W264 Cloning of the porcine selenoprotein V gene and its RNA abundance in different tissues of young pigs fed three levels of dietary selenium concentrations. Q. S. Zhang[1], H. Zhao[1], J. C. Zhou[1], K. N. Wang[1], J. Y. Tang[1], X. J. Xia[1], and X. G. Lei*1,2, [1]*Int. Ctr. of Future Agriculture for Human Health, Sichuan Agri. Univ.*, *Chengdu, China*, [2]*Cornell University*, *Ithaca, NY*.

Porcine selenoprotein V (Sel V) gene sequence and regulation of its expression remain unknown. In this study, we cloned a 1,233 base pair cDNA coding for the porcine Sel V gene and determined responses of its mRNA abundance to dietary Se concentrations. A total of 24 male pigs (5-wk old, 9.2 ± 0.4 kg BW) with a Se-deficient (0.03 mg Se/kg) corn-soy basal diet (BD) supplemented with 0, 0.3 and 3.0 mg Se/kg as Se-enriched yeast for 16 wk. At the end, pigs were killed to collect blood and nine tissues for total RNA isolation to conduct quantitative real-time Q-PCR analysis. While dietary Se supplement (0.3 or 3 mg/kg) exerted no significant effect on final body weights of pigs, it increased ($P < 0.05$) GPX activities and Se concentrations in both blood and liver. Among all the tissues assayed, testis had the highest ($P < 0.05$) and thyroid had the second highest ($P < 0.05$) Sel V mRNA levels that were not significantly different among the three dietary Se concentrations. Compared with pigs fed 0.3 and 3 mg Se/kg, pigs fed BD exhibited a lower ($P < 0.05$) Sel V mRNA level in kidney, but higher ($P < 0.05$) Sel V mRNA levels in hypothalamus and muscle, respectively. Only kidney Sel V mRNA levels were different ($P < 0.05$) between pigs fed 0.3 and 3 mg Se/kg. In conclusion, effects of dietary Se concentrations on Sel V gene expression varied with tissues in pigs.
This work was partially supported by NSFC Projects 30628019, 30700585, and 30871844, and the Chang Jiang Scholars Program (XGL).

Key Words: Sel V, gene expression, selenoprotein, real-time RT-PCR, pig

W265 Phosphate status impacts bone integrity and stem cell proliferation in neonatal pigs. L. S. Alexander*, B. S. Seabolt, and C. H. Stahl, *North Carolina State University*, *Raleigh*.

Mesenchymal stem cells (MSC) are essential to postnatal bone growth and our previous research indicates that dietary phosphate (PO_4) level impacts proliferation of these cells in vivo. To determine the effect of early PO_4 nutrition on bone integrity and MSC activity, fifteen pigs (1.5 + 0.2 kg) between 24 and 36 hr old were divided into 3 dietary treatment groups. Over a 12 d period, pigs were either fed a PO_4 adequate diet or 1 of 2 diets that exceeded PO_4 requirements. Blood collected at d 6 and d 12 was analyzed for sera PO_4, Ca, and PTH concentrations. Remaining sera was pooled from each treatment group to determine the impact of sera on MSC proliferation in vitro. At the conclusion of the trial, tibias were collected for bone measures and MSC were isolated from bone marrow of individual animals. While sera PO_4 did not differ between treatment groups at either time point, a dose response was noted in sera Ca ($P < 0.05$) and PTH ($P < 0.05$) concentrations at d 6, with adequate animals having the lowest sera PTH concentrations and correspondingly higher circulating Ca when compared to the other groups. Although, the tibias of animals receiving the PO_4 adequate diet were larger ($P < 0.05$) and thicker ($P < 0.1$) than the bones of those animals receiving excess PO_4, ash percentage did not differ between groups. Proliferation of MSC treated for 24 hr in sera from each group was effected by PO_4 status ($P < 0.1$) of the animal and tended to be influenced by PO_4 status of the sera. Because circulating PO_4 did not differ between groups, the changes in bone measures, sera mineral and hormone concentrations, and MSC proliferation would suggest possible differences in PO_4 utilization. Additional research is needed to further clarify how PO_4 status affects MSC activity and the subsequent alterations in bone integrity.

Key Words: pig, phosphate, bone

W266 The effect of calcium and phosphorus supplementation on production traits of laying hens. T. D. Knezacek*, J. P. Dahiya, K. V. Schwean-Lardner, and H. L. Classen, *University of Saskatchewan*, *Saskatoon, Canada*.

Research in our laboratory found short term feeding of high calcium (Ca) levels could increase bone mineralization. Though not investigated, this response may benefit bird welfare by reducing cage layer fatigue and bone breakage. Consequently, research investigating the relationship between Ca and available phosphorus (AP) was completed to determine the effect of increasing levels of these minerals on laying hen performance. Rations were fed to 864 Lohmann LSL Lite hens in 4 phases from 19-31, 31-43, 43-55 and 55-67 wks of age. From 19-31 wks of age, all hens were fed the same diet (3.80% Ca, 0.45% AP). The remaining phases each had 12 dietary treatments consisting of 4 levels of Ca and 3 levels of AP (3.80-4.27% Ca, 0.40-0.50% AP; 3.80-4.74% Ca, 0.35-0.55% AP; and 3.80-5.20% Ca, 0.30-0.60% AP, respectively). Egg weight, specific gravity and feed intake were measured at 4 wk intervals. Overall, level of Ca and AP inclusion had no effect on hen-day egg production, egg quality, egg weight, egg specific gravity, feed intake, feed to egg mass ratio or bird mortality. Ca level affected hen body weight at 66 wks of age (P=0.0309), with birds fed the lowest Ca level being lighter (1.752 kg) than birds fed the highest Ca level (1.818 kg). Hens fed higher levels of AP had poorer feed efficiency (P=0.0180) due to reduced egg production later in the cycle and feed intake that was similar to lower levels of AP. Though not statistically significant, hens fed higher Ca levels had a greater incidence of fatty-liver hemorrhagic syndrome. There was also a trend for higher mortality due to cage layer fatigue in low Ca and low Ca-AP diets. There were no significant interactions between level of Ca and AP supplementation. In conclusion, Ca and AP supplementation in later-phase layer rations did not affect hen performance suggesting a variety of Ca:AP ratios will meet the requirements for egg production.

Key Words: calcium, phosphorus, egg production

W267 The effects of strain and dietary phosphorus level on large tom turkey performance. B. N. West*, K. G. S. Lilly, K. R. Beaman, L. K. Shires, S. A. Loop, and J. S. Moritz, *West Virginia University*, *Morgantown*.

There are several challenges associated with maintaining a competitive edge in commercial poultry production. Choosing the appropriate genetic strain of turkey can significantly impact feed conversion and carcass yield, thus profitability. In addition, environmental impacts of production agriculture (especially manure disposal) are becoming increasingly more scrutinized and consequently regulated. Dietary phosphorus levels can also significantly impact diet cost. The objective of this study was to determine differences between strain use and dietary phosphorus level in a research setting that mimics commercial production. This was a 2x2 factorial design utilizing two strains (Nicholas and Hybrid) and two levels of dietary phosphorus (high and low) in finishing diets (d-105 through d-138). All birds were reared at the newly renovated West

Virginia University turkey research facility and all diets were manufactured at a commercial feed mill. Male poults (1216) were randomly placed in one of 16 pens and randomly assigned one of four treatments. Live weight gain (LWG), feed intake, feed conversion ratio (FCR), and percent mortality were recorded from d-1 through d-138. Both strains had similar finishing weights and mortality percentages (P>0.05), but the Hybrid strain had a significantly better FCR (P<0.05). An enzyme linked to protein degradation, Lysine-Ketoglutarate Reductase (LKR), had greater expression in Nicholas than Hybrid toms (d-1 through d-136), thus supporting an inferior FCR in the Nicholas strain. Changes in dietary phosphorus in finishing diets did not affect performance or litter phosphorus content, thus indicating potential to decrease feed cost but not environmental impacts.

Key Words: turkey, phosphorus, genetic strain

W268 Impact of breeder mineral nutrition on chick development. L. F. Araujo*[1], C. S. S. Araujo[3], L. C. G. S. Barbosa[3], L. V. B. Pereira3,1, S. Hubbard[3], and M. T. Kidd[2], [1]*University of Sao Paulo*, *Pirassununga, SP, Brazil*, [2]*University of Arkansas*, *Fayetteville,* [3]*Mississippi State University*, *Mississippi State*.

The objective of this research was to investigate chick development measured as chick quality, and growth rates of chicks, from broiler breeders fed supplemental minerals. Breeders received a control diet (vitamin and mineral premix devoid of Se) or diets containing supplemental Se (0.3 mg/kg), Zn (30 mg/kg), Mn (40 mg/kg) from organic sources, and the combination of the three minerals. Organic minerals were supplied as crystalline metal glycinate (zinc and manganese) and selenium proteinate. All dietary treatments were supplied in mash form. Breeders were housed in a floor pen facility with 40 pens (8 replications/treatment). Each pen was equipped with 1 feeder, nipple drinkers and 1 nest. Each pen contained three females which were inseminated before eggs were collected. A total of 450 eggs (90 eggs per treatment) and 800 eggs (160 eggs per treatment) were obtained and set at 31 and 42 wks of age, respectively. Chick quality characteristics included dehydration, navel condition (open navel, small navel, and large navel), wet chicks, dried yolk, red hocks, and bone strength. Furthermore, as characteristics of growth rate, it was evaluated relation between chick length and body weight at process age, and eggs production in broiler breeders. At hatch, chicks were wing banded by treatment and chick quality was assessed. Ten chicks per treatment at d 1 were euthanized and their tibias were collected to evaluate bone strength. No significant differences were noted among treatments for dehydration, navel conditions, wet chicks, dried yolk and red hocks. However, progeny from breeders fed supplemental minerals showed bigger bone strength than birds from hens fed control treatment ($P < 0.05$). Furthermore, BW increased at process age according to chick length. Chicks from hens supplemented with Mn showed an increase on BW at process age and this improvement was related to chick length at hatch. Mineral supplementation resulted in an improvement at eggs production. Chick development is positively affected by breeder mineral nutrition.
FAPESP (Financial Support: 09/07178-4).

Key Words: bone strength, chick length, chick quality

W269 The effect of feeding corn distillers dried grain with solubles to sows in gestation and lactation on sow productivity. M. Roux*, S. Kitt, and R. Moser, *JBS United, INC.*, *Sheridan, IN*.

One thousand and twenty sows (340/treatment PIC Line C29) and their pigs were used to evaluate the effects of feeding corn distillers dried grains with solubles (DDGS) in gestation and lactation over multiple reproductive cycles on sow productivity. Sows were blocked by parity (avg. 2.1) and allotted to 1) non-DDGS corn-soybean meal (SBM) control diet or two levels of DDGS 2) 15%/7.5% and 3) 30%/15% in gestation/lactation, respectively. All gestation diets were formulated to contain 0.62% SID lysine and 3,340 kcal/kg ME. Lactation diets were formulated to contain 1.11% SID lysine and 3,460 kcal/kg ME. Treatments were initiated at an average of 47 days prior to farrow and continued through the subsequent gestation and lactation. At the end of the first lactation, sows fed the highest level of DDGS (30% in gestation/15% in lactation) had less back fat (BF), reduced ADFI, and greater weight loss ($P < 0.05$); but trended to have a reduced wean-to-estrus interval (WEI, $P < 0.08$) compared to sows fed the non-DDGS diet. There were no differences among treatments in litter response variables (total born, born alive, birth weight, wean weight, number weaned, pre-wean mortality, $P > 0.10$). Sows fed high DDGS in the subsequent gestation and lactation responded to dietary treatments in a similar fashion as in the previous lactation with respect to body weight loss, BF, ADFI, and return-to-estrus. There was no difference in subsequent litter performance (total born, born alive, birth weight, wean weight, number weaned, and pre-wean mortality, $P > 0.10$). At trial completion, DDGS samples were pooled by month and screened for mycotoxins. Average vomitoxin and zearalenone levels were 3.06 ppm ± 1.12 and 0.11 ppm ± 0.04, respectively. Overall, supplementation of DDGS in gestation and lactation diets with moderate mycotoxin levels had little impact upon reproductive and lactation performance.

Key Words: DDGS, sow, lactation

W270 The effect of feeding corn distillers dried grain with solubles to sows in gestation and lactation on sow productivity. M. Roux*, S. Kitt, and R. Moser, *JBS United, INC.*, *Sheridan, IN*.

One thousand and twenty sows (340/treatment PIC Line C29) and their pigs were used to evaluate the effects of feeding corn distillers dried grains with solubles (DDGS) in gestation and lactation over multiple reproductive cycles on sow productivity. Sows were blocked by parity (avg. 2.1) and allotted to 1) non-DDGS corn-soybean meal (SBM) control diet or two levels of DDGS 2) 15%/7.5% and 3) 30%/15% in gestation/lactation, respectively. All gestation diets were formulated to contain 0.62% SID lysine and 3,340 kcal/kg ME. Lactation diets were formulated to contain 1.11% SID lysine and 3,460 kcal/kg ME. Treatments were initiated at an average of 47 days prior to farrow and continued through the subsequent gestation and lactation. At the end of the first lactation, sows fed the highest level of DDGS (30% in gestation/15% in lactation) had less back fat (BF), reduced ADFI, and greater weight loss ($P < 0.05$); but trended to have a reduced wean-to-estrus interval (WEI, $P < 0.08$) compared to sows fed the non-DDGS diet. There were no differences among treatments in litter response variables (total born, born alive, birth weight, wean weight, number weaned, pre-wean mortality, $P > 0.10$). Sows fed high DDGS in the subsequent gestation and lactation responded to dietary treatments in a similar fashion as in the previous lactation with respect to body weight loss, BF, ADFI, and return-to-estrus. There was no difference in subsequent litter performance (total born, born alive, birth weight, wean weight, number weaned, and pre-wean mortality, $P > 0.10$). At trial completion, DDGS samples were pooled by month and screened for mycotoxins. Average vomitoxin and zearalenone levels were 3.06 ppm ± 1.12 and 0.11 ppm ± 0.04, respectively. Overall, supplementation of DDGS in gestation and lactation diets with moderate mycotoxin levels had little impact upon reproductive and lactation performance.

Key Words: DDGS, sow, lactation

W271 Amino acid transporter mRNA abundance in porcine mammary tissue during pregnancy and lactation. R. Manjarin*[1], J. P. Steibel[1], V. Zamora[2], N. Am-in[3], R. Kirkwood[1], C. Ernst[1], P. Weber[1], N. P. Taylor[1], and N. L. Trottier[1], [1]*Michigan State University*, *East Lansing,*[2]*Colegio de Postgraduados*, *Montecillo, Estado de Mexico, Mexico*, [3]*Chulalongkorn University*, *Bangkok, Thailand*.

The objective of this study was to test the hypothesis that mRNA abundance of genes encoding for mammary synthesized milk proteins α-lactalbumin and β-casein is positively correlated with mRNA abundance of specific amino acid transporter genes during late pregnancy and lactation. Four sows (parity 5) were selected one week before farrowing and fed a corn-soybean meal-based diet for lactation. Mammary tissue was collected by biopsy 4 d prior to farrowing (−4 d), and on d 5 (early) and 17 (peak) of lactation. Gene expression of amino acid transporters $b^{0,+}$AT (SLC7A9), y^+LAT1 (SLC7A7), y^+LAT2 (SLC7A6), $ATB^{0,+}$ (SLC6A14), CAT-1 (SLC7A1) and CAT-2b (SLC7A2), and of mammary synthesized milk proteins β-casein (CSN2) and α-lactalbumin (LALBA) was assessed by measuring mRNA abundance using relative quantitative PCR. Coefficient of variability (R^2) and mixed model analysis were used for data analysis. Compared to early lactation, CAT-1 mRNA abundance was lower ($P < 0.05$) on −4 d and higher ($P < 0.05$) on peak lactation. For $ATB^{0,+}$ and y^+LAT2, mRNA abundance was lower ($P < 0.001$ and $P < 0.01$, respectively) on −4 d compared to early lactation, and did not differ at peak lactation. Transcript abundance of transporters CAT-2b, y^+LAT1 and $b^{0,+}$AT did not differ between −4 d and early lactation or between peak and early lactation. For β-casein, mRNA abundance was lower ($P < 0.01$) on −4 d compared to early lactation, and tended to be higher ($P = 0.06$) at peak lactation. Compared to early lactation, α-lactalbumin mRNA abundance was lower ($P < 0.0001$) on −4 d, but did not differ at peak lactation. CAT-1, y^+LAT2 and $ATB^{0,+}$ mRNA abundance was positively correlated with mRNA abundance of β-casein ($P < 0.001$; $R^2 = 0.65$, 0.60 and 0.63, respectively) and with mRNA abundance of α-lactalbumin ($P < 0.001$; $R^2 = 0.53$, 0.79 and 0.79, respectively). In conclusion, gene expression of amino acid transporters CAT-1, $ATB^{0,+}$ and y^+LAT2 is upregulated during lactation in porcine mammary gland and positively correlated to expression of genes encoding for the mammary synthesized milk proteins β-casein and α-lactalbumin.

Key Words: amino acid, transporter, sow