M332 Animal weight gain in a pastured hog production system. S. Pietrosemoli*[1,2], J. C. Guevara[2], J. Cardona[3], W. Maradiaga[3], A. Lobo[3], and J. T. Green[4,2], [1]*Animal Science Dept., North Carolina State University*, *Raleigh,* [2]*Alternative Swine Research and Extension Project*, *Raleigh, NC,* [3]*Universidad Nacional de Agricultura*, *Catacamas, Olancho, Honduras.*, [4]*Crop Science Dept., North Carolina State University*, *Raleigh.*

At the Center for Environmental Farming Systems (CEFS) located in Goldsboro NC, 60 crossbred (Yorkshire, Landrace, Hamsphire and Duroc) commercial hogs (35.7 ± 2.1 kg and 125.7 ± 2.3 kg initial and final live weight, respectively) were used in a 98-d trial (May–August 2009) to evaluate the effect of stocking rate (SR; 37, 74, 111, and 148 heads/ha) and sexual condition (SC; castrated male [CM] or female [F]) on average daily weight gain (ADG). Animals were managed under a continuous grazing system on bermudagrass (*Cynodon dactylon*) plots sized to match the SR, and had ad libitum access to a concentrate feed (16% CP). The average pig concentrate intake (ACI) was estimated for each plot. Five hogs were allotted to each one of 12 plots, but data from only 4 (2 CM and 2 F) animals were included in the statistical analysis. The experimental design was a randomized complete block, with 4 × 2 factorial arrangement of treatments and 3 field replicates. ANCOVA was performed using the PROC GLM procedure of SAS, v. 9.1 with initial live weight as a covariate. Differences were observed for ADG between replicates ($P = 0.0009$); SR ($P = 0.0566$) and SC ($P < 0.0001$). Animals in the lowest SR (37 heads/ha) had the lowest ADG (0.85 kg) whereas the other treatments were similar (0.94, 0.96 and 0.90 kg ADG, respectively, for 74, 111 and 148 heads/ha). ADG of CM was 17.9% higher than of F (0.99 vs 0.84 kg, respectively). ACI differed between replicates ($P = 0.0027$) and SR ($P = 0.0182$). The lowest intake was recorded for pigs in the lowest SR (37 heads/ha, 2.90 kg/head/d) compared with the other SR (2.96; 2.96; 2.94 kg/head/d, for 74, 111 and 148 heads/ha, respectively). Results indicated that performance of pasture-finishing pigs was influenced by SR and SC.

Key Words: outdoor swine, bermudagrass, weight gain

M333 Analysis of the effect of complexed trace minerals on the prevalence of lameness and severity of claw lesions in stall-housed sows. S. S. Anil*[1], L. Anil[2], J. Deen[1], S. K. Baidoo[2], M. E. Wilson[3], and C. Rapp[4], [1]*Veterinary Population Medicine, University of Minnesota*, *St Paul,* [2]*Southern Research and Outreach Center, University of Minnesota*, *Waseca,* [3]*Zinpro Corporation*, *Eden Prairie, MN*, [4]*Zinpro Performance Minerals*, *Boxmeer, the Netherlands*.

When considering the development of claw lesions, mineral nutrition is an important factor to examine. Trace minerals such as Cu, Zn and Mn are reported to be critical in the keratinization process. Both the quantity and form (organic or inorganic) determine the bioavailability of the trace minerals. The objective of the present study involving 229 sows was to evaluate the effect of supplementing complexed trace minerals on the prevalence of lameness and lesions in different claw areas (side wall, heel, including overgrown heel, sole, heel-sole junction, white line, and overgrown dew claw and toe) of stall-housed gestating sows. The sows were randomly allocated to 2 groups and fed either a control diet (ITM, inorganic sulfate minerals, n = 113; Zn–125 ppm, Mn–40 ppm and Cu–15 ppm) or a diet containing complexed trace minerals (CTM, n = 116) as a partial substitution of inorganic minerals Zn-50 ppm, Mn–20 ppm and Cu–10 ppm) fed at isolevels of total trace mineral supplementation. The lesions in different claw areas of these sows were scored by a trained person in one or 2 consecutive parities at mid-gestation. The total score for each claw area was obtained by adding the scores for that area in different claws. The sows were assessed for lameness while they were moved for lesion scoring. The scores for lesions in different claw areas among the sows fed ITM or CTM were compared using Kruskal-Wallis Test. The proportions of lame sows among the groups were compared using 2-sample proportion test. The results indicated that total claw lesion score and total lateral claw lesion score were lower ($P \leq 0.05$ for both) in the sows fed CTM. The total score for horizontal side wall cracks was higher ($P \leq 0.05$) for the sows fed CTM. The proportion of lame sows was lower ($P \leq 0.05$) in the sows fed CTM (34.5% vs. 51.0%). The results show a protective effect of complexed trace mineral supplementation on claw lesions and lameness in stall-housed sows.

Key Words: claw lesions, lameness, trace mineral supplementation

M334 Comparison of the production performance of group-housed sows receiving complexed trace minerals. S. S. Anil*[1], L. Anil[2], J. Deen[1], S. K. Baidoo[2], M. E. Wilson[3], and T. L. Ward[3], [1]*Veterinary Population Medicine, University of Minnesota*, *St Paul,* [2]*Southern Research and Outreach Center, University of Minnesota*, *Waseca,* [3]*Zinpro Corporation*, *Eden Prairie, MN*.

Trace minerals are important to maintain the high production performance of the modern sow. The bioavailability of trace minerals depends on both the quantity and form (organic or inorganic). The objective of the present study, involving 386 sows housed in group pens with electronic sow feeders was to compare the production performance of sows fed diets containing complexed trace minerals (CTM) with sows fed diets containing trace minerals in inorganic form (ITM). The CTM diet contained trace minerals as a partial substitution of inorganic minerals (Zn, 50 ppm, Mn, 20 ppm and Cu, 10 ppm) fed at isolevels of total trace mineral supplementation. The ITM diet contained inorganic sulfate minerals, Zn 125 ppm, Mn, 40 ppm and Cu, 15 ppm). The sows were allocated randomly to CTM (n = 197) and ITM (n = 189) diet groups. 1056 parity records (ITM, n = 527; CTM, n = 529) of these sows pertaining to 1, 2, 3 or 4 farrowings were obtained during the study period. Information on farrowing and weaning performances and lactation feed intake were collected from the PigCHAMP database of the research unit and sow cards, and compared using 2 sample *t*-test (SAS v. 9.1). Results indicated differences ($P < 0.05$ for all) between the sows fed ITM and CTM in terms of still born (1.3 in ITM vs. 1.1 in CTM), average piglet weight at weaning (14.0 in ITM vs. 14.3 lbs in CTM) and weight of the sow at weaning (543.4 in ITM vs. 531.6 lbs in CTM). The groups did not differ ($P > 0.05$) in terms of piglets born alive, mummies, average birth weight of pigs and average lactation feed intake.

Key Words: complexed trace minerals, production performance, sows

M335 Risk factors associated with frequency of abortion in swine farms. N. M. Rainho[1], M. Aparicio[1], M. A. de Andrés[1], J. Morales[1], R. Pallás[2], V. Rodríguez-Estévez[3], and C. Piñeiro*[1], [1]*PigCHAMP Pro Europa*, *Segovia, Spain*, [2]*Kubus, SA*, *Madrid, Spain*, [3]*Universidad de Córdoba*, *Spain*.

Current swine production is linked to a proper analysis and monitoring of results. Literature has described references for most of the reproductive factors, but interactions between them have not been studied in depth.

The objectives of the present study were to investigate the relationship between the relative frequency of abortion (percentage; AP) and number of parity (NP), weaning to first mating interval (WSI), number of services (NS), and day of week for service (DW). More than 870,000 mating records through 4 years (2005–2008) corresponding to about 80,000 sows in 161 farms from Spain, Portugal and Italy registered with PigCHAMP software were used. Each factor was categorized in different groups: NP in 1, 2, 3–6 and ≥ 7 parities; NS in first-serviced (FS), first re-serviced (FRS) and second-reserviced (SRS); WSI in ≤ 3, 4–7, 8–11 and ≥ 12 d; and DW in weekday and weekend. Data were analyzed using the MIXED procedure of SAS (v 9.00). Mean value of AP was 0.78 ± 0.03%. Among NP, mean AP in parities 1 and ≥ 7 was higher than those in parities 2 and 3–6 ($P < 0.001$), showing a quadratic effect that explains the higher risks in both gilts and old sows. A lineal effect was found for WSI, when AP in WSI ≤ 7 was lower than those of WSI ≥ 8 ($P < 0.001$). AP also depended on DW, and it was higher for matings during the weekend ($P < 0.001$). Finally mean AP for NS increased with the number of estrus repetition, showing 0.45, 2.87, 4.26% for FS, FRS, SRS respectively ($P < 0.001$). Some interactions between the main factors studied were found, being the most interesting one between WSI and DW: sows with ≤ 3 WSI showed no differences between DW; sows with normal WSI (4–7 d) showed a higher risk during weekends (0.63 vs 1.29%; $P < 0.001$); AP in later mated sows served 8–11 d post weaning was lower in matings during weekend (1.24 vs 0.75%; $P < 0.001$). These results add more information about the relative information of some classical factors as NP, NS or WSI, and show a new factor as it is DW.

Key Words: abortion risk factors, swine, abortion

M336 Analysis of the effect of high ambient temperature on growing pigs performance: A meta-analysis approach. D. Renaudeau* and J. L. Gourdine, *Institut National de la Recherche Agronomique, UR143*, *Petit-Bourg, French West Indies*.

The high ambient temperature has been recognized as the most important climatic factor influencing pig performance during summer heat waves in temperate climate and all the year in tropical climate. However, results from experiments dealing with the effects of high temperature on pig performance are remarkably variable. In the present work, a meta-analysis was carried out to analyze the results from different studies designed to evaluate the effect of elevated temperature on average daily feed intake (ADFI) and average daily gain (ADG) in growing finishing pigs. Data were extracted from 86 and 80 trials for ADFI and ADG, respectively, from studies published in scientific journals in PubMed, Science direct and proceedings of scientific meetings updated trough December 2009. Data on ADFI and ADG were analyzed with a linear mixed model that included the linear and the quadratic effects of temperature (T) and pig body weight (BW), the interaction between T and BW as covariates. The trial has been included as block random variable. The effects of housing conditions (n = 2; individual vs. group) and the year of publication of the trial (n = 3; 1970–1989, 1990–1999, and 2000–2009) were tested on the intercept and the linear slope of T. Results showed that high T had a curvilinear effect of ADFI and ADG and that this effect was highlighted in heavier pigs. Whatever the temperature level, the ADFI was lower when pigs were group-housed. The intercept and the slope for T were significantly affected by the year of the study publication. The effect of elevated T was greater in earlier works suggesting that modern genotypes could be more sensitive to heat stress than low growth potential pigs. In conclusion, results of this meta-analysis confirm that a large between-study variability exits for the effects of high T on pigs' performance. A part of this variability is explained by changes in pig BW and to a lesser extent by the year of the study publication.

Key Words: pig, heat stress, performance

M337 Weight gain of Duroc pigs managed in a Sudangrass (*Sorghum bicolor*) pasture. S. Pietrosemoli*[1,2], J. C. Guevara[2], A. Lobo[3], J. Cardona[3], W. Maradiaga[3], and J. T. Green[4,2], [1]*Animal Science Department, North Carolina State University*, *Raleigh,* [2]*Alternative Swine Research and Extension Project*, *Raleigh, NC,* [3]*Universidad Nacional de Agricultura*, *Catacamas, Olancho, Honduras.*, [4]*Crop Science Department, North Carolina State University*, *Raleigh.*

To reduce potential upload of soil nutrients in pastured swine systems and improve their spatial distribution, producers have the possibility to implement strategic movements of equipment. Therefore, the impact of either stationary (S) or mobile (M) shade and drinking structures on average daily weight gain (ADG) were investigated with female (F) or castrated male (CM) pigs. Mobile structures were moved on a weekly basis. Seventy-two Duroc pigs (31.9 ± 0.76 and 96.9 ± 1.69 kg initial and final live weight, respectively) were used in summer 2009 at the Center for Environmental Farming System (CEFS) in Goldsboro, NC. Twelve pigs were randomly assigned to each of 6 sudangrass paddocks (0.16 ha, 74 head/ha) and were managed under a continuous grazing system during 12 weeks. Pigs had ad libitum access to a concentrate feed (16% CP) and water. Individual pig concentrate intake (CI) was estimated from paddock average. Data from only 8 pigs (4 F and 4 CM) per paddock were included in the statistical analysis. The experimental design was a randomized complete block with a 2 × 2 factorial arrangement of treatments (S or M; F or CM) and 3 field replicates. ANOVA was performed using PROC GLM of SAS v 9.1. Initial weight (IW) was used as a covariate for ADG . Weekly movements of structures influenced CI ($P = 0.0572$) (2.37 vs 2.25 kg/head/d for S and M, respectively). Sexual condition ($P < 0.0001$) and IW affected ADG (0.71 vs 0.84 kg/day for F and CM, respectively). According to the results of this study, weekly movements of shade and drinking structures did not affect pig average daily weight gain.

Key Words: outdoor pigs, sudangrass, weight gain

M338 Heat challenge effect on peripheral blood mononuclear cells viability: comparison of a tropical and a temperate pig breed. J. C. Bambou, R. Grondin, J. L. Gourdine, and D. Renaudeau*, *Institut National de la Recherche Agronomique, UR143*, *Petit Bourg, French West Indies, France*.

Evidence was found that local Caribbean pigs (Creole) are better adapted to seasonal climatic changes of tropical climate than exotic breeds imported from Europe. We evaluated the effect of heat challenge on peripheral mononuclear blood cells (PBMC) isolated from Creole (CR) and Large White (LW) pigs, on cell viability, concanavalin A– induced proliferation and heat shock proteins (HSPs) mRNA expression. PBMC from Creole (CR) and LW growing pigs of 7 to 12 weeks of age were isolated, cultured for 9 h at 37°C, and thereafter subjected to one of the 3 trials. In trial 1, cells from 18 CR and 18 LW pigs were exposed to 42°C or 45°C for 2, 4, 6 and 9 h and cell viability was monitored using the trypan blue method. In trial 2, we evaluated mitogen–induced proliferation of PBMC from 5 CR and 5 LW pigs after for 2 and 9 h heat exposure at 45°C followed by 24 h-stimulation at 37°C with concanavalin A. The aim of trial 3 was to measure induction of HSP70.2 and HSP90 mRNA expression in PBMC from 5 CR and 5 LW pigs after a heat challenge at 45°C for 3, 6 and 9 h. Viability was affected by breed and temperature ($P < 0.01$) but no effect of breed × temperature or breed × exposure

time interactions was observed. The decrease in viability caused by heat challenge was greater for LW than for CR pigs. For mitogen-stimulated PBMC, incubation at 45°C reduced lymphoblastogenesis ($P < 0.001$). However, this reduction was not influenced by breed ($P > 0.05$). When compared with PBMC cultured at 37°C, the mRNA expression of HSP70.2 and HSP90 increased at 45°C. After 9 h exposure at 45°C, PBMC from CR pigs showed a decreased expression of HSP90 mRNA when compared with the LW pigs. In contrast, the temperature × breed interaction was not significant for HSP70 mRNA expression. In conclusion, breed differences in resistance to heat challenge at the whole organism scale is also reflected at the cellular level. Neither HSP70.2 nor HSP90 mRNA expression level could explain this effect.

Key Words: pig, breed, heat stress