had greater enzyme activity than steers for (1) CAT in IN (0.095 vs. 0.023 k min^{-1} mg $protein^{-1}$; $P = 0.003$); (2) GPX in BF (0.040 vs. 0.029 U/mg protein; $P = 0.004$); and (3) SOD in BF (13.6 vs. 10.0 U/mg protein; $P = 0.002$), LD (11.9 vs. 8.0 U/mg protein; $P < 0.001$), and ST (11.6 vs. 7.1 U/mg protein; $P = 0.026$). Antioxidant activity was numerically greater in 8 additional enzyme/muscle assays. As hypothesized, antioxidant enzyme activity was greater in the muscle tissue of older cows compared with market steers, and IRP are detectable in these animals.

Key Words: Cattle, Antioxidants, IRP

283 Effect of pasteurization of colostrum on serum immunoglobulin concentrations and health of bull calves.

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Immunoglobulins (Ig) in colostrum provide passive immunity to neonatal dairy calves. Colostrum may be pasteurized to reduce the risk of calves consuming viable disease-causing pathogens, but pasteurization can damage colostral Ig. The objective was to determine if pasteurization of colostrum using a batch pasteurizer affected serum Ig concentrations, health and growth rate of calves. Colostrum of high quality (#880550 mg/mL Ig) was divided in half, and one half was pasteurized for 30 min at 61 °C and cooled. Colostrum was stored at -20 °C and thawed in a water bath prior to use. Bull calves were alternately assigned to one of two treatments by date of birth and fed either unpasteurized (U; n=10) or pasteurized (P; n=11) colostrum. Starting body weight did not differ between treatments. Calves were fed 2 L of colostrum within 6 h after birth and another 2 L of colostrum within 12 h after birth. After 24 h of age, all calves were fed 2 L of milk replacer twice daily and managed similarly according to standard farm procedures. Blood samples were obtained at 48 to 60 h of age for measurement of serum IgG concentrations using a radial immunodiffusion assay. Body weight gain and health indicators were measured from 1 through 10 d of age. Data were analyzed using the GLM procedure of SAS. P colostrum decreased serum IgG concentrations by 20% compared to U colostrum (19.1 mg/mL versus 23.9 mg/mL; $P < 0.06$). Body weight at 10 d of age did not differ between calves fed P or U colostrum (47.8 versus 47.7 kg; $P > 0.66$). Calves fed P colostrum had similar daily rectal temperatures to calves fed U colostrum (39.2 versus 39.1 °C; $P > 0.39$). Fecal scores averaged 3.3 (on a scale of 1 to 5) for 1 through 10 d of age and did not differ by treatment ($P > 0.69$). P colostrum also did not affect ease of breathing of calves. We conclude that pasteurization did not decrease Ig concentration in high-quality colostrum to a degree that produced detectable adverse effects on calf health.

Key Words: Colostrum, Pasteurization, Health

284 Effect of weaning age and commingling on behavior of pigs in a wean-to-finish facility.

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To determine the effect of weaning age and commingling on behavior, pigs from one farrowing group of gilts bred to farrow pigs that would be either 14 or 21 d of age at weaning, were divided into older and younger age groups (108 pigs/group), blocked by BW, and penned 12 pigs/pen in a wean-to-finish facility. At the end of the nursery phase, one-half of the pigs in each pen were removed and commingled within each age group for the growing/finishing phase, whereas the other half of the pigs remained in their original pens. Pigs were fed common nursery and growing/finishing diets, and behavior was monitored during the nursery period on d 0 (weaning), 7, 14, and 27 post-weaning, and during the growing/finishing phase on d 35 (after commingling following the nursery phase), 38, 44, and 65 post-weaning. Four pens per treatment during the nursery phase, and two pens per treatment during growing/finishing phase were monitored. The frequency of times aggressive behaviors were observed was greater ($P < 0.05$) at weaning (d 0) than on any other observation day during the nursery period. Younger pigs spent less ($P < 0.05$) time resting on the day of weaning, and more ($P < 0.05$) time active during the overall nursery phase. During the growing/finishing period, pigs weaned at 14 d of age that remained unmixed spent a greater ($P < 0.05$) percentage of time engaged in feeding behavior on d 35 after weaning than 21 d-old pigs that were unmixed, or commingled pigs regardless of age. On d 65 after weaning, pigs weaned at 21 d of age and mixed and pigs weaned at 14 d of age and unmixed spent a greater ($P < 0.05$) percentage of time engaged in feeding behavior than pigs in the other treatments (weaning age × commingling × day interaction, $P < 0.05$). The results of this study indicate that weaning age had little long-term effect on behavior after weaning, and the interactive effects of weaning age and commingling after the nursery phase should be further explored.

Key Words: Swine, Behavior, Weaning

285 Lactose and specialty protein sources influence flow ability of starter diets.

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High levels of lactose and specialty protein products are often included in nursery pig diets to stimulate feed intake and improve growth performance. However, these ingredients, unless pelleted, frequently increase the incidence of bridging in bins and feeders. Therefore, our objective was to evaluate the effects of lactose products and specialty protein ingredients on angle of repose. Angle of repose is the maximum angle in which a pile of ingredient retains its slope. A large angle of repose represents a steeper slope and poorer flow ability. A 70:30 corn-soybean meal blend served as the base to which all specialty ingredients were added. In Exp. 1, we evaluated six lactose sources. Three sources were fine powdered whey permeates. The other sources were a coarse ground whey permeate, edible grade spray-dried whey, and a crystalline lactose source. Lactose sources were added at 0, 5, 10, 20, and 30% to the corn-soybean meal blend. Angle of repose was then measured on these mixtures as well as the individual lactose sources. There was a lactose source ï level interaction (P<0.0001). Increasing lactose source decreased angle of repose; however, the coarse whey permeate had the greatest improvement in angle of repose. In Exp. 2, we evaluated five specialty protein ingredients: spray-dried animal plasma (powdered or granulated), spray-dried blood cells (powdered or granulated), and select Menhaden fish meal. Specialty protein sources were added at 0, 2.5, 5, 7.5, and 10% to the corn-soybean meal blend. There was a specialty protein source ï level interaction (P<0.0001). As powdered animal plasma and blood cells increased, angle of repose increased, resulting in poorer flow ability. With the addition of granulated animal plasma and blood cells, angle of repose decreased indicating better flow ability. Increasing fish meal did not influence angle of repose. These data confirm that greater flow ability is observed with granulated or coarser lactose or specialty protein sources.

Key Words: Lactose, Flow ability, Specialty protein

286 Inhibition of methanogenesis in free living vs. protozoa-associated ruminal methanogens.

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Compounds designed to inhibit 4-(β-D-ribofuranosyl)aminobenzene-5′-phosphate synthase should decrease methane production in ruminal cultures. Some methanogens may be resistant to inhibition because of their association with ruminal protozoa. The objectives were to determine whether: 1) para-aminobenzoate analogs can eliminate ruminal methanogenesis in vitro; and 2) protozoa-associated methanogens differ in sensitivity to these compounds compared to free living methanogens. In experiment 1, cultures inoculated with total ruminal fluid were incubated anaerobically at 37 C for 22 h with increasing concentrations (0 to 5.0 mM) of two potential methanogenesis inhibitors (compounds X and Y; n = 4/dose). Methane concentrations in the headspace were determined by gas chromatography. In experiment 2, cultures were inoculated with either protozoa-associated methanogens (obtained by centrifugation) or with free living methanogens (600 x g ruminal fluid supernate). In quadruplicate, each type of culture was treated with a 1.0 mM concentration of each compound. In cultures inoculated with total ruminal fluid, compound X decreased ($P < 0.05$) methane production by 56, 85, 92, and 100% at concentrations of 0.5, 1.0, 2.5, and 5.0 mM, respectively. Compound Y decreased ($P < 0.05$) methane production by 19, 99 and 99% at concentrations of 0.1, 1.0 and 2.5 mM, respectively. Compounds X and Y decreased ($P < 0.05$) methane production by protozoa-associated methanogens (86 and 99%, respectively)