 days in length and consisted of a 10-day diet adaptation followed by a 4-day total urine and fecal collection. Pre and post-exercise blood samples were drawn from each horse on day 3 and 4 of the collection period and analyzed for urea-N concentration. There was no difference ($P > 0.05$) in NR (g/d) between VL (24.80 ± 4.95), L (29.30 ± 5.21), and C (33.02 ± 4.95). Nitrogen retention (g/d) increased ($P < 0.05$) in H (46.18 ± 4.95) versus VL, L, or C. Nitrogen retention (g/d) in VH (48.29 ± 4.95) was not different ($P > 0.05$) compared to H, and was higher ($P < 0.05$) compared to VL, L, or C. Pre-exercise BUN increased ($P < 0.05$) with increasing CP intake. There was no difference ($P > 0.05$) in post-exercise BUN (mg/dL) between VL (13.14 ± 1.33), L (15.27 ± 1.37), and C (16.83 ± 1.33). Post-exercise BUN (mg/dL) increased ($P < 0.05$) in H (19.16 ± 1.33) and VH (20.20 ± 1.33) versus VL, L, or C diets. In summary, NR was maximized in horses fed 1016 g CP and BUN was minimized in horses fed 903 g CP. In conclusion, NR and BUN can be used to estimate the CP requirement for exercise in the mature horse, and yield close estimates of CP requirement.

Key Words: Horse, Protein, Exercise

87 Computer simulation of the economics of swine insemination scenarios. K. A. Fischer*, T. J. Safranski, and W. R. Lamberson, *University of Missouri-Columbia.*

A stochastic simulation model has been developed to allow comparison of biological and economic efficiencies of scenarios of estrous detection and insemination of sows. The simulation consisted of 1500 herds of 100 sows bred under different scenarios to yield an economic return based on the conception rate (CR) and litter size (LS) of each individual sow. Conception rate and litter size were assumed dependent on time of insemination relative to ovulation, which in turn was dependent on wean-to-estrus interval. Economic return was the value of income from selling weaned piglets minus cost of producing a litter and cost of semen and

labor for each scenario. Effects of once versus twice daily estrous detection were evaluated at intervals of: 24 h (S1), 12 h (S2), 8 and 16 h (S3), and 6 and 18 h (S4). Observations of commercial farms practicing twice daily estrous detection suggest that the afternoon check is often not as efficient as the morning check, so three additional scenarios were evaluated assuming a 70% efficiency of detection in the afternoon checks. Insemination was simulated one, two, three or four times for each heat check scenario resulting in 59 combinations. Greatest return (\$84.79/sow) was from sows bred three times per day with S2. The added costs of labor and semen from a fourth insemination superceded the benefits of the higher LS and CR. The best two-insemination scenario, S1, had an economic return of \$7.23/sow less than the optimum scenario; this might be offset if the cost of insemination was higher than that simulated (\$10.93). The best single breeding schedule, sows bred 24 hours after first detection of estrus using S2, had a \$17.43 return than the optimum scenario. Most heat check scenarios with 100% efficiency had higher return than scenarios with 70% efficiency. High economic return resulted from high conception rate, large litter size, precise estrous detection, and using resources such as labor and semen as efficiently as possible.

Key Words: Artificial Insemination, Computer Simulation, Sows

88 Effects of CIDR devices on follicular development and *in vitro* fertilization in anestrus ewes treated with melatonin and follicle stimulating hormone. J.S. Luther*, D.A. Redmer, L.P. Reynolds, J.T. Choi, D. Pant, C. Navanukraw, J.D. Kirsch, R.M. Weigl, K.C. Kraft, and A.T. Grazul-Bilska, *North Dakota State University.*

In a recent study from our laboratory (Luther et al., Biol. Reprod. 66, Suppl.1; 240, 2002), a combination of melatonin implants (Melovine[®]; 18 mg melatonin, Sanofi Sante Nutrition Animal, La Ballastiere, France) and controlled internal drug release (CIDR-Type G; 300 mg progesterone, Inter Ag, Hamilton, New Zealand) devices increased the number of developing follicles in follicle stimulating hormone (FSH-P with 10% luteinizing hormone; Sioux Biochemical, Sioux Center, IA, USA)-treated anestrus ewes; however, CIDR treatment decreased the rate of *in vitro* fertilization (IVF). In the current study, effects of alternative CIDR treatments on follicular development and rate of IVF in anestrus ewes was evaluated. On d -60 from oocyte collection (d 0) all ewes (1CIDR and 2CIDR treatment groups; n=6/group) received a melatonin implant. In addition, CIDR's were implanted on d -22 and removed on d -17. On d -10 2CIDR ewes received a second CIDR for 8 d (removed on d -2). All ewes received FSH injections twice daily on d -2 and d -1. On d 0, oocytes were aspirated from follicles, matured *in vitro* for 17-24 h and then subjected to IVF on d 1 of culture. 1CIDR and 2CIDR ewes had a similar ($P > 0.10$) number of follicles ≥ 1 mm in diameter (26.7 ± 8.6 and 24.3 ± 13.3 , respectively) and rate of oocyte recovery (91.3 ± 3.5 and $99.3 \pm 1.6\%$, respectively). On d 3 of culture, the rate of oocyte maturation (sum of fertilized and matured unfertilized oocytes [determined by DAPI staining]) was similar ($P > 0.10$) between 1CIDR and 2CIDR ewes (89.7 ± 7.4 and $87.6 \pm 6.3\%$, respectively). However, oocytes collected from 2CIDR ewes had lower ($P < 0.01$) rates of IVF than oocytes collected from 1CIDR ewes (30.2 vs. 58.0%, respectively). Thus, IVF rates were adversely affected by an additional 8 d CIDR treatment. These data indicate that the interval between CIDR treatment and oocyte collection affects IVF rates in FSH-treated ewes during anestrus. Therefore, progestogen treatment protocols used in ovine IVF programs should be carefully designed to minimize adverse effects on fertilization rates.

Key Words: IVF, CIDR, Anestrus Ewe