

ENVIRONMENT AND LIVESTOCK PRODUCTION

18 Use of Florfenicol or Oxytetracycline for treatment of ovine foot rot. S. VanDyke*, J. A. Daniel, S. W. Sterle, B. Holmberg, and D. H. Keisler, *University of Missouri-Columbia*.

Ovine virulent foot rot is a costly source of production loss caused by the bacteria *Fusobacterium necrophorum* and *Dichelobacter nodosus*. In the U.S. sheep industry it is recognized that there are various methods of treating foot rot with varying levels of efficacy. In this study the effectiveness of the antibiotic Florfenicol was compared with Oxytetracycline, a proven therapy for foot rot. Both of these antibiotics combat gram negative bacteria. At time=0, 262 sheep 1 to 5 years of age received routine foot trimming and then were randomly assigned to one of three treatments as follows: no antibiotic (C; n=87), 20 mg/kg body weight im injection of Florfenicol (Flor; n=87), or 20 mg/kg body weight im injection of Oxytetracycline (Oxy; n=88). Treatments were given as a single injection to respective sheep on weeks 2 and 3. Feet were scored by the Egerton and Roberts (1971) method during weeks 1, 2, 3, 4, and 7 by two independent evaluators. A scale of 0 to 4 was used with 0 denoting no foot rot and 4 denoting excessive foot rot. At time 0 mean foot rot score among all sheep was 2.05±.05. Data were analyzed using the GLM procedures for SAS. Means separation procedures were performed using a Student-Newman-Keuls test where appropriate. Mean foot rot score improved significantly among sheep treated with Flor or Oxy vs. C (P<.01). No difference in foot rot score existed between sheep treated with Flor or Oxy. Mean foot rot scores were significantly lower following the second injection than the first. On week 7 of the trial, average foot rot scores were 0.69±.06, .59±.06, and 1.69±.09 for Flor, Oxy, and C respectively. We suggest these data provide evidence that Flor and Oxy equally reduced the severity of foot rot and the improved condition of the foot persisted in Flor and Oxy vs C for at least 6 weeks.

Key Words: Foot Rot, Oxytetracycline, Florfenicol

19 Age of calves at weaning effects cow and calf performance and calf carcass characteristics at slaughter. C. E. Story*, R. Rasby, D. Brink, and R. Stock, *University of Nebraska-Lincoln*.

Time of weaning is a management practice used by beef producers to improve herd reproductive performance, or reduce cow nutrient requirements during drought conditions. Beef producers can adjust time of weaning to influence profitability of the cow/calf enterprise, but there is little information about its resulting effects on cow and calf performance. Over a 4 year period spring calving cows were randomly assigned by age, weight, body condition score (BCS), and calving date to the following three weaning groups to evaluate the effect of calf weaning age on cow and calf performance: early (n 60, calf age 5 months, EW); control (n 60, calf age 7 months, C); and late (n 60, calf age 9 months, LW). Groups were fed to achieve a BCS of 5 (1 emaciated; 9 obese) prior to calving. Each year after calving, groups were reassigned to weaning treatments in this completely randomized carry-over design experiment. Cow BCS and weights at the time of the last weaning were different (P < .05): 5.8, 581 ± 3.5 kg; 5.5, 553 ± 3.5 kg; and 5.2, 540 ± 3.5 kg; for EW, C and LW, respectively. Prior to calving, BCS was different (p < .01): EW 5.6, C 5.4, and LW 5.2. Conception rate among treatments was not different (P > .05) and averaged 92%, 94%, and 96% for EW, C, and LW, respectively. Calves were fed until average back fat for the pen was estimated to be .4 inches. Days on feed for groups was different (P < .0001): EW 243 days, C 200 days, and LW 159 days. Feedlot average daily gain (kg/day) differed (P < .01) among groups and averaged 1.50 for LW calves, 1.41 for C calves, and 1.35 for EW calves. Hot carcass weight was greater (P < .01) for EW (325 kg) and C (326 kg) groups compared to the LW (315 kg) group. Yield grade differed among treatments (P < .05) and was 2.78, 2.59, and 2.42 for EW, C, and LW, respectively. Quality grade of at least choice was 94%, 84%, and 77% for EW, C, and LW treatment groups, respectively. Weaning time effects cow weight and body condition, calf performance and carcass characteristics.

Key Words: Weaning, Cow and Calf Performance, Carcass Characteristics

20 Effects of yeast culture inclusion in *ad libitum* trace mineralized salt on cow and calf performance. G. R. Wehner¹, L. Brokaw*¹, J. E. Garrett², and J. Zidon², ¹ *Truman State University, Kirksville, MO*, ² *Diamond V, Cedar Rapids, IA*.

Thirty cow-calf pairs were assigned to one of two treatments (yeast or control) with 3 replicates by initial cow weight (COWW), initial calf weight (CW) and calf sex. COWW and CW were obtained every 28 days for 84 days. Cow body condition scores (BCS) were evaluated at the start and end of the trial. Yeast culture (Diamond V XP) was included in *ad libitum* trace mineralized salt to deliver an average of 28.3g./hd/day of yeast and control cows received only the Vigortone 32-s mineral mix. Pairs were rotationally grazed every 7 days on mixed pastures within treatment groups for the duration of the trial. Calves were creep fed a pelleted supplement (12%CP-68%TDN) starting 14 days into the second period until the end of the trial. Yeast cows gained 15 kg. (P<.08) more than controls in period 1 but lost 19.1 kg. more weight (P<.02) in period 2. Weight loss (average 5 kg.) was not different (P>.36) for period 3. Weight loss in treatment cows was probably due to greater milk production (MP) as compared to controls. Yeast group calves gained 3.2 kg. more than controls (P>.3) during the trial. Control calves compensated for lower cow MP by consuming 40% more creep than yeast group calves. Treatment cows maintained higher BCS (P<.05) than control cows. Yeast inclusion tended to increase MP and maintain calf gains while sparing creep feed.

Key Words: Yeast Culture, Mineral Inclusion, Cow-Calf Performance

21 Health of growing and finishing steers: Effects on performance, carcass traits, and meat tenderness. B. A. Gardner*¹, H. G. Dolezal¹, L. K. Bryant², F. N. Owens¹, J. L. Nelson¹, B. R. Schutte¹, and R. A. Smith¹, ¹ *Oklahoma State University, Stillwater*; ² *Great Plains Veterinary Education Center, Clay Center, NE*.

Steer calves (n = 204) were used to evaluate effects of respiratory disease during a 150-d finishing period on daily gain, carcass trait, and longissimus tenderness. Steers were monitored daily for clinical signs of respiratory infection and medicated as needed. At harvest, lungs were evaluated for bronchopneumonia lesions in the anterioventral lung lobes (AVBP lesions) and lymph gland activity (non-active vs. active), as an indicator of lesion age. Lung lesions were present in 33% of all lungs but were equally distributed between medicated (37%) and non-medicated groups (29%). Steers that were either medicated (n = 102) or had AVBP lesions (n = 68) had reduced (P < .05) final live weights, ADG, carcass weights (HCW), less external and internal fat, and more desirable YG. Classification by lesion age revealed that steers with lesions (n = 87), regardless of lymph gland activity, and those with active lesions (n = 9) had lower (P < .05) daily gains, lighter HCW, less internal fat, and lower marbling scores than steers without or steers with non-active lesions, respectively. Morbid steers, regardless of classification system, yielded more U.S. Standard carcasses than "non-sick" steers. No differences (P >.10) in longissimus shear force (WBS) values were evident, except that steaks from steers without lesions aged 7 d tended (P = .05) to have lower WBS values than steaks from steers with lesions. Overall, morbidity suppressed daily gains and carcass quality (increased the percentage of U.S. Standard) but improved YG as compared to "non-sick" steers. Classification of lung lesions by lesion age was more predictive of production, carcass trait, and meat tenderness differences than ante-mortem health evaluations.

Key Words: Morbidity, Performance, Carcass Traits

22 Effects of implants on performance of steers dry-wintered on native tallgrass prairie. S. I. Paisley*¹, G. W. Horn¹, C. J. Ackerman¹, and D. S. Secrist², ¹Oklahoma State University, Stillwater, ²Farmland Industries, Inc..

Three hundred crossbred steers (184 ± 25 kg) were used in a 164-d trial to determine the effects of various implants on weight gain of steers wintered on tallgrass prairie. Steers were weighed October 16, 1996 and received either no implant (control) or Synovex-C, Synovex-S or Revalor-G implant. Steers were equally divided between two dormant tallgrass prairie pastures and received 1.36 kg/d of a 25% CP supplement that supplied 100 mg monensin/steer. Intermediate weights were taken January 9, 1997, with final weights taken on March 29, 1997. Data were analyzed as a randomized complete block design with pasture used as a blocking factor. Treatment sums of squares were separated using non-orthogonal contrasts comparing implant effects. Overall daily gains averaged .28, .32, .32 or .35 kg/d, respectively for control, Synovex-C, Synovex-S or Revalor-G implanted steers. Daily gains were superior ($P < .01$) for implanted steers compared with controls. Although daily gains were below .45 kg/d, the improved performance resulted in increased weight gains ($P < .01$) of implanted steers vs. controls. The increased weight gains increased estimated gross returns/steer by \$12 to \$21. Following the winter grazing trial, all steers were re-implanted with Ralgro and grazed a common native tallgrass prairie pasture. They were re-weighed on July 18, 1997 to determine if winter implant treatment had a carryover effect on summer weight gains. Weight gains were similar ($1.05 \pm .02$ kg/d; $P > .66$) from March 29 to July 18. At the completion of the summer grazing period, steers implanted during the winter grazing period maintained their weight advantage ($P < .01$) over non-implanted control steers, despite similar management during the summer phase. The results of this trial indicate that growing cattle on low rates of gain in winter grazing programs will respond to exogenous hormones, gaining more weight than non-implanted controls. This increased weight is maintained through the summer grazing season.

Key Words: Beef Cattle, Implant, Grazing

23 Factors affecting performance of early-weaned, lightweight calves grazing winter wheat pasture. S. I. Paisley, C. J. Ackerman, H. T. Purvis II*, and G. W. Horn, Oklahoma State University, Stillwater.

Forty fall born Angus X Hereford steers and heifers (102 ± 4.6 kg) weaned at approximately 73 d of age were used to determine if lightweight calf performance during the initial period of wheat pasture grazing is more closely related to calf size or to forage intake adaptation regardless of size. Calves were randomly assigned to one of two receiving period lengths, 15 d (LIGHT) or 35 d (HEAVY), in order to create two weight groups among calves with similar background and growth potential prior to grazing wheat. Calves were weighed approximately every 14 d to characterize performance changes throughout the grazing period. Weights and daily gains were analyzed as a completely randomized design with weight group (HEAVY or LIGHT), the only independent variable. Forage intake after 20 d and 70 d of grazing wheat pasture was measured using a subset of 10 calves from each weight group. Forage intake data were analyzed as a repeated measures design using calf(weight group) as the error term to test weight group effects. Initial calf age and weight were similar ($P = .91$ and $P = .93$, respectively) prior to receiving period. By adjusting receiving period length, starting weight on wheat pasture was different (114 vs 136 kg; $P < .01$) for LIGHT and HEAVY groups. During the first 20 d of grazing wheat, LIGHT calves had higher (.84 vs .22 kg/d; $P < .01$) daily gains than HEAVY calves. Daily gains from 20 to 70 d on wheat were similar (.82 vs .86 kg/d; $P = .50$) for LIGHT and HEAVY groups. Forage OM intake was similar (4.47 vs 4.50 kg/d; $P = .90$) for LIGHT and HEAVY groups. However, when intake was expressed as %BW, LIGHT calves consumed more forage (2.84 vs 2.56%; $P < .01$) relative to calf weight. Forage OM intake was lower ($P < .01$) during the first 20 d of wheat pasture grazing compared to 70-d intakes (3.78 vs 5.18 kg/d). The results of this trial suggest that initial performance of early-weaned, lightweight calves grazing winter wheat is influenced by a forage intake adaptation response independent of calf weight.

Key Words: Cattle, Early Weaning, Wheat Pasture

24 Factors associated with low subsequent litter size on commercial swine farms using short lactation. Y. Koketsu* and G. D. Dial, University of Minnesota, St. Paul.

Sixteen farms having an average lactation length between 14.9 and 18.9 d were selected. Data contained 9,162 subsequent litter size records abstracted from the PigCHAMP production information system files and lactation feed intake records. The two 2-way interactions between the effects of parity and lactation length, and parity and weaning-to-conception interval on subsequent litter size were found ($P < .05$) in the same statistical model using the GLM of SAS. Subsequent litter size responded differently to lactation length changes and weaning-to-conception interval depending on parity. Subsequent litter size did not increase in parities 1 and 2 as lactation length increased ($P > .10$), while subsequent litter size in parity 3-6 sows increased ($P < .05$). In only parity 1, sows with weaning-to-conception interval 6-12 d produced .5 fewer pigs at subsequent farrowing ($P < .05$) than those with weaning-to-conception interval 1-5 d. However, in multiparous sows, no difference in subsequent litter size was found ($P > .10$) between weaning-to-conception interval 1-5 and 6-12 d groups. Sows with a low lactation feed intake (≤ 4.2 kg/d) produced smaller subsequent litters ($P < .05$) than those with > 4.2 kg/d feed intake. Our findings suggest considering parity and lactation feed intake to minimize the negative effects of short lactation length on subsequent litter size.

Key Words: Sows, Litter Size, Lactation Duration

25 Weaned sows treated with PG600® during winter months. R. O. Bates*, J. Kelpinski, and B. Hines, Michigan State University, East Lansing, MI.

Gilts administered PG600 near the onset of puberty have been reported to have an increased ovulation rate. It was hypothesized that sows which return to estrus within seven days after weaning may have increased ovulation rate and subsequent litter size when treated with PG600 at weaning. A field study was completed that evaluated sows, weaned during late fall and winter months, and treated with PG600 at weaning. During November, 1996 through February, 1997, 1,030 sows across five commercial farms were used for this study. Within farm weekly weaning groups, sows were blocked by parity (1, 2 and 3-6) and length of lactation (less than 16 days and more than 15 days) and randomly allocated to be either a non-treated control or treated with PG600. Subsequent return to estrus and farrowing data were collected to determine response. Parity 2 sows weaned after 15 days of age and treated with PG600 were more likely ($P < 0.09$) to express estrus than all other treatment categories. A similar trend was observed for farrowing rate among parity 3-6 sows ($P < 0.02$). Among parity 1 sows, those treated with PG600 had lower (15.9 vs 16.6 kg, $P < 0.05$) subsequent litter birth weights than control sows. Among parity 3-6 sows there was a treatment by lactation length interaction ($P < 0.07$). Sows weaned before 16 days and treated with PG600 had more total pigs born at subsequent farrowing than those weaned before 16 days and not treated (11.5 vs 9.9, $P < 0.06$). No difference was determined among treatment groups for sows weaned after 15 days of age. However subsequent number born dead also increased among parity 3-6 sows treated with PG600 (.49 vs .34, $P < 0.09$) when compared to controls. Treatment with PG600 at weaning did improve subsequent return to estrus among parity 2 sows and subsequent farrowing rate among parity 3-6 sows when weaned after 15 days of lactation. However among parity 3-6 sows weaned before 16 days of lactation, subsequent litter size was improved when treated with PG600 at weaning.

Key Words: Pig, Reproduction, Hormonal Therapy

26 A Comparison of Different Grazing Systems Using the Grazing Response Index. G. Poe and K. R. Ekberg*, *San Juan/Rio Grand U.S. National Forest, Del Norte, CO.*

In assessing grazing systems an efficient tool is needed to monitor the land and its response to livestock use. The objective of this study was to determine if the Grazing Response Index (GRI), is a reliable indicator of range condition, and could be used to make range management decisions. The GRI system has three key components; 1) Frequency, the number of times forage plants are defoliated during the grazing period; 2) Intensity, the amount of leaf material removed during the grazing period; and 3) Opportunity, the amount of time plants have to grow or re-grow after grazing. The GRI was evaluated on three grazing systems within the San Juan/Rio Grande Forest Service Divide Ranger District in Colorado. From the results of this evaluation we concluded that the usefulness of the GRI system is limited. Potential concerns in using this system to make range management decisions include: forage availability predictions without considering specific plant species and disregard for unforeseen management decisions influenced by the environment such as snow, drought etc. In conclusion the GRI system does evaluate range condition, but due to its limitations should be used in conjunction with a visual appraisal to make management decisions.

Key Words: Range Management, Monitoring, GRI

27 Evaluation of grower-finisher feeders: production and behavior. H. W. Gonyou* and Z. Lou, *Prairie Swine Centre, Inc., Saskatoon, Canada.*

Twelve feeders were included in a study of the effects of feeder design on productivity and eating behavior of grower-finisher pigs. The feeders were classified according to the number feeding spaces and availability of water as: single-space, dry (2 feeders); single-space, wet/dry (3); multiple-space, dry (4); and, multiple-space, wet/dry (3). Four pens of 12 pigs were fed from each model of feeder from 25 to 105 kg BW. The pigs were fed a mash diet based on wheat and barley. Data for production variables were collected at 2-wk intervals throughout the trial. Carcass lean was determined at the time of slaughter when pigs weighed between 100 and 110 kg. Behavior observations were made by videotaping each pen for 24 hr during weeks 3-4 and 8-9. Time budgets for eating behavior and use of feeder holes were determined by instantaneous sampling at 10 min intervals. Frequency of entrances into the feeder was determined by 10 min of continuous observation each hour. There were no differences in the ADFI, ADG or FE between pigs fed from single-space and multiple-space feeders. Pigs fed from wet/dry feeders consumed more feed (2.82 vs. 2.66 kg/d; $p < .01$) and grew more rapidly (.92 vs. .87 kg/d; $p < .02$) than did pigs fed from dry feeders, but feed efficiencies were similar (.327). Pigs fed from wet/dry feeders yielded less percent lean (56.3 vs. 57.0; $p < .05$) than did those fed from dry feeders. Decreasing the number of feeder spaces from two to one resulted in pigs spending less time eating (84 vs. 98 min/d; $p < .01$), a higher occupancy rate for feeder holes (68 vs 39%; $p < .01$), but no difference in the frequency of entrances (ave. 43 entrances/d). Pigs fed from wet/dry feeders spent less time eating (86 vs. 104 min/d; $p < .01$) and entered the feeder less often (37 vs. 60 entrances/d; $p < .01$) than did those fed from dry feeders.

Key Words: Pigs, Feeders, Behavior

28 A study of behavioral and physiological responses of pigs to student handlers. M. Gemus* and A. J. Zanella, *Michigan State University, East Lansing.*

While there are many factors which contribute to the successful handling of pigs, research has shown that negative human interaction toward pigs adversely affects the animal's behavior and physiological responses. Understanding human characteristics that influence both the behavior and productivity of pigs, may be important to the pig producer when selecting employees as a stockperson. The purpose of this study was to qualitatively evaluate human characteristics and behavior that improve pig handling. University students completed a survey containing an instrument assessing interpersonal skills (self-esteem), demographics and exposure to livestock production. Students ($n=32$), matched based on esteem score, gender and experience, moved 3 pigs, through a circuit with obstacles designed to incorporate common features found in pig handling facilities. Video recordings and observers provided information on time in the circuit, human-pig interaction and pig behavior. Salivary cortisol was monitored in the pigs and handlers before and after handling. Cortisol was measured by radioimmunoassay. Statistical analyses were performed using linear regression models (SAS) for dependent variables time and cortisol. Humans used eight categories of behaviors and pigs responded using 12 categories of behavior. Human behavior including bumping vocalizing and slapping were associated with less time in the circuit ($p \leq 0.10$), while both slapping ($p \leq 0.10$) and slapping the head ($p \leq 0.05$) were associated with a higher increase in salivary cortisol. Pig response such as escape significantly increased both time in the circuit ($p \leq 0.01$) and salivary cortisol ($p \leq 0.05$). Time in the circuit and a stress indicator, such as salivary cortisol levels, were affected by the qualitative nature of the human-pig interaction.

Key Words: Pig Behavior, Handling, Cortisol

29 Birth order, weight and interval have no apparent effect on teat order. M. F. Haussmann*, D. C. Lay, Jr., N. J. Biensen, S. P. Ford, M. J. Daniels, and L. L. Christian, *Iowa State University, Ames.*

Nursing bouts in swine are characterized by piglets forming a strong attachment to a specific teat during the first week of life. It is commonly accepted that larger pigs occupy the anterior teats; however, this correlation is weak (-.16). Teat order is important because the more anterior teats have been associated with greater milk production and greater piglet weight gain. Previous research has shown that piglets will suckle from a specific teat 95% of the time after one week of age. This study was designed to examine the relationship between birth order, interpiglet birth interval, birth weight and placental weight on teat order at one week of age. Nine Yorkshire sows and five Landrace sows were observed during farrowing, and data were collected from a total of 160 piglets. The 8-d litter size was $11.43 \pm .61$. Upon birth, birth weight, interpiglet birth intervals, and placenta weights were recorded and piglets were ear-notched according to birth order. At $8 \pm .5$ d of age piglets were marked with their birth order on their hindquarter (for easier identification), and two to three suckling bouts were observed for each litter. The teat on which the piglet suckled was recorded, and any cross suckling was also documented. Piglets consistently suckled from the same teat during these observations ($r = .94$, $P < .0001$). To conduct analysis the teats were categorized as anterior, medial, or posterior. Piglets birth weight averaged $1,447.7 \pm 21.6$ gm and interpiglet birth interval averaged $12.5 \pm .9$ min. Birth order, weight and interpiglet birth interval did not affect teat order ($P > .10$), nor was teat order affected by placental weight or birth weight:placental weight ratio ($P > .10$). Possibly, inherent differences in piglet temperament and hunger drive established the degree of competition, which in turn, affect teat order. Examination of individual behavioral differences may be more conclusive.

Key Words: Teat Order, Birth Order, Swine

30 Effect of drinker design on growing-finishing pig performance and water use. M.C. Brumm* and J. M. Heemstra, *University of Nebraska, Concord.*

An experiment was conducted using 240 single source crossbred, mixed sex feeder pigs of PIC genetic origin to determine the effect of drinker type on pig performance and water use from purchase (17 kg BW) to slaughter (114.5 kg BW). Experimental treatments consisted of either one stainless steel drinking bowl (B) located over the slatted portion of a partially slatted pen with the bowl lip adjusted to 25.4 cm above the floor for the duration of the experiment or one paired set of nipple drinkers (S) suspended in the approximate middle of a partially slatted pen from the ceiling via a chain and adjusted as necessary to maintain 5 cm distance above the back of the pigs in the pen to the bottom of the suspended drinkers. Each pen of 20 pigs was provided with a 4-hole self feeder. At arrival, pigs were blocked by arrival weight and sex and randomly allocated within sex and weight outcome groups to the experimental, mixed sex pens. Diets based on corn and soybean meal in meal form containing 5% added fat were formulated to contain 1.08%, 1.00%, .95%, and .74% lysine for pens of pigs weighing 17 to 36 kg, 36 to 59 kg, 59 to 86 kg, and 85 kg to slaughter, respectively. Pigs were housed in duplicate (six pens per facility) mechanically ventilated, partially slatted facilities. Sprinklers were used for summer heat relief. There was no effect ($P > .1$) of drinker type on ADG for the B vs S drinkers (.820 vs .831 kg/d, respectively). However, pigs on B had a lower ($P < .01$) overall daily feed intake than S (2.043 vs 2.118 kg/d), resulting in an improved ($P = .09$) gain:feed (.401 vs .392) for the overall experiment. Total water use was reduced 24% for the B vs S drinkers (3.8 vs 5.0 l/pig/day; $P < .1$). These results suggest total water use by growing-finishing pigs is impacted by drinker design, and reductions in total water use associated with B vs S in this experiment resulted in an improved feed conversion efficiency. These results also suggest that design considerations for estimating total water needs for growing-finishing pigs for purposes of planning new construction need to include consideration of the water delivery devices to be installed in the facilities.

Key Words: Pigs, Water

31 Effects of heat stress versus manual restriction of feed intake on performance of finishing swine. T. M. Brown-Brandt*¹, J. A. Nienaber², L. W. Turner¹, and J. T. Yen², ¹*Univ. of Kentucky, Lexington*, ²*R. L. Hruska U.S. Meat Animal Research Center, Clay Center, NE.*

The effects of heat stress are well documented: reduced intake, reduced growth, and occasional reduced feed efficiency. In recent years, producers and researchers alike have noted the increased susceptibility of high-lean growth swine to heat stress. A study was developed to look at the effects of heat-stress-induced feed restriction versus similar feed restriction in thermoneutral conditions on growth performance for high-lean growth finishing barrows. Sixty Large White x Landrace finishing pigs (65.2 +/- 0.5 kg) were randomly assigned to one of five treatments (two replications). The five treatments included: control (*ad libitum* feeding, thermoneutral temperature, 18° C (TN)), 13% HS (13 % feed restriction induced by an increased temperature, fed a diet with 13% more ideal protein), 13% TN (fed the same amount of the same diet as the 13% HS, consumed in two separate meals, but housed in TN), 26% HS (26 % feed restriction induced by an increased temperature, fed a diet with 26% more ideal protein), and 26% TN (fed the same amount of the same diet as the 26% HS, consumed in two separate meals, but housed in TN). Ten additional animals were slaughtered at the onset of the experiment to measure initial body composition. Animals were slaughtered when the average treatment weight reached 107.5 kg. Actual feed restrictions were 18.7% and 25.4% reduced from controls. Daily feed intake (FI), weekly weights(WT), and bi-monthly backfats (BF) were taken. Neither FI nor WT were different between the respective HS and TN treatments ($P > 0.01$). BF taken at the 10th rib by ultrasound revealed significant differences in both the 13% HS vs. 13% TN and the 26% HS vs. 26% TN ($P < 0.05$). It was concluded that compared to feed restriction at TN, heat stress does not affect growth rate but may have affected carcass composition.

Key Words: Pigs, Environment, Growth Rate

32 The effect of feeding monensin in a mineral mixture to steers grazing native grass. F. Brazle*, *Kansas State University, Manhattan.*

Four hundred sixty-nine crossbred steers were allotted randomly to two treatments over a two year period using 14 pastures of approximately 32 hectares. Pasture treatments were: 1) Monensin added to a mineral mixture at 1,620 g/909 kg and 2) control (no Monensin) in same mineral mixture. The steers were grazed on Flint Hills native grass (big bluestem, little bluestem, Indian and switch grass) for an average of 90 d and were weighed individually early in the morning at the start and finish of the study.

Results

Items	Monensin	Control	SE
No. pastures	7	7	
No. steers	229	240	
Starting wt, kg	251	248	3.876
ADG, kg	1.21 ^a	1.12 ^b	.029
Mineral intake, kg	.095 ^a	.150 ^b	.009
Monensin intake, mg/d	169	—	

^{a,b}Means in the same row with unlike superscripts are different ($P < .05$).

The steers receiving the Monensin in the mineral mixtures gained more ($P < .05$) and had lower mineral intake ($P < .05$) compared to the control steers. The cost of the mineral mixtures with Monensin added would be less per animal in this study than the control mineral mixture because of the reduced intake. Few times does it occur that a feed additive will reduce cost per animal and increase animal gains. In this study, adding Monensin to a mineral mixture more than compensated for any loss gain due to lower mineral intake by steers grazing native grass.

Key Words: Monensin, Mineral, Native Grass

33 Evaluation of condition scoring of feeder calves as a tool for management and nutrition. D. D. Loy*, S. Greiner, G. H. Rouse, and D. Maxwell, *Iowa State University, Ames.*

Two experiments were conducted to evaluate the effects of body condition scores of beef calves on performance, efficiency and carcass characteristics. In experiment 1, 111 steer calves were stratified by breed and condition score (CS) and randomly allotted to 14 pens. The study was analyzed as a 2 by 3 factorial design, with two breeds (Angus and Simmental) and 3 initial CS (4.4, 5.1 and 5.6). In experiment 2, 76 steer calves were allotted to six pens by CS. The resultant pens averaged 3.9, 4.5, 4.7, 5.0, 5.1 and 5.6 for CS. Calves in both studies were fed a corn based finishing diet formulated to 13.5% crude protein. All calves were implanted with Synovex-S initially and reimplanted with Revalor-S. In experiment 1, 29-day dry matter intake (kg/day) increased with condition score (8.1, 8.3 and 8.6) for CS 4.4, 5.1 and 5.6, respectively; $p < .04$). Daily gain (29 d) tended to decrease with increasing condition scores (1.90, 1.69 and 1.48 kg; $p < .13$). Days on feed decreased with CS (185, 180 and 178d; $p < .07$). In experiment 2, daily gains also increased with decreasing initial condition score for the first 114 days ($p < .05$) and tended to increase overall ($p < .20$). In experiment 1, calves with lower initial condition scores had less external fatness at slaughter (1.22, 1.35 and 1.55 cm for CS 4.4, 5.1 and 5.6, respectively; $p < .05$). This effect was also noted at slaughter ($p < .10$), as well as at 57 days ($p < .06$) and at 148 days ($p < .06$) as measured by real-time ultrasound. Measurements of intramuscular fat and marbling were not different in either study. These data suggest that condition scoring of feeder calves may be a useful tool for adjusting energy requirements of calves based on body condition. Also potential for earlier sorting of feeder cattle into outcome or management groups may be possible, using body condition and/or real-time ultrasound, than is currently practiced.

Key Words: Condition Scoring, Steers

34 Revalor[®]-G as an Initial Implant on Feedlot Performance and Carcass Merit. J. M. Heemstra*¹, T. L. Mader¹, R. T. Brandt, Jr.², and G. E. Sides², ¹University of Nebraska, Concord, ²Hoechst Roussel Vet, Warren, NJ.

Three hundred thirty-six English crossbred steers (324 kg) were used to measure the effects of reimplanting with three different initial implants versus single implant programs. Seven pen replicates were assigned to each of six treatments: 1) nonimplanted control, 2) implanted with Revalor[®]-S at day 0, 3) implanted with Revalor-S at day 66, 4) implanted with Revalor[®]-G at day 0, reimplanted with Revalor-S at day 66, 5) implanted with Synovex[®]-S at day 0, reimplanted with Revalor-S at day 66, and 6) implanted with Ralgro[®] at day 0, reimplanted with Revalor-S at day 66. Four replicates were fed for 173 days, while the other three replicates were fed 155 days. Over the entire study, implanted steers gained faster and more efficiently ($P < .10$) than nonimplanted control steers. Steers implanted initially with Revalor-G or Synovex-S gained faster ($P < .10$) than steers implanted only once. Of the three reimplant treatments, only those initially implanted with Revalor-G had improved feed efficiency ($P < .10$) compared with single-implanted steers. Compared to nonimplanted controls, marbling score was reduced ($P < .10$) when Synovex-S or Ralgro were used as initial implants, although cattle in all treatment groups graded between 78% and 92% choice and prime. Results from this study indicate that Revalor-G can be effectively utilized as an initial feedlot implant to maintain rate and efficiency of growth, with minimal impact on marbling and quality grade.

Key Words: Beef Cattle, Implant, Steers

35 Treatment of dilute swine waste utilizing the Zebra mussel (*Dreissena polymorpha*). R. W. Steffen*, T. A. Winters, R. G. Dado, M. A. Albers, and B. N. Jacobson, Southern Illinois University, Carbondale.

The handling and disposal of livestock wastes has recently become more problematic due to new regulations and decreasing tolerance by the public sector. Zebra mussels have been shown to be able to remove turbidity from activated sewage sludge. The objective of this study was to determine if Zebra mussels could be utilized in the treatment of swine waste. Prior tests determined that mussels tolerated only dilute mixtures of waste. Manure was drawn from the pit under a nursery building and mixed with de-chlorinated water. Initial experiments utilized glass jars filled with 850 mL of 0, 0.25, 0.5, 0.75 and 1 percent manure by volume. Mussels were added to half of the jars in each group. The containers were aerated to provide adequate oxygen for the mussels. Samples were drawn from the containers at 0, 24, 48, 72, 144 and 216 hours and evaluated for turbidity, chemical oxygen demand (COD) ammonia, total nitrogen, total phosphorus and pH. Significant reductions ($p < 0.05$) in turbidity were achieved in the 0.5, 0.75 and 1% mixtures (94, 92 and 96% respectively) within 48 hours. Most of the reduction occurring in the first 24 hours (83, 79 and 77 % respectively). COD ($p < 0.05$) followed a similar pattern with 48 hour reductions of 83 (0.5% mixture), 86 (0.75% mixture) and 88% (1% mixture) with 24 hour levels at 80, 78 and 80% respectively. Significant differences ($p < 0.05$) in COD and turbidity levels in the containers with mussels compared to the containers without mussels were observed in the 0.5, 0.75 and 1% mixtures. The Zebra mussels also had an effect on the levels of ammonia, nitrogen, phosphorous and pH. These observations indicate that the Zebra mussel may provide an additional tool in the treatment of swine waste. This research was supported by the Illinois Council on Food and Agricultural Research and the National Pork Producers Council.

Key Words: Swine Waste, Zebra Mussel, Livestock Waste Treatment

36 Segregated early weaning of outdoor-farrowed pigs. M. S. Honeyman, A. D. Penner*, and W. B. Roush, Iowa State University, Ames.

The effects of segregated early weaning (SEW) of outdoor-farrowed pigs were observed during 1995 and 1996 at the ISU Western Research Farm, Castana, IA. The study started when the pigs were two wk old and continued for seven wk. Litters were randomly assigned to treatments when a sufficient number had farrowed within a 5 to 10 d period. The SEW pigs (8 litters/yr.; 70-75 pigs) were weaned at two wk of age, and moved to an off-site nursery until 9 wk of age. The SEW pigs were given water medicated with Sol-met for the first 7 d, feed medicated with carbadox while in the nursery, and an injection of Naxcel (1995 only). The conventionally-weaned (CW) pigs (8 litters/yr.) remained on pasture with the sows until they were weaned at 5 wk of age. They were then moved to an on-site open front shelter with a concrete floor and bedding. They remained there for four wk, until the end of the trial. All pigs were weighed at the beginning and end of the trial and at five wk of age. Feed intake, average daily gain, and feed efficiency (FE), were calculated. At the beginning of the trial the age and weights of all pigs were similar. In 1995, at 9 wk of age, SEW pigs were 1.85 kg heavier than the CW pigs, (24.53 vs 22.68 kg; $P < .01$). But in 1996, the SEW pigs were 1.07 kg lighter than the CW pigs (27.63 vs 26.56 kg; $P < .07$). Both years, about 3% of the CW pigs died (2-9 wk of age). Mortality of the SEW pigs was 0 in 1995 and 1.3% in 1996. In 1995, for 5-9 wk of age the SEW pigs ate more feed (1,077 vs 923 g/d ADFI), grew faster (425 vs 384 \pm 9 g/d ADG); $P < .001$) and were more efficient (483 vs 443 g gain/kg feed) than the CW pigs. However in 1996, ADFI was similar (1,084 vs 1,073 g/d) ADG was less (464 vs 487 \pm 9 g/d; $P < .03$) and efficiency was similar (554 vs 557 g gain/kg feed) for the SEW pigs compared to CW pigs, respectively. Overall, 12.4% of the SEW pigs weighed less than one SD below the mean weight compared to 17.1% of CW pigs. Early weaning of outdoor farrowed pigs improves pig uniformity, decreases mortality and may improve performance. Cost effectiveness of SEW needs careful examination.

Key Words: Swine, Early Weaning, Outdoor Farrowing

37 The effect of supplemental bovine serum protein to newborn beef calves at two commercial Kansas ranches. J. D. Arthington* and J. C. Hauptert, American Protein Corporation, Ames, Iowa.

The effect of USDA food-grade bovine serum protein (LifeLine[®]) as a supplement to colostrum in newborn beef calves was investigated at two commercial Kansas beef ranches. Spring calves were collected at birth and administered either 45 g of serum globulin protein via Life-Line or 0 g of globulin protein via powdered calf milk replacer (Control) in alternating birth order. Treatments were blinded to the ranchers and investigators. Calves at location one ($n = 146$) were large framed Angus X Simmental while calves at location two ($n = 448$) were moderate framed Angus X Hereford. Blood samples were collected from a random subpopulation of the calves at both locations ($n = 60$ and 72 calves for location 1 and 2, respectively) for determination of 24h blood immunoglobulin-G (IgG) concentrations via radial immunodiffusion assays. Individual body weights were collected at birth and weaning. No differences were detected in measures of morbidity and mortality, however, overall neonatal calf morbidity was less than 5% for all calves. This was considered exceptionally low for the region and was most likely reflective of this year's mild, dry weather spring weather. Serum IgG concentrations were increased ($P < .05$) in LifeLine calves at location 2 but not location 1 (42.4 and 34.2, and 23.4 and 23.1 mg IgG/mL for LifeLine and Control calves at location 2 and 1, respectively). All of these values are considered adequate for supporting passive immune protection in neonatal calves. Weaning weight and preweaning ADG tended ($P = .09$) to be greater for LifeLine calves at location 1 (298.4 and 289 kg, and 1.13 and 1.09 kg/d for LifeLine and Control calves, respectively), but not location 2 (234.5 and 231.7 kg, and .99 and .98 kg/d for LifeLine and Control calves, respectively). These results suggest that globulin protein derived from bovine serum may influence increases in calf growth performance. The magnitude of this response may be greater in calving seasons that experience greater levels of environmental stress contributing to increased levels of overall morbidity.

Key Words: Calf, Serum Protein, IgG

38 Breeding ewes out of season using MGA or one injection of progesterone. J. A. Daniel*, S. W. Sterle, and D. H. Keisler, *University of Missouri-Columbia*.

Numerous methods have been investigated to induce ewes to breed out of season, however, few producers routinely use these methods. In an attempt to reduce time and labor committed to out of season breeding efforts, mature ewes of mixed breeding were randomly assigned to one of four treatment protocols in April 1997 in Missouri. Treatments consisted of feeding ewes: .3 kg corn twice daily for 7 days prior to ram introduction (control; n=49), .125 mg of MGA in .3 kg corn twice daily for 7 days prior to ram introduction (MGA7; n=46), .3 kg corn twice daily for 6 days followed by 1 day of .5 mg MGA in .3 kg corn at ram introduction (MGA1; n=48), and .3 kg corn twice daily for 7 days and injecting ewes im with 20 mg progesterone solubilized in 2 mL corn oil and 10% benzyl alcohol at ram introduction on day 7 (P; n=47). Ewes were exposed to proven rams for 21 days. At lambing, the number of ewes lambing and the number of lambs born per ewe were recorded and analyzed using the General Linear Model procedures for SAS. Means separation procedures were performed using Student-Newman-Khuel's test where appropriate. Lambing rate was greatest among MGA7 treated ewes (54%; $p < .02$ vs controls), intermediate among P treated ewes (38%; $p < .18$ vs controls) and least among MGA1 and control ewes (15% and 18%, $p > .80$, respectively). Identification of a user friendly and effective method of inducing ewes to breed out of season will enhance producer acceptance and profitability in the sheep industry.

Key Words: MGA, Progesterone, Ewe

39 Contaminated bedding samples cultured on a volume basis. M. T. Gabler*, J. K. Reneau, and R. J. Farnsworth, *University of Minnesota, St. Paul*.

Environmental mastitis is defined as those intramammary infections caused by pathogens whose primary reservoir is the environment in which the cow lives in. Cows are exposed to infectious pathogens at the surface of bedding. Volume is a closer measure of surface area than density due to its units, cm^2 . Cultured bedding samples are used to evaluate the exposure potential of a bedding. Culture counts have been reported on the basis of CFU's per g of bedding. The objective of the study was to determine the most appropriate method of reporting bedding culture counts when comparing different materials. Bedding materials used in the study include two sources of sawdust and two sources of sand. One hundred ml of dry sterilized bedding materials were placed in disposable aluminum pans. Beddings were inoculated with approximately 3.6×10^6 or 2.4×10^7 *Streptococcus uberis* per ml. Not allowing time for replication of bacteria, inoculated pans were washed with sterile saline. A 0.2 ml aliquot of the bedding wash was serially diluted and plated on tryptose agar/5% sheep blood plates. Plates were incubated for 48 hrs at 37°C . Upon completion of the 48-hr, CFU's were counted. Sand was 6 times denser than sawdust. Thus can be interpreted as sand requiring 6 times more material to achieve the same volume as sawdust. Plate counts were statistically transformed. Counts calculated on a volume basis for both data sets were normally distributed, $\text{Pr} < W = 0.06$ and $\text{Pr} < W = 0.29$ respectively. While counts calculated on a density basis were not normally distributed for both data sets, $\text{Pr} < W = 0.02$ and $\text{Pr} < W = 0.01$. Counts on a volume basis were similar, while counts on a density basis were not. Use of filter paper blotting to recover surface counts was also examined. Sand surface area counts averaged 10 times less bacteria recovered per cm^2 than sawdust, 133.1 CFU's/ cm^2 and 1266.2 CFU's/ cm^2 respectively. These results give some insight as to properties that allow sand to perform as a lesser environment for intramammary infectious pathogens.

Key Words: Bedding Cultures