

had received animals from the program. The third group (G3, n=39) had no special training and had received no animals from the program. There was no difference in the overall number of animals reared by the three groups. Many farmers in each group had 2 goats (33% G1, 25% G2, 21% G3) and no pigs (48% G1, 36% G2, 58% G3). Many farmers had less than 10 chickens (19% G1, 58% G2, 64% G3) and only a few members of G1 and G2 had more than 30 chickens. The reasons why chicken were reared differed between groups ($P < 0.05$), as G1 reared chickens mostly for food and income while G2 and G3 reared chicken mostly to meet their basic daily needs. There was no difference in the

reasons for rearing goats and pigs. There was a difference in animal sales among groups ($P < 0.05$), as G1 sold more animals. More members of G1 than G2 or G3 felt that their households consumed enough livestock products ($P < 0.001$). All groups consumed more home grown livestock products than purchased products and reported that livestock rearing had improved their livelihoods. Supporting rural farmers in Kamuli with animals and training in animal management had a positive effect on their livelihoods.

Key Words: livestock, development, livelihoods

Graduate Student Oral Competition-M.S.

75 Relative efficiency of completely randomized and randomized complete block designs in swine growth trials. N. W. Shelton*, S. S. Dritz, M. D. Tokach, R. D. Goodband, J. L. Nelssen, J. M. DeRouchey, and L. W. Murray, *Kansas State University, Manhattan*.

Randomized complete block (RCBD) designs are frequently used in swine growth experiments; however, blocking pigs by uniform BW groups reduces the error degrees of freedom compared to a completely randomized design (CRD). Thus, our objective was to directly compare the efficiency of a CRD and RCBD for detecting differences in performance due to dietary treatments. A total of 256 weanling pigs (6.3 kg BW) were used in a 28-d trial. Two diets were fed with or without growth promoters (antibiotics and zinc oxide). Weaned pigs were allotted to the 2 designs such that each design would have equal mean and variation of BW for all pigs. Pigs assigned to the CRD were allotted so that average BW and within-pen variation of BW were similar between all pens. Pigs in the RCBD were blocked by BW and placed in location blocks. There were 8 replications of each diet in each design and 8 pigs per pen. From d 0 to 28, variation of BW within pen remained the same in the CRD at 20%, but increased from 3 to 10% for the RCBD. Data was analyzed using two statistical models. The first model evaluated dietary treatment and experimental design in a 2×2 factorial and found no interactions between diet and design or differences in pig performance between designs ($P > 0.07$). The second model evaluated each design independently. Growth promoters increased ($P < 0.001$) ADG (387 vs 319 g) and ADFI (526 vs 446 g) and improved ($P < 0.03$) G:F (0.74 vs 0.72) in the CRD and increased ($P < 0.02$) ADG (372 vs 326 g) and ADFI (516 vs 448 g) in the RCBD. Standard errors for the difference were lower for ADG and G:F in the CRD than in the RCBD. The overall σ^2_{error} ratios of the CRD to RCBD were 0.67 for ADG, 1.70 for ADFI, and 0.23 for G:F. When compared with an F-test, these ratios were well below the upper critical limit of 4.6 indicating that blocking was not an effective use of degrees of freedom. Therefore, the greater degrees of freedom for the error term in CRD allow greater power to detect treatment differences.

Key Words: allotment, experimental design, pig

76 Effects of feeding diets containing bacitracin methylene disalicylate (BMD) to heat stressed finishing pigs. R. Song*, D. N. Foster, and G. C. Shurson, *University of Minnesota, St. Paul*.

The objective of this study was to evaluate the effects of heat stress and adding BMD to a diet containing 10% dried distiller's grains with solubles (DDGS) on growth performance, carcass characteristics, physiological parameters, and gut health of pigs. Four groups of 32

mixed sex finishing pigs (n = 128) with initial BW between 80 to 90 kg were used in this study. Pigs were assigned randomly to diets and temperature treatments in a 2×2 factorial arrangement. Pigs were fed a corn-soybean meal based control (CON) or BMD (31.5 ppm) diet and exposed to a constant thermal neutral temperature (23°C) or a cyclical heat stress environment (37°C from 1000 h to 1900 h and 27°C from 1900 h to 1000 h) for 28 days. Each group of pigs was kept in 4 rooms with 2 pens/room and 4 pigs/pen. Saliva samples from each pig were collected on d -1 (initial baseline), d 1, 13, and 27 for cortisol analysis. Haptoglobin (Hp), IL-1 β and TNF- α concentrations were determined in serum collected from one barrow per pen on d -1, 1, 13, and 27. Pigs exposed to heat stress had 31% lower ADG ($P < 0.0001$), 23% lower ADFI ($P < 0.0001$), 9% lower G:F ($P < 0.001$), and 34% higher average daily water intake ($P = 0.03$), compared with pigs housed in the thermal neutral environment. Dietary BMD did not improve growth performance of pigs. Heat stress increased ($P < 0.05$) saliva cortisol in pigs on d 1, but no effects were observed on subsequent days. Serum Hp levels were not different between dietary treatments, but heat-stressed pigs showed a higher ($P < 0.05$) level of Hp on d 1, and levels tended to remain high ($P < 0.1$) on d 13. Pigs fed the BMD diet tended to have greater villus height ($P = 0.07$) and crypt depth ($P = 0.09$) in the duodenum, and greater crypt depth in the jejunum ($P = 0.07$). Pigs housed under heat stress conditions tended to have a lower proportion of propionate ($P = 0.08$), greater acetate:propionate ratio ($P = 0.08$), and a lower proportion of valerate ($P = 0.02$) in the cecum. These results suggest that heat stress reduces pig growth performance and impacts the pig's immune system and gut health.

Key Words: heat stress, finishing pig, antibiotic

77 Effect of chronic exposure of low levels of aflatoxin and deoxynivalenol on growth and immune status of pigs. A. C. Chaytor*, M. T. See¹, J. A. Hansen², A. L. De Souza², T. Middleton³, and S. W. Kim¹, ¹North Carolina State University, Raleigh, ²Murphy-Brown LLC, Rose Hill, NC, ³Ag ProVision LLC, Kenansville, NC.

This study investigated the growth and immune responses of pigs fed diets with low to moderate concentrations of aflatoxin (AF) and deoxynivalenol (DON) from naturally contaminated corn. Sixty gilts (13.9 \pm 0.2 kg BW) were randomly assigned to 4 treatments (5 replicates per treatment and 3 pigs per pen): A (pigs fed a control diet without detectable AF and DON); B (pigs fed a diet with 60 AF and 300 μ g/kg DON); C (pigs fed a diet with 120 AF and 600 μ g/kg DON); and D (pigs fed a diet with 180 AF and 900 μ g/kg DON). Pigs were fed diets ad libitum for 33 d. Feed intake and BW were measured weekly, and pigs were bled (8 mL) through the jugular vein on d 33 to measure the