67 Effect of feeding reduced phosphorus diets on bone characteristics of swine reared under both research and commercial settings. R. Hinson*, A. Schinckel, A. Sutton, and B. Richert, *Purdue University*, *West Lafayette, IN*.

Three experiments in research settings (Exp. 1, 98 hd; Exp. 2, 148 hd; Exp. 3, 384 hd) and two experiments in commercial settings (Exp. 4 and 5, 256 hd each) were conducted to determine the effects of feeding low nutrient excretion (LNE) diets formulated with reduced crude protein, amino acid supplementation, and phytase (Exp. 4 and 5), plus, low phytic acid corn (Exp. 1 and 2) with 7% soybean hulls and a non-sulfur trace mineral premix (Exp. 3) on pig performance and bone characteristics. Overall growth performance was similar (P>.10) between treatments in Exp. 1, 2, and 5 and was reduced (P<.05) in Exp. 3 and 4 when feeding LNE type diets. Carcass characteristics were similar (P>.05) between treatments in all experiments. Subsets of pigs were harvested at the end of the nursery (Exp. 2, 24 hd, 25.2 kg BW), grower (Exp. 2, 40 hd, 71.7 kg BW), and finisher phases (Exp. 1, 40 hd, 125.9 kg BW; Exp. 2, 40 hd, 125.0 kg BW; Exp. 3, 94 hd, 88.1 kg BW; Exp. 4, 40 hd, 115.3 kg BW; Exp. 5, 40 hd, 117.6 kg BW). Front feet (Exp. 3) or both feet from the left side of the carcass (Exp. 1, 2, 4, and 5) were removed after harvest and the metacarpal and metatarsal bones were removed to determine % ash and peak breaking strength. At the nursery phase (Exp. 2), dry fat-free extracted weight was reduced (P<.05) with the feeding of the LNE diets. At the grower phase (Exp. 2), metacarpal and metatarsal ash weight, ash %, and peak breaking strength were reduced (P<0.05) with the feeding of the LNE diets. At the end of the finisher phase LNE diets reduced (P<.05) metatarsal ash % (Exp. 1, 2, and 4), metatarsal ash mass (Exp. 4 and 5), metatarsal breaking strength (Exp. 4; 78.7 vs 105.7 kg) and metacarpal dry fat-free weight (Exp. 2 and 3), metacarpal ash mass (Exp. 2, 3, and 4) metacarpal peak breaking strength (Exp. 3, 64.4 vs 91.5 kg; Exp. 4, 97.0 vs 120.8 kg) compared to the control type diets. Feeding reduced P diets negatively impacted bone characteristics of pigs reared under both research and commercial settings.

Key Words: Swine, Reduced phosphorus diets, Bone characteristics

68 Ingestion of endophyte infested fescue does not affect exercise recovery of horses exercised at a light workload. G. Webb*, S. Webb, and R. Humes, *Missouri State University*, *Springfield*.

During the summer months, 12 horses averaging 533 kg where fed either orchard grass (Dactylis glomerata) or endophyte infested tall fescue (Festuca arundinacea) hay which averaged 1995 ppm ergot alkaloids. Horses were maintained on free choice orchard grass hay only diets 14 d prior to and between two experimental periods. During the 14 d experimental periods, six horses were offered orchard grass control and six were offered fescue hay on a free choice basis. During the last 4 d of each 14 d period horses were individually housed in 13.3 m^2stalls so that individual intake and refusals could be recorded. During period 2, horses were fed the opposite hay from period 1. Fescue hay averaged 10.7% CP and 50.7% TDN compared to 14.9% CP and 55.3% TDN for orchard grass. In order to establish a light workload, horses were exercised 30-45 min/d, 4 d per wk in all periods. On day 14 of each test period horses were subjected to an exercise tolerance test consisting of 4 min at a walk, 14 min at a trot and 6 min at a lope/gallop with target heart rate ranges of 50-70, 71-110 and 111-150 beats per minute respectively. Weight of rider and tack as a percent of horse BW was standardized. All tests were done in an indoor arena between 1200 and 1430 h. Ergot alkaloids in urine samples from horses consuming fescue averaged 282.2 ng /mg creatine compared to 14.4 ng/mg creatine for those consuming orchard grass. Horses consumed more (P<0.01) orchard grass than fescue (2.06% vs. 1.69 % B.W/day) and lost less (P<0.01) weight (4.3 vs. 29.3 kg) during the 14 d experimental periods. No difference was observed (P<0.01) for pre or post exercise rectal temperatures or respiration rates after 1, 5 and 10 min of recovery between treatment groups. Ingestion of fescue with high levels of ergot alkaloids did not affect post exercise recoveryof temperature, heart rate or respiration when horses were subjected to a light workload.

Key Words: Fescue, Equine, Exercise

69 Oregano essential oils (OEO) supplementation and its effect on reproductive performance of sows, growth pattern of piglets and their immune measurements. C. Ariza-Nieto*, S. K. Baidoo, M. Bandrick, and T. W. Molitor, *University of Minnesota*, *St. Paul*.

A study was performed to evaluate supplementation of OEO in gestation and lactation sow diets on sow reproductive and suckling pig performance. Within 24 hours after service, 150 sows were randomly assigned to one of two groups: control and oregano (OEO 250ppm of Regano500®). Blood was collected via jugular from 6 randomly chosen sows per treatment and their litter at farrowing (piglets bled before and after suckling), 7, and 14 days of lactation. Colostrum and milk samples were collected on these days. T lymphocytes subpopulations (ΓΔ, CD8, CD4) were enumerated from whole blood. Natural cytotoxicity was used to assess functional activity asociated with innate immunity in pigs. To evaluate growth rates due to OEO supplementation, 686 piglets were individually identified and weighed at 1, 5, 9, 12, 16, and 19 days of age. The number of live born piglets was higher when sows were supplemented with OEO during gestation (+1.1 piglets, P<0.05). Sows fed OEO during gestation-lactation improved litter weaning weight and litter weight gain (2.7 and 3.3 kg; P<0.05) compared to control. Breeding value sow productivity (BVSP) and sow productivity index (SPI) were higher (P<0.01) in OEO fed sows (104 v 99 and 115 v 98, respectively). Wean to service interval was lower in OEO fed sows compared to control (5 v 8 days). Growth rate of piglets was higher (P<0.01) in sows fed OEO on 1-5, 9-12, and 16-19 days of lactation. Piglets from sows fed OEO during gestation-lactation showed the greatest (P<0.05) amount of IGF-1 at day 14 of lactation (135 ng/ml). The percentage of ΓΔ lymphocytes isolated from piglets before suckling from sows fed OEO was greater (P<0.05) than control, although no differences were observed after suckling. These pigs also demonstrated greater natural killer (NK) activity throughout lactation, and significantly greater NK activity before suckling (P<0.01). OEO supplementation during gestation and lactation shows a biological growth potential on suckling piglets.

Key Words: Oregano, Growth, Immune response

70 Effects of increasing oregano oil in nursery pig diets. C. R. Neill*, J. L. Nelssen, M. D. Tokach, R. D. Goodband, S. S. Dritz, and J. M. DeRouchey, *Kansas State University*, *Manhattan*.

A total of 210 weanling pigs (PIC L327 × L42) with an initial weight of 5.4 kg and 21 d of age were used in a 28-d growth trial to evaluate the

effects of increasing oregano oil on growth performance of weanling pigs. Oregano oil is an extract derived from the Greek oregano herb, Origanum vulgare. The oregano oil (5%) is mixed with an inert carrier (95%) to make a premix that is added to the diet. There were seven pigs per pen and six pens per treatment. Pens consisted of four barrows and three gilts or three barrows and four gilts. Pigs were blocked by weight and randomly allotted to one of five dietary treatments. Dietary treatments were: a negative control diet (without an antibiotic or oregano oil); a positive control diet containing neomycin/oxytetracycline (NT; 154 ppm); and the negative control diet plus oregano oil premix at 0.05, 0.10, or 0.20% of the diet. Oregano oil concentration remained constant for the 28-d trial. From d 0 to 14, ADG, ADFI, and G:F improved ($P < 0.01$) for pigs fed NT compared with those fed oregano oil or the control diet. From d 0 to 28, ADG and ADFI increased ($P < 0.006$) in pigs fed NT whereas G:F was not improved ($P = 0.35$) compared with pigs fed the negative control diet (see table). Pigs fed oregano oil had similar ($P > 0.15$) ADG, ADFI, and G:F compared with pigs fed the negative control diet. Pigs fed NT had increased ($P < 0.04$) ADG, ADFI, and G:F compared with pigs fed any level of oregano oil. In conclusion, NT improved growth performance of weanling pigs; whereas, oregano oil did not influence pig performance.

Table 1. Effects of increasing oregano oil in nursery pig diets

			Oregano oil, %			
D 0 to 28	Negative Control	Positive Control	0.05	0.10	0.20	SE
ADG, g	357[b]	418[a]	356[b]	354[b]	358[b]	17.289
ADFI, g	450[b]	520[a]	455[b]	459[b]	461[b]	23.138
G:F	0.79[ab]	0.81[a]	0.78[ab]	0.77[b]	0.78[b]	0.013

[ab] Means in the same row without common superscript differ ($P < 0.05$).

Key Words: Antimicrobial, Nursery pigs, Oregano

71 Effect of whey protein concentrate source on growth performance of nursery pigs. R. O. Gottlob*, J. M. DeRouchey, M. D. Tokach, R. D. Goodband, S. S. Dritz, J. L. Nelssen, C. R. Neill, and C. W. Hastad, *Kansas State University*, *Manhattan*.

A total of 228 weanling pigs (6.8 kg and 21 d of age) were used to evaluate the effects of whey protein concentrate (WPC) source on growth performance. Pigs were blocked by BW and sex and allotted to one of seven diets in an unbalanced complete block design. There were five or six pigs per pen (equalized within block) with five pens for each control and six pens for each WPC treatment. The seven treatments included a negative control with no WPC, a positive control with 5% spray-dried animal plasma (SDAP), or the negative control diet with WPC from one of five sources. Sources of WPC varied in CP from 57.6 to 80.2% and replaced SDAP on a lysine basis. Pigs were fed experimental diets from d 0 to 14 and a common diet from d 14 to 28. For d 0 to 14, ADG was 206, 242, 248, 225, 206, 237, and 235 g/d and G:F was 0.71, 0.79, 0.84, 0.80, 0.80, 0.83, and 0.84 for pigs fed the negative and positive control and WPC sources 1 to 5, respectively. Pigs fed WPC had improved ($P<0.01$) G:F compared to pigs fed the control diet, but tended to have decreased ($P<0.09$) ADFI compared to pigs fed diets containing SDAP. Pigs fed diets containing Source 1 WPC had greater ADG ($P<0.05$) than pigs fed the control diet or diets containing Source 3 WPC, while pigs fed other diets were intermediate. Pigs fed diets containing SDAP had greater ADFI ($P<0.05$) than pigs fed diets containing Source 3 WPC, while pigs fed other diets were intermediate. Pigs fed diets containing Source 1, 4, or 5 WPC had improved G:F ($P<0.05$) compared to pigs fed the control diet. From d 0 to 28, pigs fed diets containing Source 1 WPC had greater ADG ($P<0.05$) than pigs fed diets containing Source 3 WPC. There were no differences in overall ADFI and G:F and no differences in overall performance between pigs fed WPC and SDAP. The difference in growth performance of pigs fed WPC confirms our previous results in that variation between WPC sources exists. Pigs fed diets containing high quality WPC can have similar performance to those fed SDAP.

Key Words: Nursery pigs, Plasma, Whey protein concentrate

72 Evaluation of regional differences in nutrient composition and physical characteristics among six U.S. soybean meal sources. P. E. Urriola*[1], M. H. Whitney[2], N. S. Muley[1], and G. S. Shurson[1], [1]*University of Minnesota*, *St Paul*, [2]*Extension Regional Center*, *Mankato, MN*.

A total of 86 soybean meal (SBM) samples were collected monthly from July 2003 to December 2004 from 6 soybean processing plants (SPP) located in two regions (R): North Carolina (n = 13), South Carolina (n = 13), and Alabama (n = 12) in the southern region (SR), and two Minnesota (n = 14, respectively) and one South Dakota SPP (n = 20) in the northern region (NR). Subsamples were sent to Iowa Testing Laboratory (Eagle Grove, IA) for proximate and mineral analysis, and to the University of Missouri for amino acid analysis. Additional subsamples were analyzed for bulk density and particle size. All nutrient values were expressed on a DM (%) basis. Crude protein (55.23 ± 0.14) and ash (7.02 ± 0.05) content were influenced ($P = 0.004$) by year, R, and SPP. However, crude fat (1.68 ± 0.05) was affected only by SPP ($P = 0.0001$), while crude fiber (3.77 ± 0.03) was affected only by year ($P = 0.01$). Samples from SR were higher ($P = 0.05$) in lys (3.45 ± 0.02), met (0.77 ± 0.01), thr (2.08 ± 0.01), and trp (0.76 ± 0.01) than NR (3.38 ± 0.01, 0.74 ± 0.01, 2.00 ± 0.01, and 0.73 ± 0.01, respectively). Crude protein of SBM was poorly correlated with essential amino acid content ($r^2 = 0.52$). Total amino acid content and total non-essential amino acids were higher ($P = 0.001$) for SR compared to NR. Concentrations of P, K and Mn were higher ($P = 0.001$) in samples from SR than NR. However, Ca, Mg, Na, S and Zn content was similar ($P = 0.035$) between R. Average particle size (μm) was higher ($P = 0.001$) in NR (851 ± 33) compared to SR (731 ± 31). Bulk density (kg/m^3) was similar ($P = 0.41$) between R (532 ± 3). Mean particle size and bulk density values were different ($P = 0.002$) between SPP. Although there were significant differences in nutrient content and physical characteristics of soybean meal samples among regions, year, and SPP, these differences were small and of minimal consequence when formulating practical animal diets.

Key Words: Soybean meal, Nutrient composition, Physical characteristics