.10) between treatments. G/F did not differ between HS and LS diets (P > .10) except during Phase II when pigs fed HS had higher G/F than pigs fed LS (P < .10). Average ODU, H2S, and NH3 levels tended to increase weekly during the 5-wk feeding period. Feeding LS had no effect on ODU and H2S during wk 1 and 2, but tended to reduce ODU and H2S during wk 3, 4, and 5. Weekly and final NH3 level was unaffected by dietary treatment. These results suggest that use of alternative reduced sulfur ingredients in starter diets may reduce odor and H2S emissions in confinement nursery rooms without reducing pig performance.

Key Words: Sulfur, Odor, Hydrogen sulfide

189 Calculated body-N loss or infused alanine-N is not recovered from starved newborn pigs. N.J. Benevenga*, T.W. Rasch, L.G. Haas, B.D. Mickelson, and J.A. Davis, University of Wisconsin-Madison, Madison, WI

Estimating body nitrogen (N) loss by comparative slaughter in newborn pigs starved for 60 h (12-72 h of age ) and comparing it to N measured in urine revealed that 30-50% of body-N loss was recovered in urine (FASEB J. 9:A745 1995). In other studies, 4 small pigs (.99 ± 190 kg) and 4 large pigs (1.86 ± 192 kg) were given alanine IV with levels stepped every 6 h from 0 to 25, 50 and 75% of fasting heat production followed by infusion of water for 12 h. The recovery of the infused alanine-N in both urinary-N and the expanded body urea-N pool was 73% and 54% in small and large pigs respectively (FASEB J. 10:A472 1996). In these studies, expired ammonia accounted for between 1.1 and 1.0% of the infused alanine-N. Urinary-nitrate-N in piglets starved for 60 h could account for .06% of body-N loss. Because the standard Kjeldahl used to measure total N in the previous studies does not detect oxidized N (nitrite and nitrate), it was modified to include these N compounds. When comparing the two Kjeldahl methods, no methods difference (P≥ .05) in body-N or urinary-N in 7 pigs was detected. A closed circuit respiration system was developed so possible gaseous forms of N loss from L-alanine, particularly 15 N, could be sampled, identified and measured. Nine pigs were infused IV with either 15 N enriched L-alanine (2.5 A.P.) or unenriched alanine (.37 A.P.) for 60 h. After establishing and maintaining an atmosphere of 80% Ar and 20% O2 in confinement nursery rooms without reducing pig performance. Newborn Pig, Body-N, N-loss

Key Words: Newborn Pig, Body-N, N-loss

190 Effects of corn hybrids fed to growing pigs on nitrogen metabolism. J. L. Snow*, L. L. Andersen¹, D. Rozeboom², M. Allen², and N. L. Trotter², ¹University of Illinois; Urbana, IL, ²Michigan State University; East Lansing, MI

Eight barrows (19.11 ± .49 kg, Yorkshire) were arranged in two 4 x 4 Latin squares to investigate the effect of feeding different corn hybrids on nitrogen balance. The test corns were: high oil (HO), isogenic high oil (IHO), waxy (WX), isogenic waxy (IWX), high lysine (HL), yellow dent one (YD1), yellow dent two (YD2). Pigs were fed corn-based diets consisting of 96.87% test corn. Pigs were allowed adjustment period to differ (5d) followed by five days of total urine and fecal collection. Nitrogen (N) retained was not different between HO vs IHO, WX vs IWX and HL vs YD1 (P ≥ .1). Nitrogen retention as a percent of N intake and N absorbed was similar between HO vs YD2 and WX vs YD2 (P ≥ .1), but was different when HL was compared to YD2 (P ≤ .05). Overall, pigs fed the YD1, HL and HO corns retained numerically more nitrogen consumed and absorbed than all other corns.

Key Words: Genistein, Growth, Immune Response


Pigs (30 ± 1 kg) were used in a 25 d trial to determine the effects of an enteric disease challenge on N balance, growth performance, and immune variables. Pigs (n=21) were challenged on d 8 with Salmonella typhimurium (S), unchallenged and fed ad libitum (A; n=6), or unchallenged and pair-fed the feed intake of a challenged pig (P; n=8). Collection periods were d 4 to 7, 8 to 11, 12 to 15, 16 to 19, and 22 to 25. Blood was collected on d 5, 9, 13, 17, and 23. There was a disease...
challenge × time interaction (P < .05) for ADG, due to decreased ADG (P < .01) for S vs A from d 8 to 11 (617 vs 1385 g). Pair-fed pigs had intermediate ADG (949 g), and differed from S (P < .07). Gain/feed was lower for S vs P from d 8 to 11 (20.62; P < .05). There was a disease challenge × time interaction for retained N (P < .05), indicating reduced lean growth from d 8 to 11 for S (19.6 g/d; P < .01) and P (23.2 g/d; P < .07) vs A (30.1 g/d). From d 8 to 11, N retention, as a percentage of N intake or N absorbed, was worse for S (38.6%, 34.4%) vs A (57.0%, 65.5%; P < .05), and P (51.7%, 58.7%; P < .07). While short-term differences were evident, d 8 to 25 growth performance and N balance were not affected (P > .20), except for increased DM digestibility and decreased fecal N for S vs A (P < .05). There was a disease challenge × time interaction for serum haptoglobin (P < .05), with higher haptoglobin on d 9 and 13 for S vs A, (P < .05) and S vs P on d 13 (P < .05) and 17 (P < .10). On d 13 and 17, serum alpha-1 acid glycoprotein was only higher for S vs A (P < .05). Plasma IGFB-I increased from d 4 to 25 (linear, P < .05), and was higher for S vs A on d 17 (P < .10), d 23 (P < .05), and for S vs P (P < .05) on d 17. Results indicate that short-term reductions in N balance and growth performance from an acute disease challenge are due to feed intake reductions and immune response nutrient repartitioning. Because of compensatory gain during recovery, long-term effects were minimal.

Key Words: Pig, Salmonella, N Balance

PHYSIOLOGY

193 The effect of exogenous estradiol-17β (E2β) during elongation on placental size at d112 of gestation in the Meishan (M) pig. M. E. Wilson* and S. P. Ford, Iowa State University, Ames IA.

Day 2.5 transferred M embryos are larger, contain more trophoderm cells and secrete more Eβ when gestated in a Yorkshire (Y) as compared to M uterus to d12. Additionally, placenta of M conceptuses are larger when gestated in a Y uterus as compared to a M uterus to d112. The amount of embryonic E2β secretion during elongation on d12-14 is thought to stimulate endometrial secretion of growth factors including IGF-I. This experiment was conducted to determine if exogenous E2β given to piglets would increase placental size of M females during conceptus elongation would increase placental size of M conceptuses. M females (n=12) were checked twice daily for estrus (0700 and 1900) and bred to a M boar at 0 and 12h after the onset of estrus (d0). Bred females were randomly assigned in equal numbers to receive eight 1 ml injections (im) at 6h intervals starting on d0700 or 1900 (time of day when first in estrus), of saline oil starting on d12 (Veh), 1mg of E2β in sesame oil starting on d12 (E12), or 1mg of E2β in saline oil starting on d12 (E12). Pregnant females were then slaughtered on d112 of gestation and ovulation rate, litter size, fetal weight (FW), and crown-rump length (CRL), placental weight (PW) and placental surface area were quantified. As there were no differences in any of the measurements between E12 and E13, the E2β groups were combined (E) for analysis. There were no differences between E and Veh treated females in ovulation rate or litter size, which averaged 16.3±7.1 and 11.8±7.7, FW and CRL were not different (P=0.10) between E and Veh treated females, averaging 802±26 g and 24.3±3.3 cm. Placenta were heavier (P<.05) and larger (P<.001) in E treated females than in Veh treated females (175±10 g and 1428±65 cm 2 vs 134±10 g and 978±29 cm 2, respectively). In addition, placental efficiency (as estimated by the FW:PW) was greater (P<.05) in the Veh as compared to E treated females (5.8±2 vs 4.9±2). These data demonstrate that the amount of embryonic Eβ produced around the time of elongation effects placental size at term.

Key Words: Pig, Placental size, Meishan

194 Estrogen receptor genotype is not associated with placental size in the pig. K. A. Vonnahme*, M. E. Wilson, and S. P. Ford, Iowa State University, Ames, IA.

Litter size is positively associated with placental efficiency (PE), defined as a piglet’s birth weight to that of its placenta (Wilson et al., 1998; Proc Midwest Sec ASAS; abstract #170). By selecting progeny with a greater PE, we increased litter size in a single generation in Yorkshire pigs. Although we have evolved an efficient way to match each piglet with its placenta, much time is invested in obtaining these measurements. Allelic polymorphism (A and B) associated with the estrogen receptor gene has been proposed by others (Rothchild et al., 1996; PNAS 93 201-205) as a marker for litter size. It was our objective to determine if there was any association between the estrogen receptor genotype of an individual piglet and its observed PE. The current study analyzed 249 Yorkshire piglets from 32 litters representing animals selected on PE (high and low) as well as unselected controls. Sows were monitored at farrowing, with each piglet’s umbilical cord double tagged and cut to allow piglets to be matched with their placenta. Ear tissue was obtained immediately after birth, estrogen receptor genotyping was performed by PCR as described by Short et al. (1997, JAS 75 3138-3142). We confirmed previous data that PE shows significant variation both among (range 2.15 to 8.87) and within (range 2.96 to 8.59) litters. Although there was a positive correlation (r=.58, p<.0001) of piglet birth weight with placental weight, there was no correlation of piglet birth weight with PE. There was however, a strong negative correlation (r=-.62, p<.0001) between placental weight and PE. There was no effect of piglet estrogen receptor genotype on placental weight or PE (p>.05). Further, there was no obvious skew in the genotypes (AA, AB or BB) of animals that were selected on PE compared to unselected controls. Therefore, estrogen receptor genotype gives no insight into a piglet’s PE, a trait known to be associated with litter size in the Yorkshire breed.

Key Words: Estrogen receptor gene, Litter size, Placental efficiency

195 Inability of Progesterone to Delay Return to Estrus in 14 d Weaned Sows. D. F. Hentges**, T. J. Safranski†, and W. E. Trout†, †University of Missouri, Columbia.

Segregated early weaning has been instituted to improve growth, efficiency, and health status of weaned pigs. Sow reproductive performance is impaired when sows are weaned at 14 d or less. Greatest limitations are seen in reduced conception rates and subsequent litter size, and an increase in length and variation of wean-to-estrus interval (WEI). The immediate objectives of the present experiment were to determine the effect of a single injection of progesterone (P4) on the WEI, return of LH pulsatility, and consistency of return to estrus in early-weaned sows. A total of 38 sows were weaned at 9 to 14 d of lactation. Nineteen sows were injected at weaning with 4,000 mcg of P4 dissolved in 8 ml of sesame seed oil and the other 19 sows served as controls and were given an 8-ml sesame seed oil injection. Twenty-three sows were fitted with indwelling jugular catheters and blood collected every 4 hours for 6 d beginning 8 hours after the saline or progesterone injection. Blood samples were also collected at 20-minute intervals for 6 hours beginning the day after weaning for 8 d for LH assays. Sows were checked twice daily for return to estrus with a mature boar starting on day 3 post-weaning. WEI ranged from 3 to 14 d with no significant difference (P>0.05) between treatments. Two sows remained anestrus and were not included in the WEI analysis. The P4 treated sows had a significantly higher (P<.01) level of P4 (4.40 vs 4.77 ng/ml) lasting for approximately 30 hours after weaning. The LH data were analyzed for mean LH, the number of LH pulses, LH pulsatility, and consistency of return to estrus. There were no significant interactions between treatment and time for any of the above parameters. In summary, the single P4 injection cleared the system too quickly to delay return to estrus. Although P4 concentrations were elevated in the treated group, no significant change was observed in the LH pulsatility or consistency of return to estrus. Future research is needed to determine the possibility of another delivery mechanism.

Key Words: early wean, wean-estrus-interval, sow

196 Follicular development and atresia during the luteal phase of the estrous cycle in gilts selected for high ovulation rate and controls. H.W. Yen*, K. Arumugananthan, and Dwane R. Zimmerman, University of Nebraska, Lincoln.

Follicular development and atresia were characterized during the luteal phase in two genetic lines differing in ovulation rate (RLS, n=62, cross of Relax Select and Litter Size; C, n=45 randomly selected control line). Gilts were assigned randomly within sire for ovary recovery on days 5, 8, 11 and 14 (d 0 = first d of estrus) of the estrous cycle. Ovaries

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