

fermentation after 24 h. Thus, the 24 h AV measurements might be acceptable to qualitatively rank feedstuffs based on the estimated accumulated acid-load during fermentation. The rate of rumen fluid pH changes showed similar patterns to AV in ranking feedstuffs. Energy sources showed the highest rumen fluid pH decrease; fiber sources were intermediate and protein sources were lowest in rumen fluid pH change after 24 h of incubation suggesting that NFC-rich feedstuffs had the lowest rumen buffering capacity compared to fiber and protein

rich feedstuffs. Rumen fluid pH changes after 24 h of incubation had a stronger relationships with AV for all feedstuffs ($R^2 = 0.74$) compared to starch ($R^2 = 0.35$) and NFC ($R^2 = 0.56$). The best predictors of feed AV were NFC and ADF ($R^2 = 0.81$). However, further studies are needed to examine the effect of feed AV on in vivo ruminal pH changes in dairy cows.

Key Words: Acidogenic value, In vitro, Ruminal pH

Swine Species

M256 Effects of conjugated linoleic acid (CLA) on sow and litter performance. R. Patterson*, M. L. Connor, C. M. Nyachoti, and D. O. Krause, *University of Manitoba, Winnipeg, Canada.*

The potential for CLA supplementation to improve physiological benefits affecting sow and litter performance was evaluated using 14 Cotswold sows in a completely randomized design with a 2x2 factorial arrangement of treatments. Diet (0% or 2% CLA) and parity (IM=Immature or M=Mature) corresponded to the following: 1) 0%IM n = 3; 2) 0%M n=3; 3) 2%IM n=4; 4) 2%M n=4. Treatment diets were fed as gestation rations from d 85 through d 110 and as lactation rations from d 110 until weaning. On gestation d 85, 105, and 112 and lactation d 1, 3 and 17 plus 4 d post-weaning, sow BW, back fat depths and condition scores were taken. Piglets were weighed on d 1, 3 and 17. Parity effects ($P < 0.01$) were observed for sow BW at each period. However, parity only affected ($P < 0.05$) back fat depth at d 17 of lactation and 4 d post-weaning and condition scores on d 1 of lactation and 4 d post-weaning. Diet did not affect ($P > 0.05$) piglet weaning weights. In a follow-up experiment, 78 of these piglets were weaned at 17 ± 1 d and randomly arranged in a 2x2 factorial based on lactation and weaning diets as follows: 1) 0:0 (0%CLA sow: 0%CLA piglet); 2) 0:2 (0%CLA sow: 2%CLA piglet); 3) 2:0 (2%CLA sow: 0%CLA piglet); 4) 2:2 (2%CLA sow: 2%CLA piglet). Piglets weaned from 2% sows had greater feed to gain ratios ($P < 0.035$) and tended ($P < 0.058$) to have higher ADFI compared to those weaned from 0% sows by d 28, but diet did not affect piglet performance by d 36. On d 28 piglets were given an oral *E.coli* K88+ challenge. Fecal scores were taken at 8, 24, 48 and 56 h post-challenge. Piglets weaned from 2% CLA sows had less severe scours ($P < 0.05$) at all sampling periods and a dietary interaction effect ($P < 0.05$) was observed at 56 hours. Weaning diets reduced ($P < 0.1$) scour incidence only at 48 hours. It is thus apparent that provision of CLA during gestation and lactation improves litter performance. Further work is intended to determine the immunological/physiological mechanisms underpinning these improvements.

Key Words: CLA, Sows, Piglets

M257 The effects of feeding grains naturally-contaminated with Fusarium mycotoxins to gestating and lactating sows on metabolism and reproduction and the efficacy of a polymeric glucomannan adsorbent in preventing those effects. G. Diaz-Llano* and T. K. Smith, *University of Guelph, Ontario, Canada.*

The feeding to swine of feedstuffs naturally-contaminated with *Fusarium* mycotoxins can reduce feed intake, and hepatic protein synthesis. An experiment was conducted to investigate the effects of feeding grains naturally-contaminated with *Fusarium* mycotoxins on reproductive performance, serum chemistry, ADFI and ADG of first parturition sows during late gestation and lactation, and to test the

efficacy of a polymeric glucomannan mycotoxin adsorbent (GMA) in preventing these effects. A completely randomised block design, 36 sows, 12 sows per treatment was used in the experiment. Diets consisted of corn, wheat and soybean meal and were fed from 91 days of gestation up to the weaning on d 21 post farrowing. The diets were: (1) control (C), (2) contaminated grains (CG) (5.5 ppm DON + 0.5 ppm 15-acetyl DON + 0.3 ppm zearalenone), and (3) contaminated grains + GMA. Means were compared using Tukey's test and significance was declared at $P < 0.05$. During gestation, *Fusarium* mycotoxins did not reduce ADFI. The ADG was reduced in sows fed CG ($P = 0.03$) but not in sows fed CG + GMA. Growth to feed ratio was also reduced in sows fed CG compared to C ($P = 0.047$), but not in sows fed CG + GMA. Stillbirth rate was increased in piglets born from sows fed CG compared to piglets born from sows fed CG + GMA ($P = 0.03$). During lactation, ADFI of sows fed CG and CG + GMA was reduced compared to C ($P < 0.001$). Higher body weight losses were seen in sows fed CG compared to controls ($P = 0.007$). Total serum protein concentrations were lower for sows fed CG compared to sows fed CG + GMA ($P = 0.045$). Weaning to estrus interval tended to increase in sows fed CG and CG + GMA compared to controls ($P = 0.094$). It was concluded that the feeding of grains naturally-contaminated with *Fusarium* mycotoxins reduces the reproductive efficiency of gestating and lactating sows. The feeding of GMA can prevent much of this inefficiency.

Key Words: Sows, *Fusarium*, Growth

M258 Effects of exogenous porcine somatotropin and transportation on physiological parameters in weaned pigs. C. J. Kojima*, P. E. Roberson, M. P. Roberts, T. Sun, and H. G. Kattesh, *University of Tennessee, Knoxville.*

An experiment was performed to examine effects of exogenous porcine somatotropin (S) on physiological measures of health and well-being in weaned pigs with or without subsequent transport (T). We hypothesized that S may abrogate stress-related decreases in health and well-being in recently weaned and transported pigs. On d 17 of lactation pigs were weighed and assigned to treatment groups (n=8/group): NS-NT (vehicle injection, no transport), S-NT (S injection, no transport), NS-T (vehicle injection, transport at weaning), and S-T (S injection, transport at weaning). Upon allocation, all pigs received daily intramuscular injections containing S (0.5 mg/kg) or vehicle for 5 d. On d 21, a blood sample was drawn immediately prior to injection (0800 h). At 1200 h on d 21, pigs were weighed and blood was collected. Pigs in the NT groups were then weaned into mixed nursery pens while pigs in the T groups were mixed and transported by truck for 3 h before being brought back to the nursery. All weaned pigs were fed a standard nursery diet. Blood samples and body weights were taken on d 22, 29 and 37. Data were analyzed by a mixed model procedure with a factorial design and repeated measures. Transport resulted in lower

body weights ($P<0.05$) at all time points post-weaning, and weight gain within the 14-d window postweaning was less in T pigs ($P=0.05$). Transport increased circulating neutrophil numbers and overall white cell count ($P<0.05$). An S*Time interaction was observed ($P<0.05$) such that S caused a sharp increase in circulating neutrophils 4 h after injection; however, neutrophil count returned to control levels within 24 h. Elevated concentrations of circulating cortisol were noted in all groups on d 22 (the morning after weaning; $P<0.0001$). On d 22, a Time*S*T interaction was observed ($P=0.05$) such that cortisol was higher in S-NT and NS-T than in NS-NT pigs, with S-T pigs not different than NS-NT pigs. We conclude that treatment with S altered immune and hormonal profiles in weanling pigs but was not effective in abrogating the weight loss observed in transported pigs.

Key Words: Pig, Stress, Weaning

M259 Use of a ground raw soybean diet to enhance reproductive efficiency in gilts. D. Sykes*, S. Couvillion, P. Gerard, M. Crenshaw, and P. Ryan, *Mississippi State University, Mississippi State.*

Soybeans contain high levels of phytoestrogens, a bioactive compound known to have beneficial effects on human health and reproduction in farm animals. Preliminary reports have suggested that raw soybean-based diets when fed to pigs have the potential to enhance ovarian function. Thus, the objective of this study was to determine the efficacy of a raw soybean (RSB) diet on reproductive performance in prepubertal gilts. To this end, Yorkshire x Landrace crossbred gilts ($n=20$; BW 75.9 ± 1.5 kg; age 140 d) were assigned to balanced isonitrogenous (CP 14%), isocaloric diets using either soybean meal supplemented with poultry fat (SBM, $n=10$) or ground raw soybeans (RSB, $n=10$). Soybeans accounted for 75% of the supplemental protein source for the first four weeks then increased to 100% thereafter. Gilts were housed in covered, outdoor pens with ad libitum access to feed and water and monitored daily (0600-0700) for signs of estrus using a teaser boar (exposure commenced at age 160 d). Gilts were bred by AI on the third standing estrus, then penned indoors individually and restricted to their respective diets (2.3 kg/d) through to d 35-40 of gestation when they were slaughtered for the recovery of the reproductive tract and carcass evaluation. Values given are mean \pm SE. No differences in BW were observed at time of AI (RSB, 136.3 ± 11.9 kg; SMB, 147.8 ± 20.1 kg). By the second week of boar exposure 70% of RSB gilts exhibited first estrus compared to 30% of SBM gilts. While there was no difference in age at onset of first estrus (RSB, 184 ± 3.9 d; SBM 193 ± 7.3 d), RSB gilts were lighter (136.3 ± 3.8 kg) than SMB gilts (147.8 ± 6.4 kg). At slaughter, 9 SBM and 10 RSB gilts were pregnant. While there were no differences in the mean number of corpora lutea on the ovaries (RSB, 16.9 ± 0.9 ; SBM, 18.3 ± 1.0) or mean total number of embryos recovered (RSB, 12.6 ± 0.8 ; SBM 14.9 ± 1.6) between the two groups, there was a higher incidence of embryo resorption in SBM gilts. In Phase II studies we will carry gilts to term and weaning to determine the benefit of feeding RSB diets.

Key Words: Raw soybeans, Gilts, Reproduction

M260 Litter performance in the swine nucleus herds of Sri Lanka. J. A. D. R. N. Appuhamy*, L. P. Silva, and C. M. B. Dematawewa, *University of Peradeniya, Peradeniya, Sri Lanka.*

Large White (LW) and Landrace (LR) nucleus sow herds are maintained separately in Horakele farm, Sri Lanka to produce breeding females

for multiplier herds. This study investigated the genetic variability and progeny performance of the sires and dams of the two herds with respect to litter size at birth (LSB), litter size at weaning (LSW), individual birth weight (BWT) and individual weaning weight (WWT). There were 24 sires and 40 dams in the LW nucleus, and 24 sires and 29 dams for the LR nucleus. Intensive management of the breeding stock included standard feeding and health practices, under tropical conditions. Average ambient temperature was 27°C with relative humidity of 80 percent. Weights (kg) and litter size data for 2057 pigs from 225 litters were used for the analysis. Least square means of traits for the two herds were compared using PROC GLM of SAS treating parity and birth year as fixed effects and age of dam as a covariate. In addition, sex of pigling was used as a fixed effect for BWT and WWT, while age at weaning was used as a covariate for WWT and LSW. Genetic and phenotypic variance components of the four traits were estimated using PROC VARCOMP in SAS (maximum likelihood method) for the two herds separately. There were no significant differences between the two herds with respect to any of the four traits ($P>0.05$). However, the other fixed effects and covariates fitted were significant ($P<0.05$), with better performance for male pigs and later parities and older sows. Dam components of variance were greater than sire components for all traits. Heritability estimates (full-sib method) for BWT, WWT, LSB and LSW for LW were 0.20, 0.51, 0.25 and 0.17, respectively. The respective estimates for LR were 0.66, 0.17, 0.38 and 0.35, respectively. Progeny means (\pm SD) of the LW nucleus sires for the above traits were 1.45 ± 0.07 , 9.27 ± 1.6 , 9.28 ± 1.9 , and 8.25 ± 1.9 , respectively. For the LR nucleus sires they were 1.48 ± 0.2 , 9.67 ± 1.5 , 9.69 ± 2.0 , and 8.34 ± 2.2 , respectively. Sufficient genetic variability and potential exists in the nucleus herds for genetic improvement of the four traits.

Key Words: Swine breeding, Nucleus, Sri Lanka

M261 Effect of the consistency of collection frequency on semen quality of boars. W. L. Flowers* and M. C. Seal, *North Carolina State University, Raleigh.*

Two experiments were conducted to examine the influence of varying the consistency of collection frequency on semen quality. Experiment 1 was a retrospective analyses of data obtained from a 250-boar stud. The planned collection frequency was 1.5 times per week. However, the actual collection frequency varied each week from 1 to 5 times due to changes in breeding demands and number of low quality ejaculates. Boars were retrospectively assigned to collection frequency groups as follows. Beginning in June, the collection frequency increased from 1.5 to 3 times or more per week for 122 of the 250 boars. For 80 of the 122 boars, the high collection frequency was consistently maintained through July and August (HC). Collection frequency varied randomly between 1 and 4 collections per week during the same time period for the other 42 boars (HV). For 128 of the boars, collection frequencies between June and August remained consistent at 1.5 times per week (LC). Insemination doses/ejaculate were highest for the LC; intermediate for the HC; and lowest for the HV groups ($P<0.01$). The order for ejaculates discarded due to increased sperm abnormalities was HV>HC>LC ($P<0.01$). Experiment 2 was a prospective study in which 32 mature boars were collected for 12 weeks. Boars were collected at a high (H: 3 times/week) or low (L: 1 time/week) frequency under a consistent (C) or variable regimen (V). Boars assigned to the consistent regimen were collected on the same days each week. Days of collection for boars assigned to the variable regimen were determined with a random number generator at the beginning of each week. A frequency by regimen interaction was present ($P<0.05$) for

motility, normal morphology and acrosin activity of spermatozoa. Each of these variables was reduced ($P < 0.05$) in the HV boars compared with their counterparts in other treatments. No differences ($P = 0.27$) were observed among the LC, LV, and HC boars. In conclusion, the consistency at which high frequency collection regimens are administered to boars has an important effect on semen quality.

Key Words: Boars, Collection pattern, Spermatogenesis

M262 Effect of group size and floor space during the growing period on the growth performance of pigs after the heaviest pigs have been removed. J. M. DeDecker*¹, M. Ellis¹, B. F. Wolter², and B. A. Peterson¹, ¹*University of Illinois, Urbana*, ²*The Maschhoffs, Inc, Carlyle, IL*.

This study was carried out with 2600 crossbred pigs to investigate the effects of group size and floor space during the growing period on

performance at the end of the finishing period after the heaviest pigs were removed from the group. A randomized complete block design was used with a 2×5 factorial arrangement of treatments: 1) group size (26 vs 78 pigs/pen); 2) floor space (0.58 vs 0.64 vs 0.70 vs 0.76 vs 0.82 m²/pig). Floor spaces were created by adjusting pen sizes. Feeder space and number of waterers per pig were the same across all treatments. Pigs were allotted to treatments at weaning and the study started when the first pigs were removed from the group at a mean pen weight of 129.7 ± 1.2 kg and ended 21 days later. A total of 50 pens of pigs were involved. The same pig removal protocol was followed for all treatments. Pigs were removed at the start of the study (heaviest 30% of the pen) and on d 7 (heaviest 30%) and d 14 (heaviest 20%). No treatment interactions were found. In addition, there was no effect of group size or floor space on ADG, ADFI or G:F during the 21-d study period. However, groups of 26 pigs tended ($P = 0.06$) to have fewer pigs removed due to morbidity and mortality than groups of 78 (0.47 and 0.84% for the 26 and 78 pig groups, respectively) over the 21-d study period.

Key Words: Pigs, Group size, Floor space