

content of insoluble and undigested substrate (IUS). The relationship between SI WRC and IUS was:  $WRC = 0.0279 IUS + 0.7047$  ( $R^2 = 0.654$ ). On the other hand, extrusion of cereals promoted a significant increase in Gastric WRC, probably due to the gelatinization and dispersion of starch. Extrusion and grinding promoted decreases in SI WRC, which was associated with a decrease on the amount of IUS rather than a variation on the feed particle size. Further studies are required *in vivo* to evaluate the influence of processing on the physicochemical properties of digesta and the gastrointestinal microbial population.

	Wheat		Barley		Oats	
	Gastric	SI	Gastric	SI	Gastric	SI
Raw						
0.8 mm	1.4	1.7	1.9	1.9	2.4	2.5
3.0 mm	1.6	1.8	2.4	2.4	3.2	3.1
Hydrothermal						
0.8 mm	1.4	1.2	1.9	1.7	1.8	2.2
3.0 mm	1.7	1.6	2.6	2.6	2.8	2.6
Extrusion						
0.8 mm	3.5	0.9	3.6	1.1	2.6	1.9
3.0 mm	3.8	1.0	3.6	1.2	2.8	2.1
SEM	0.10	0.05	0.04	0.10	0.16	0.12
Thermal	***	***	***	***	*	***
Grinding	**	0.08	***	***	***	***
Thermal*grinding	NS	NS	***	***	0.07	NS

Values are least square means; NS,  $P > 0.05$ ; \*  $P < 0.05$   
 \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ .

**Key Words:** Processing, Cereal, Water Retention

**91 Response of growing and finishing pigs to dietary energy concentration.** J. F. Patience<sup>\*1</sup>, A. D. Beaulieu<sup>1</sup>, R. T. Zijlstra<sup>1</sup>, and N. H. Williams<sup>2</sup>, <sup>1</sup>*Prairie Swine Centre Inc., Saskatoon, SK, Canada*, <sup>2</sup>*PIC USA, Inc., Franklin, KY*.

Achieving the full genetic potential for swine growth requires an understanding of the response to dietary energy in all phases of growth. This experiment was designed to develop an energy response curve for growing and finishing pigs. Barley and soymeal based diets were formulated with increasing wheat and canola oil to contain 3.05, 3.19, 3.33, 3.47, or 3.61 Mcal DE/kg. Separate diets were formulated with appropriate dLys:DE ratios for barrows and gilts within 3 phases of growth (25 to 50, 51 to 80 and 81 to 115 kg BW). Offspring of C22 females and L337 boars (n=300) were blocked according to gender, weight per day of age and BW and randomly assigned to treatment. Light (28.8 kg mean BW) and heavy (33.6 kg mean BW) blocks allowed the determination of differential animal response to energy according to initial weight. Pigs were weighed on d0, d14 and at the end of each phase. ADG averaged 0.97, 1.07 and 1.07 kg/d in phases 1, 2 and 3, respectively, and was unaffected by diet DE concentration ( $P > 0.05$ ). Lighter pigs grew 50 g/d slower than heavier pigs ( $P < 0.001$ ). Block by DE interactions did not exist ( $P > 0.05$ ). Overall feed intake decreased from 2.76 to 2.49 kg/d (linear,  $P < 0.001$ ) and feed efficiency improved from 0.36 to 0.42

## Physiology and Endocrinology: Factors Affecting Embryonic and Fetal Mortality

**95 Effect of elevated systemic concentrations of ammonia and urea on amino acid concentrations in oviduct fluid in cattle.** D. A. Kenny<sup>\*1</sup>, P. G. Humpherson<sup>3</sup>, D. G. Morris<sup>2</sup>, H. J. Leese<sup>3</sup>, M. G. Diskin<sup>2</sup>, and J. M. Sreenan<sup>2</sup>, <sup>1</sup>*Department of Animal Science and Production, Faculty of Agriculture and Food Science, University College, Dublin, Ireland*, <sup>2</sup>*Teagasc Research Centre, Athenry, Co. Galway, Ireland*, <sup>3</sup>*Department of Biology, University of York, York, UK*.

It has been suggested that elevated systemic concentrations of urea and ammonia may compromise early bovine embryo development in the oviduct. The objective of this study was to determine the effect of elevated systemic ammonia and urea on amino acid (AA) concentrations in cattle oviduct fluid. Heifers (n=25) were allocated to one of three intravenous infusion treatments; saline (C), urea (U) or ammonium chloride (AC) at either 2 or 8 d after oestrus. Treatment solutions were infused over a 7 h period and oviduct fluid was collected during mid

(linear,  $P < 0.001$ ) as DE increased from 3.05 to 3.61 Mcal DE/kg. DE concentration did not affect lean thickness (average 61.3 mm;  $P > 0.05$ ), however, backfat increased from 16.8 to 19.4 mm when DE increased from 3.05 to 3.61 Mcal/kg (linear,  $P < 0.05$ ). In conclusion, a positive response to dietary energy concentration is confirmed for feed conversion, but not ADG. Further research is required to understand why pigs do not always respond to increased dietary energy concentration with improved growth.

**Key Words:** Swine, Energy, DE

**92 Withdrawn by author. , .**

**93 Withdrawn by author. , .**

**94 Palm oil and hydrogenated fat as alternative oil sources for fattening pig diets.** P. Medel<sup>\*1</sup>, J. I. Fernández<sup>2</sup>, J. Peinado<sup>1</sup>, J. C. González<sup>1</sup>, and C. López-Bote<sup>4</sup>, <sup>1</sup>*Imasde Agropecuaria, S.L. Spain*, <sup>2</sup>*Norel, S.A. Spain*, <sup>3</sup>*Universidad Complutense de Madrid, Spain*.

A total of 96 Large White × Landrace\*Large White pigs of  $29.0 \pm 3.2$  kg of initial BW, 50 % males and females, were used to study the influence of type of fat source on productive performance and carcass quality. Feeding program consisted of three phases offered *ad libitum* (1.08 % lys from 29 to 63 kg BW, 1.03 % lys from 63 to 78 kg BW, and 0.89 % lys from 78 to slaughter at 96 kg BW). There were 4 treatments based on fat source (5 % of inclusion): T1 and T2, containing respectively lard or palm oil throughout the whole period, T3, containing soy oil from 29 to 63 kg and hydrogenated palm stearin thereafter, and T4, containing soy oil from 29 to 78 kg and hydrogenated palm stearin thereafter. Each treatment was replicated four times (12 pigs housed together), and biopsies from 2 pigs per pen were taken at every change of diet. For the whole period, feeding lard improved growth and feed conversion relative to T3, showing all the other dietary treatments intermediate results (754, 717, 670, 704 g/d and 2.56, 2.71, 2.76 and 2.70 g feed/g gain for T1 to T4, respectively,  $P < 0.05$ ). Fatty acid profile (FAP) was similar for T1 and T2 and presented low variation throughout the trial, with T2 showing slightly higher values for palmitic and stearic acids at the end of the trial. From 63 kg or 78 to slaughter, palmitic, oleic and stearic acids were increased in T3 and T4, respectively, reaching the T1 and T2 range for palmitic acid, but showing higher stearic and lower content of oleic and linoleic acids than control diets. Type of fat did not affect dressing percentage, backfat depth, or carcass pH and temperature. It is concluded that: i) palm oil can be used efficiently as an alternative to lard, and ii) hydrogenated fats may be used to increase fatty acids positively related to fat consistency when unsaturated fat sources has been previously fed, but administration should begin at least at 60 kg and productive performance could be affected.

**Key Words:** Hydrogenated Fats, Fatty Acids, Fattening Pigs

ventral laparotomy over the final 3 h of infusion. Oviduct and blood plasma samples were analysed for concentrations of ammonia, urea and 17 AA. There was no treatment × day interaction for any of the plasma or oviduct fluid AA measured ( $P > 0.05$ ). The concentration of all AA was similar between oviducts ipsi- or contralateral to the corpus luteum. Plasma and oviductal urea were elevated by infusion with U ( $P < 0.001$ ) and AC ( $P < 0.05$ ). Plasma and oviductal ammonia were elevated by AC ( $P < 0.001$ ) but not by U ( $P > 0.05$ ). There was no effect of day on plasma concentrations of any AA ( $P > 0.05$ ). Plasma and oviductal glutamine, histidine and valine were similar ( $P > 0.05$ ) while the concentration of all other AA was lower in plasma than oviduct fluid ( $P < 0.01$ ). Plasma glutamine was higher in animals on AC than on C ( $0.29 \pm 0.03$  v  $0.19 \pm 0.03$ ;  $P < 0.05$ ) while plasma isoleucine was lower in animals on AC than on C ( $0.04 \pm 0.008$  v  $0.06 \pm 0.008$ ;  $P < 0.05$ ). There was no effect of infusion treatment on the plasma concentration of any of the other AA measured ( $P > 0.05$ ). Across treatments, oviductal isoleucine was higher on day 2 than 8 ( $0.06 \pm 0.004$  v  $0.05 \pm 0.004$ ;  $P <$

0.05) and there was a tendency for oviductal concentrations of histidine and lysine ( $P = 0.06$ ) and isoleucine and phenylalanine ( $P = 0.07$ ) to be higher on day 2 than 8. These data, in combination with previous studies from this laboratory, show that elevated systemic concentrations of ammonia or urea *per se* are unlikely to reduce embryo survival in cattle, particularly through disruptions to the oviductal environment.

**Key Words:** Oviduct, Amino Acids, Urea

**96 Initial characterization of abortigenic activity associated with mare reproductive loss syndrome.** K. J. McDowell<sup>\*1</sup>, N. M. Williams<sup>1</sup>, J. M. Donahue<sup>1</sup>, M. D. Lindemann<sup>1</sup>, K. E. Newman<sup>2</sup>, and B. A. Webb<sup>1</sup>, <sup>1</sup>University of Kentucky, Lexington, <sup>2</sup>Venture Laboratories, Lexington, KY.

A newly recognized abortigenic disease, now known as mare reproductive loss syndrome (MRLS), struck the Ohio Valley in Spring, 2001. Abortion rates exceeded 60% on some farms, and epidemiological surveys (Dwyer et al., 2003, JAVMA 222:613-619) linked abortions with eastern tent caterpillars (ETC; *Malacosoma americanum*). Previous studies demonstrated that feeding mares ETC causes abortion, the abortigenic activity is stable to freezing but not autoclaving, it is not extracted with aqueous solutions, and is confined to the insect cuticle (Webb et al., 2004, J Insect Physiol 50:185-193). Therefore, these studies were designed to test the hypothesis that ETC abortigenic activity can be extracted with an organic solvent, and to determine if ETC produce lesions in animals that ingest them. Pregnant mares ( $n = 5/\text{group}$ ) were fed ETC cuticle (+ control), corn oil (- control), ground cuticle, corn oil containing lipids extracted from cuticle with methylene chloride (MC), or cuticle after extraction (treatments were equivalent of 50g insect/mare/day for 10 days). Abortion rates were 3/5 ( $P < 0.05$ ), 2/5, and 1/5 for mares fed cuticle only, cuticle after MC extraction, or ground cuticle. No mares fed MC extract or corn oil alone aborted. All abortions were typical of MRLS including increased echotexture of fetal fluids and presence of streptococci or actinobacilli in aborted fetuses. This study provides new information that the abortigenic activity does not reside in extractable lipids of the cuticle, and that disrupting physical integrity of the cuticle reduces the abortigenic activity. In subsequent trials, mares or gilts fed ETC had lesions containing ETC setae in the submucosal region of their GI tracts, while control animals fed the same diet had no lesions. These findings led to the hypothesis that ETC cuticular setae penetrate the intestinal lining and allow bacteria from the GI tract to invade the circulatory system. Fetal infections then lead to fetal death and abortion.

**Key Words:** Equine, Caterpillar, Abortion

**97 Developmental competence of oocytes fertilized in vitro with semen from bulls grazing tall fescue pastures.** G. M. Schuenemann<sup>\*1</sup>, J. L. Edwards<sup>1</sup>, J. L. Lawrence<sup>1</sup>, R. R. Payton<sup>1</sup>, F. N. Scenna<sup>1</sup>, J. C. Waller<sup>1</sup>, J. W. Oliver<sup>2</sup>, and F. N. Schrick<sup>1</sup>, <sup>1</sup>Department of Animal Science, University of Tennessee, Knoxville, <sup>2</sup>Department of Comparative Medicine, University of Tennessee, Knoxville.

During a two-year study, developmental competence of oocytes fertilized in vitro with semen of yearling beef bulls grazing Kentucky 31 tall fescue (*Festuca arundinacea* Schreb.) infected with *Neotyphodium coenophialum*, an ergot alkaloid-producing fungal endophyte (E+;  $n = 3/\text{yr}$ ), or Jesup tall fescue infected with the non-ergot alkaloid-producing endophyte strain MaxQ#8482 (MaxQ;  $n = 3/\text{yr}$ ) was determined. Bulls were grouped by scrotal circumference, BW, breed composites, and age to graze E+ or MaxQ pastures from November to July. Each year, semen was collected from the same bulls in May and June by electroejaculation. After motility and morphology examinations, semen was diluted with Bioxcell extender and maintained at 4°C until fertilization of oocytes (26 h after semen collection). Oocytes were matured for 22.5 h and fertilized with the identical number of motile percoll-prepared sperm for each treatment. Number of putative zygotes that cleaved and developed to blastocysts (including nuclei number) was evaluated on d 3 and 8 post-fertilization, respectively. Data were arranged in a randomized block design and analyzed using mixed models of SAS. Percent normal sperm morphology ( $86.8 \pm 3.8\%$ ) recorded at time of collection did not differ between pasture types. Motility at semen collection ( $72.5 \pm 7.2$  and  $75.4 \pm 6.5\%$ ), immediately prior to ( $48.7 \pm 7.6$  and  $53.3 \pm 6.7\%$ ), and after ( $56.8 \pm 5.4$  and  $59.9 \pm 5.9\%$ ) percoll preparation was not different between E+ and MaxQ treatments, respectively. Semen from E+ bulls decreased cleavage rates ( $73.5 \pm 3.1$  vs  $84 \pm 2.4\%$ ;  $P = 0.02$ )

compared to MaxQ bulls. Development to 8-cell ( $85.4 \pm 10.3$  vs  $82.3 \pm 8.7\%$ ), blastocysts ( $32.4 \pm 5.5$  vs  $30.1 \pm 4.7\%$ ), and nuclei number ( $72.9 \pm 4.8$  vs  $76.5 \pm 4.5\%$ ) of cleaved embryos did not differ between treatments. In conclusion, use of semen from bulls grazing tall fescue containing the ergot alkaloid-producing fungal endophyte decreased embryonic cleavage rates and may lower reproductive performance due to reduced fertilization ability.

**Key Words:** Tall Fescue, Bull, Fertility

**98 The association between early luteal phase concentrations of progesterone and embryo survival in heifers and dairy cows.** M. G. Diskin<sup>\*1</sup>, A. J. H. Stronge<sup>1</sup>, D. G. Morris<sup>1</sup>, D. A. Kenny<sup>2</sup>, and J. M. Sreenan<sup>1</sup>, <sup>1</sup>Teagasc Athenry, Co. Galway, Ireland, <sup>2</sup>University College, Dublin, Ireland.

There is evidence of an association between systemic progesterone (P4) and embryo survival in cattle but not all studies are in agreement on the timing of this association. A retrospective analysis of two large-scale data sets was carried out to clarify the temporal associations between early luteal phase P4 and subsequent embryo survival for both beef heifers and dairy cows. In study 1 beef heifers ( $n = 368$ ) were inseminated (day 0) by one inseminator using semen from one high fertility bull. Two blood samples were collected on day 7 (am and pm) and subsequently assayed (RIA) for P4. In study 2 milk samples were collected on days 5, 6 and 7 post AI from dairy cows in 6 herds (total inseminations=871). The concentration of P4 was measured by enzyme-immunoassay. In both studies pregnancy diagnosis was carried by ultrasonography at about 40 days post AI. Logistic regression was used to evaluate the relationship between the post insemination concentration of P4 and embryo survival rate. Sixty-eight and 48% of the inseminated animals in studies 1 and 2, respectively, were pregnant at 40 days post AI. In study 1 there was a positive linear ( $P < 0.01$ ) and quadratic ( $P < 0.01$ ) association between plasma P4 on day 7 and subsequent embryo survival rate. In study 2 there were positive linear and quadratic relationships ( $P < 0.05$ ) between milk P4 on days 5, 6 and 7 and between the change in P4 between days 4-7 inclusive and embryo survival rate. This analysis indicates an optimum concentration of P4 during the early luteal phase above or below which embryo survival or conception rate is reduced.

**Key Words:** Progesterone, Embryo, Survival

**99 Effect of ovulatory follicle size on pregnancy rates and fetal mortality in beef heifers.** G. A. Perry<sup>\*1,2</sup>, M. F. Smith<sup>3</sup>, A. J. Roberts<sup>1</sup>, M. D. MacNeil<sup>1</sup>, and T. W. Geary<sup>1</sup>, <sup>1</sup>USDA-ARS Miles City, MT, <sup>2</sup>Department of Animal & Range Science, South Dakota State University, Brookings, <sup>3</sup>Department of Animal Science, University of Missouri, Columbia.

Ovulatory follicle size at time of GnRH/TAI significantly influenced pregnancy rates and fetal mortality following timed AI (TAI) in postpartum cows. Our objective was to assess the relationships between ovulatory follicle size and pregnancy rates or fetal mortality in beef heifers bred in one of two breeding groups: 1) heifers ( $n = 108$ ) were inseminated following the CO-Synch protocol (TAI), subsequently 2) heifers ( $n = 154$ ) were inseminated after detection in standing estrus by electronic mount detectors during a 23-d breeding season (EAI). Transrectal ultrasonography was used to determine ovulatory follicle size at AI and pregnancy status on d 27, 41, 55, and 68 after TAI. The relationship between follicle size and pregnancy status was quadratic for both TAI ( $P < 0.01$ ) and EAI ( $P = 0.04$ ), indicating predicted maximum pregnancy rates of  $69.3 \pm 5.8\%$  at a follicle size of 12.7 mm and  $73.6 \pm 4.8\%$  at a follicle size of 13.3 mm, respectively. Interactions between breeding group and follicle size did not affect pregnancy rate or fetal mortality ( $P > 0.20$ ). Pooled across breeding groups, the relationship between pregnancy rate and follicle size was quadratic ( $P < 0.01$ ) and indicated an intermediate predicted maximum pregnancy rate of  $71.2 \pm 3.8\%$  at a follicle size of 13.1 mm. Follicles  $< 11.5$  mm or  $> 16$  mm were less likely ( $P < 0.05$ ) to support pregnancy than an optimal sized follicle (13.1 mm). Fetal mortality between d 27 and 68 was independent of follicle size ( $P > 0.20$ ), but was only 2% in these data. Ovulation of smaller than optimal sized follicles are a more serious problem than ovulation of larger than optimal sized follicles, as 47% of heifers ovulated follicles #8804 11.5 mm but only 3% ovulated follicles  $> 16.0$  mm. Ovulatory

follicle size is a strong indicator of fertility and management practices that influence ovulatory follicle size may significantly influence fertility.

**Key Words:** Follicle Size, Pregnancy Rates, Fetal Mortality

### 100 Follicular phase events and the postovulatory progesterone rise in dairy cows. G. Mann\* and G. Starbuck, *School of Biosciences, University of Nottingham, Sutton Bonington Campus, Loughborough, UK.*

In dairy cows, the timing of the postovulatory progesterone rise is critical to early embryo development. The aim of this study was to determine how variation in the timing of follicular phase events contributes to the timing of the postovulatory progesterone rise. The study was performed on 18 mature, non-lactating Holstein-Friesian cows in which plasma concentrations of progesterone, oestradiol and LH and the timing of oestrus and ovulation were determined at 8h intervals following induction of luteolysis. Ovulation was determined through ultrasound scanning at 8h intervals commencing at the onset of oestrus. Four animals were excluded on the basis of abnormal reproductive function. The remaining 14 cows showed normal reproductive function with oestrus occurring  $57.4 \pm 4.5$ h and the LH surge  $58.2 \pm 5.1$ h following luteolysis (progesterone fall to  $< 1$ ng/ml). The LH surge was followed by a fall in circulating oestradiol concentration at  $64.6 \pm 4.4$ h. Cows ovulated at  $88.0 \pm 4.7$ h with the postovulatory progesterone rise (to  $> 1$ ng/ml) occurring  $167.4 \pm 7.2$ h after luteolysis. Cows were split on the basis of interval from progesterone fall to progesterone rise giving groups with long ( $188.6 \pm 6.7$ h;  $n=7$ ) and short ( $146.3 \pm 5.7$ h;  $n=7$ ) intervals from luteolysis to post ovulatory progesterone rise. Both the interval from progesterone fall to ovulation ( $106.3 \pm 6.9$ h vs.  $85.7 \pm 3.4$ h;  $P < 0.05$ ) and the interval from ovulation to progesterone rise ( $82.3 \pm 4.2$ h vs.  $60.6 \pm 5.5$ h;  $P < 0.01$ ) were longer in long interval cows. While the time from onset of oestrus to progesterone rise was also longer in the long interval group ( $82.3 \pm 4.2$ h vs.  $60.6 \pm 5.5$ h;  $P < 0.01$ ) the time from oestrus to ovulation did not differ (long  $27.4 \pm 3.0$ h vs. short  $34.3 \pm 3.4$ h). Thus in cows with an extended period from luteolysis to the subsequent progesterone rise, a delay in the time from luteolysis to ovulation and a delay in the time from ovulation to the progesterone rise appear to contribute equally to the overall delay while the interval from oestrus to ovulation is similar to that seen in cows with a shorter interval. Supported by MAFF and MDC under the Link Sustainable Livestock Production Programme.

**Key Words:** Cow, Ovulation, Progesterone

### 101 Effect of hCG on d 5 of the estrous cycle on luteal function and pregnancy rates (PR) in lactating cows receiving embryos from gossypol fed donor heifers. K. N. Galvao\*, A. C. Coscioni, S. O. Juchem, M. Villasenor, and J. E. P. Santos, *University of California, Davis.*

Objectives were to determine the effects of hCG treatment on day 5 of the estrous cycle on luteal function and PR in lactating cows receiving frozen/thawed embryos from gossypol fed donor heifers. Holstein cows, 269, were blocked by parity, days in milk (DIM) and body condition score (BCS) and randomly assigned to one of six treatments in a 2x3 factorial design. Recipient cows were treated with either hCG (3,300 IU) or kept as controls on d 5 and received an embryo on day 7 collected from heifers fed 0, 20, or 40 mg of free gossypol/kg of BW resulting in consumption of 0, 8, and 16 g/d of free gossypol. Recipients were synchronized with the Ovsynch protocol. Ovaries were examined by ultrasonography every injection of the Ovsynch, and at 2, 5 and 12 days after the last GnRH to determine ovulation, and size of follicles and CL. Pregnancy was diagnosed on gestation days 28 and 42 (21 and 35 d after embryo transfer). Data were analyzed by the LOGISTIC and GLM procedures of SAS (2001). Because fertility responses were similar for embryos from heifers fed 20 and 40 mg of free gossypol/kg of BW, data were combined. Treatment with hCG on d 5 increased the proportion of cows with an accessory CL on day 12 ( $92.6$  vs  $3.0\%$ ;  $P < 0.001$ ). Number of CL on day 5 was similar for control and hCG cows ( $1.1$  vs  $1.1$ ;  $P = 0.61$ ). The luteal area was increased by hCG ( $921.6$  vs  $766.0$  mm<sup>2</sup>;  $P < 0.001$ ) because of increased number of CL ( $2.20$  vs  $1.1$ ;  $P < 0.001$ ). Pregnancy rates on days 28 and 42 were not affected by hCG ( $P > 0.60$ ). However, embryos from donor heifers fed gossypol resulted in lower PR at 28 ( $23.3$  vs  $33.3\%$ ;  $P = 0.07$ ) and 42 ( $20.5$  vs  $29.6\%$ ;  $P = 0.08$ ) d of gestation. Treatment with hCG induced an accessory CL, but did not improve pregnancy rates. However, consumption of 8 to 16 g/d of free gossypol by embryo donor heifers reduced pregnancy rates despite grade

quality of embryos. Our data suggest that the negative effects of gossypol on fertility in cows are mediated by changes in embryo viability in spite of similar morphology.

**Key Words:** Gossypol, Dairy Cows, Reproduction

### 102 Influence of duration of proestrus on circulating estradiol, the LH surge and luteal function in cattle. G. A. Bridges\*, M. L. Mussard, C. L. Gasser, D. E. Grum, and M. L. Day, *The Ohio State University, Columbus.*

Previous research from our lab suggests that length of proestrus preceding an induced ovulation can influence subsequent pregnancy rates. The present objective was to compare the endocrinology associated with a GnRH-induced ovulation in cows with either a short or long proestrus. On d -6.25 (d 5.8 of the estrous cycle), transvaginal follicular aspiration was used to remove all ovarian follicles  $> 4$  mm from non-lactating beef cows ( $n = 16$ ). Cows received PGF<sub>2 $\alpha$</sub>  on either d -2.2 or -1.2 to induce either a long (2.2 d; LP) or short (1.2 d; SP) proestrus before a GnRH-induced ovulation on d 0 and AI on d 0.5. Ovarian ultrasonography was performed on d -6.25, -3, -2, -1, 0, 2, 6 and 12 to evaluate follicular and luteal development. Blood samples were collected at 8-hr intervals from d -2.2 to 0, at 0, 0.5, 1, 2, 4, 6, 8, and 12 h after GnRH, then daily from d 3 to 8 and every 2 d thereafter until d 26. Diameter of the largest ovulatory follicle on d 0 did not differ between treatments (LP;  $12.4 \pm 0.3$  mm, SP;  $11.8 \pm 0.3$  mm). Plasma concentrations of estradiol (E2) were greater ( $P < 0.05$ ) in the LP than SP treatment from d -1.5 to 0. Pregnancy rate did not differ (56%), however across treatments, cows with E2  $> 10$  pg/ml on d 0 had increased ( $P < 0.05$ ) pregnancy rates compared to cows with E2  $\#8804$  10 pg/ml ( $88.9$  vs  $14.3\%$ , respectively). The GnRH induced LH surge pattern did not differ between treatments, but cows that conceived tended ( $P = 0.10$ ) to have an LH surge of greater magnitude. Cows in the SP treatment tended ( $P = 0.10$ ) to have increased incidences of short-lived CL ( $50$  vs  $12.5\%$ ) and decreased ( $P = 0.06$ ) concentrations of progesterone from d 3 to 14 than cows in the LP treatment. In conclusion, cows with a shorter proestrus had decreased preovulatory concentrations of E2 and in the ensuing estrous cycle, luteal function tended to be compromised compared to cows with a longer proestrus. The putative role of these endocrine differences in determining the likelihood of pregnancy requires further investigation.

**Key Words:** Cattle, Estradiol, Progesterone

### 103 Factors influencing fetal loss in dairy cattle. F.D. Jousan\*, M. Drost, and P.J. Hansen, *University of Florida, Gainesville.*

Since reproductive function in dairy cattle has declined coincident with increased milk production, fetal loss may be greatest for high-producing cows. Heat stress, which compromises early embryonic survival, could also conceivably affect fetal loss. The purpose of this study was to evaluate effects of lactation number, milk yield and somatic cell count score (scs) at breeding, number of times bred, season of breeding, and the interval from calving to breeding (days open) on fetal loss. Holstein cattle at the University of Florida Dairy Research Unit were palpated to determine pregnancy status between d 40-50 of gestation and again at d 70-80. Early fetal loss was defined as loss that occurred after d 40-50 but before d 70-80. Mid-to-late fetal loss represented losses after d 70-80 but before expected calving. Lactating females ( $n = 950$ ) had higher early and mid-to-late fetal loss than non-lactating heifers [ $n = 386$ ;  $6.3 \pm 0.7\%$  vs  $3.6 \pm 1.1\%$  for early fetal loss ( $P = 0.05$ ) and  $3.7 \pm 0.6\%$  vs  $1.1 \pm 0.9\%$  for mid-to-late fetal loss ( $P < 0.05$ )]. For lactating animals, early fetal loss was affected by days open ( $P < 0.05$ ;  $< 75$  d:  $5.8 \pm 3.8\%$ ,  $75-150$  d:  $2.6 \pm 1.8\%$ ,  $151-300$  d:  $10.0 \pm 2.0\%$ , and  $> 300$  d:  $7.9 \pm 3.0\%$ ). Similarly, mid-to-late fetal loss was affected by days open ( $P < 0.05$ ;  $< 75$  d:  $1.9 \pm 2.9\%$ ,  $75-150$  d:  $4.2 \pm 1.3\%$ ,  $151-300$  d:  $4.4 \pm 1.6\%$ , and  $> 300$  d:  $10.5 \pm 2.3\%$ ) and scs ( $P < 0.01$ ;  $\#8804$  2.5:  $2.7 \pm 1.4\%$ ,  $> 2.5-5.0$ :  $3.6 \pm 1.3\%$ , and  $> 5.0$ :  $9.3 \pm 1.7\%$ ). Early and mid-to-late fetal loss for lactating animals was not significantly influenced by season, milk yield, lactation number, or times bred. Similarly, there was no significant effect of times bred or age at breeding on early or mid-to-late fetal loss for heifers. In conclusion, days open and scs at breeding influence the lactating cow's ability to maintain pregnancy, and lactating females are most likely to suffer early or mid-to-late fetal loss. However, increased

milk yield or heat stress was not associated with increased fetal loss. (Research Support: USDA IFAFS grant 2001-52101-11318).

**Key Words:** Dairy Cattle, Fetal Loss, Pregnancy

**104 Effect of a CIDR insert and flunixin meglumine administered at the time of embryo transfer on pregnancy rate and resynchronization of estrus in beef cattle.** S. H. Purcell<sup>\*1</sup>, B. E. Beal<sup>1</sup>, and K. R. Gray<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State University, Blacksburg, <sup>2</sup>Cross Country Genetics North, Westmoreland, KS.

The objectives of this study were to evaluate the effects of flunixin meglumine (FM), an inhibitor of PGF<sub>2α</sub> synthesis, administered at the time of embryo transfer (ET) and insertion of an intravaginal progesterone-releasing device (CIDR) at the time of ET on pregnancy rates (PR) and the resynchronization of estrus. Beef cows (n = 552) and heifers (n = 160) in three locations were assigned randomly within age to one of four treatments: FM = injection of FM (500 mg i.m.; Phoenix Scientific; St. Joseph MO) 2 to 12 min prior to ET; CIDR = insertion of a CIDR

(1.38 g progesterone; Pfizer; New York, NY) for 13 d immediately following ET; FM + CIDR or untreated control. Fresh or frozen embryos were randomly assigned to be transferred to recipients on d 6 to 9 of the estrous cycle. At one location, recipients (n = 493) were observed for signs of return to estrus beginning 9 d after ET. Recipients that returned to estrus were bred by AI or received an embryo 7 d after estrus. Pregnancy was diagnosed (d 28 to 60) by ultrasonography or palpation per rectum. PR were analyzed using the LOGISTIC procedure of SAS. Variation in the timing of the return to estrus was determined by an F-test for heterogeneity of variances. PR following the initial ET was not affected by CIDR administration (P > 0.05; 69% with CIDR, 76% without CIDR). There was a significant FM x location interaction on PR (Location 1, 89 vs 57%; Location 2, 70 vs 66%; Location 3, 74 vs 77% for FM vs no FM, respectively). The timing of the return to estrus was less variable (P < 0.01) for recipients fitted with a CIDR, but PR following AI (69 and 64%) or second ET (74 and 82%) did not differ (P > 0.05) in cows receiving or not receiving a CIDR, respectively. Effects of FM on PR varied among locations and CIDR insertion at ET reduced variation in timing of the return to estrus.

**Key Words:** Embryo Transfer, Flunixin Meglumine, CIDR

## PSA-Environment and Management-Enteric Bacteria

**105 Utilization of an experimental chlorate product in reduction of necrotic enteritis in broiler chickens.** J. L. McReynolds<sup>\*1</sup>, J. A. Byrd<sup>1</sup>, R. C. Anderson<sup>1</sup>, T. S. Edrington<sup>1</sup>, T. L. Poole<sup>2</sup>, R. W. Moore<sup>2</sup>, L. F. Kubena<sup>1</sup>, and D. J. Nisbet<sup>1</sup>, <sup>1</sup>USDA-ARS, Southern Plains Agriculture Research Center, College Station, TX, <sup>2</sup>USDA-ARS, Russell Research Center, Athens, GA.

*Clostridium perfringens* (CP) is one of the etiologic agents of Necrotic Enteritis (NE). The clinical signs of this disease include depression, decreased appetite, diarrhea, and severe necrosis of the intestinal tract. Development of new technologies to combat this costly disease is needed in the commercial poultry industry. In the present investigation, in vitro and in vivo studies were conducted to determine the effects of an experimental chlorate product (ECP) on CP. In the in vitro study intestinal contents were obtained from single comb White Leghorn laying hens and diluted (1:1) with thioglycollate enrichment medium. The contents were divided into six 10 mL aliquots and assigned to the following experimental groups: a control, ECP with a 5 mM chlorate ion equivalent, or ECP with a 10 mM chlorate ion equivalent (2 replicates/group). The effects of ECP were evaluated in vitro over time. By 3 h there was a significant reduction in CP (P < 0.05) in the 5 mM ECP (3.88 Log<sub>10</sub>), and 10 mM ECP (3.29 Log<sub>10</sub>) when compared to the control (5.51 Log<sub>10</sub>). In the in vivo experiment, evaluations of the ECP administered in the drinking water and in the feed (1X ECP is equivalent to a 15 mM chlorate ion concentration) showed reductions in clinical signs associated with NE. Lesion scores were reduced significantly in birds fed the ECP (1.25) when compared to the controls (2.1). The incidence of CP and mortality were also reduced significantly in birds fed the ECP. Populations of generic *E. coli* were significantly lower in all of the treatment groups compared to the controls. These results indicate that an ECP may provide the poultry industry with an additional management tool for controlling NE.

**Key Words:** *Clostridium perfringens*, Experimental Chlorate Product, Necrotic Enteritis

**106 The use of biodegradable pellets for the control of *Salmonella* in broilers during feed withdrawal.** J. A. Byrd<sup>\*1</sup>, L. H. Stanker<sup>2</sup>, J. L. McReynolds<sup>1</sup>, and D. J. Nisbet<sup>1</sup>, <sup>1</sup>USDA-ARS, Food & Feed Safety Research Unit, College Station, TX, <sup>2</sup>USDA-ARS, Foodborne Contaminants Research Unit, Albany, CA.

Poultry undergo a feed withdrawal (FW) prior to transport to the processing plant. During FW, poultry tend to peck at floor litter that may be contaminated with *Salmonella* and *Campylobacter*. These pathogens could be transported to the processing plant in the upper gastrointestinal of poultry which may leak out during slaughter and cross contaminate other carcasses. One approach would be to supply a disinfectant and another source of nutrition that would not physically fill the upper gastrointestinal tract. Presently, we evaluated the use of a novel biodegradable starch extruded pellet (BP) that can be treated with bactericidal or bacteriostatic compounds. The BP was provided to market-age broilers during an 8 h FW. All broilers were challenged with 10<sup>8</sup>

*Salmonella* Typhimurium (ST) by oral gavage 6 days prior to FW. One h after the onset of FW, 454 g of BP containing either 2% lactic acid (LA), citric acid (CA), or D-limonene + CA + diosulfosuccinate (DSS) were placed on the litter in each pen. In two experiments, broiler provided BP containing LA caused a significant decrease (P < 0.05) in the incidence of ST in crop contents (40%) as compared to the controls (65%). Similarly, broilers provided BP containing LA (0.8 Log<sub>10</sub> ST/g crop content) caused a significant decrease (P < 0.05) in the number of ST recovered in the crop compared to controls (1.87 Log<sub>10</sub> ST/g). The material is environmentally compatible in that it will degrade in poultry grow-out houses thus providing beneficial bacteria a food source without physically filling the gastrointestinal tract. These studies suggest that incorporation of this biodegradable material in the broiler grow-out house during pre-transport feed withdrawal may reduce *Salmonella* and *Campylobacter* contamination of crops and broiler carcasses at processing.

**Key Words:** Salmonella, Biodegradable, Crop

**107 Apparent absence of horizontal transmission of *Campylobacter* among caged broiler breeder roosters.** R. J. Buh<sup>\*1</sup>, N. A. Cox<sup>1</sup>, J. S. Bailey<sup>1</sup>, J. L. Wilson<sup>2</sup>, L. J. Richardson<sup>1,2</sup>, D. E. Cosby<sup>1</sup>, and D. V. Bourassa<sup>1,2</sup>, <sup>1</sup>USDA-ARS Russell Research Center, Athens, GA, <sup>2</sup>University of Georgia, Athens.

This study was undertaken to evaluate the potential for horizontal transmission of *Campylobacter* between adjacent caged broiler breeder roosters. Feces and semen from individually caged roosters at 41 wk of age were sampled for the presence of *Campylobacter* for 3 consecutive wk and determined to be negative. Three roosters were challenged with a marker strain of *Campylobacter jejuni* either orally using 1.0 mL of suspension (1.4 10<sup>6</sup> / mL). Three additional roosters were challenged by dropping 0.1 mL of suspension on the everted phallus immediately after semen collection. Six non-challenged roosters were placed in wire-floored cages interspersed between the challenged roosters. Roosters were meal fed daily in individual feed troughs and provided individual nipple drinkers per cage. Feces and semen samples were collected weekly from each rooster for a period of 5 wk post-challenge. The 6 non-challenged adjacently caged roosters were consistently negative for both feces and semen from 1 through 5 wk. At 6 wk roosters were necropsied and samples collected from the thymus, spleen, liver/gall bladder, and ceca, and all were negative for non-challenged roosters. Challenged roosters all produced *Campylobacter* positive feces and semen at 1 and 2 wk post-challenge. At 3 wk post challenge all fecal samples were positive for *Campylobacter*, but 2 semen samples were negative, one from each challenge route. At 4 wk post-challenge all semen samples were negative for *Campylobacter*, and only 3 fecal sample remained positive (2 for oral and 1 for phallus challenge routes). At 5 wk post challenge all semen and fecal samples were negative for *Campylobacter*. Necropsy samples from challenged roosters were negative for the thymus, spleen, and liver/gall bladder at 6 wk post-challenge. Two ceca samples were found to contain *Campylobacter*, one from each challenge route. These results indicated