swine nutritionists to check models and diets and propose recommendations to improve their economic and environmental feasibility. Nutritionists have an important role because they create connection between the scientific research, validation, and pig producers. Also, we will perform the multi-objective analysis and evaluate the potential to simultaneously reduce cost and environmental impacts. The proposed diets will be available in the PPEC for pig producers, which will allow pig producers to make informed decisions that can help reduce costs and environmental impacts throughout pig life-cycle.

Key Words: life cycle assessment, linear optimization, pig diets, pig production

GRADUATE STUDENT COMPETITION: MS POSTER

114 Alterations of the rumen bacterial and archaeal communities in growing and finishing beef cattle and its effects on methane emissions.

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The rumen harbors a complex microbial community that is greatly influenced by diet composition. This microbial community is critical to the survival of the animal and provides up to 80% of the animals' energy needs. However, as a by-product, the rumen microbial community also produces methane. The sub-group of methane producing organisms in the rumen are called methanogens. The interactions between methanogens and the rumen microbial population is dictated by diet. As a result, the methane being released from cattle will be influenced by the diet being fed to the cattle. Therefore, evaluating the microbial community composition under different dietary conditions and relating these interactions to methane emissions is critical to methane mitigation. To evaluate the effects of diet on microbial community composition and methane emission, 120 animals were fed 10 different growing and 6 finishing diets. Growing diets included high and low quality forage, with and without monensin supplementation, and different inclusions of modified distillers grains plus solubles (MDGS), and finishing diets contained different fat sources (corn oil, tallow, and distillers) with and without monensin supplementation, and direct fed microbial (DFM). Microbial community composition and methane emission was monitored. Methane and CO_2 concentrations of respired air were taken during feeding in an individual feeding facility utilizing 120 individual bunks equipped with the Calan® gate system and an automated gas collection system. Rumen contents were collected via esophageal tubing for microbial community analysis. The V3 region of the 16S rRNA gene was sequenced using the Ion Torrent personal genome machine (PGM). When compared to the respective control diets, the microbial community composition differed in growing and finishing diets. To further evaluate the microbial community involved in methane emission and performance, correlation analysis was performed using microbial community composition and performance parameters. This analysis identified many OTUs correlated with methane emission, performance, and intake. This study demonstrates that certain members of the rumen microbial community have a profound effect on animal performance and methane emission.

Key Words: Interactions, methane, microbial community

115 Effects of stocking density on finishing pig growth performance.

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A total of 405 pigs (PIC 327 × 1050) from 2 consecutive finishing groups (group 1 initially 66 ± 1.8 kg BW, group 2 initially 61 ± 2.5 kg BW) were used to examine the effects of stocking density on finishing pig growth performance. Pens of pigs were balanced by initial BW and randomly allotted to 1 of 3 treatments with either 7 or 8 replications per treatment (group 1 and 2, respectively). Pens were stocked with 9 pigs, and adjustable gates provided treatments that allowed for 0.84, 0.74, or 0.65 m^2 per pig. All pigs were fed the same diets fed in 3 phases. Pigs were provided with 7.91 cm of feeder space per pig. In both studies, as stocking density decreased, ADG and ADFI increased (linear, $P < 0.019$), but there was no difference in G:F. As a result, final weight was 3.9 and 5.3 kg greater (linear, $P \leq 0.005$) in groups 1 and 2, respectively, when comparing the lowest to the highest stocking density treatments. When comparing growth performance to a suggested required *k*-value of 0.0336, performance should have been affected above 122, 102, and 83 kg at 0.84, 0.74, and 0.65 m^2 per pig. In group 1, performance should not have been affected until after 109.0 kg, 94.0 kg, and 80.3 kg for the 0.84, 0.74, and 0.65 m^2 per pig treatments, respectively. However, in group 1 even after d 14 (less than 74.5 kg), negative effects of increased stocking density were observed on ADFI (linear, $P < 0.08$). In group 2, performance should not

Table 115.

Group 2	Space allocation per pig, m^2				Probability, $P <$	
Item	0.84	0.74	0.65	SEM	Linear	Quadratic
Pens, no.	8	8	8	–	–	–
d 0 to 77						
ADG, kg	0.995	0.964	0.931	0.0134	0.005	0.949
ADFI, kg	2.917	2.804	2.702	0.0323	< 0.001	0.899
G:F	0.341	0.344	0.345	0.0032	0.416	0.814
Final BW, kg						
d 77	138.24	135.76	132.93	1.1626	0.004	0.902

have been affected until after 118 kg, 87 kg, and 74 kg for the 0.84, 0.74, and 0.65 m^2 per pig treatments. Similar to group 1, feed consumption and consequently ADG decreased linearly ($P \leq 0.033$) as stocking density increased, before pigs reached the *k*-value that should have influenced performance. Overall, this study indicates that increasing stocking density resulted in poorer ADG driven by a reduction in ADFI and the accepted *k*-value of 0.0336 might underestimate the impact of increased stocking density.

Key Words: finishing pig, space allowance, stocking density

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116 Improving the feeding value of corn stover to enhance cattle performance in a backgrounding phase. K. Nenn[1,*], P. H. V. Carvalho[2], E. Mousel[3], G. A. Bridges[3], S. L. Bird[3], T. L. Felix[2], A. DiCostanzo[1], *[1]University of Minnesota, Saint Paul, [2]University of Illinois at Urbana-Champaign, Urbana, [3]University of Minnesota, Grand Rapids.*

The objective of this study was to investigate the effects of alkali-treatment ($CaOH_2$) or water addition to corn stover on in situ DM and NDF digestibility (DMD and NDFD) and growth performance of cattle during a backgrounding phase. Fifty-one lightweight Angus steers (average BW 197 kg), fed individually in a Calan-Broadbent feeding system, were randomly allotted to 1 of 3 corn stover (30% of diet DM) feeding treatments: 1) dry, untreated corn stover (85% DM), 2) corn stover treated with $CaOH_2$ at 6% inclusion (as-fed basis) and water hydrated to 50% DM, or 3) corn stover water hydrated to 50% DM. Legume-grass silage (15%), dry rolled corn (25%), dry distillers grains and solubles (25%), and a vitamin and mineral supplement (5%) constituted the balance of the diet DM. Steers were fed once daily at 0600 h, and orts were weighed and sampled during this time. Body weight was measured on d 1and 49 after withdrawing feed and water for 16 h. In situ DMD and NDFD were measured at 12, 24, 36, and 48 h in 2 ruminally cannulated steers. Averaged over time, DMD and NDFD differed ($P < 0.05$). Digestibility of DM and NDF of calcium hydroxide-treated corn stover were greater (38.1% and 45.7%), that of untreated corn stover was intermediate (28.1% and 32.8%), and that of water-treated corn stover was lowest (16.9% and 15.5%). Similar results were observed using an in vitro gas production batch culture. Cattle fed water-treated corn stover consumed more ($P < 0.05$) feed DM and had faster rates of gain ($P < 0.05$) than those fed untreated corn stover. Cattle fed calcium hydroxide-treated corn stover had intermediate rates of gain that were similar ($P > 0.05$) to those of cattle fed water-treated or untreated corn stover. Feed conversion was not affected ($P > 0.05$) by corn stover treatment. An alternative to alkali-treatments, albeit when forage supply is not limiting, may be simple water addition as cattle fed water-treated corn stover gained weight more rapidly while consuming more DM.

Key Words: alkali-treatment, corn stover, gains

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117 Effect of milk yield genotype on lipidomic profiles of multiparous Holstein cows during the first 9 wk of lactation. F. Ding[1,*], G. T. Cousillas[2], W. J. Weber[2], B. A. Crooker[2], C. Chen[1], *[1]Department of Food Science and Nutrition, University of Minnesota, St. Paul, [2]Department of Animal Science, University of Minnesota, St. Paul.*

The concentrations of individual fatty acids (FAs) are commonly measured to define the chemical composition and nutritional value of cow milk. However, the distribution of FAs in different milk triacylglycerols (TAGs) and the distribution of these TAGs in different cow milks are rarely examined due to the challenges of analyzing numerous TAGs in milk. In this study, cows (n = 12/genotype) from unselected (stable milk yield since 1964, UH) and contemporary (CH) Holsteins that differed by more than 4500 kg milk/305 d (UH < CH) were fed the same diet ad libitum and housed together beginning 5 wk prepartum. Milk samples were collected weekly from each Tuesday pm milking through 9 wk of lactation. No differences in milk protein and lactose content (PRO%: 3.13% vs. 2.98%, $P = 0.49$; LAC%: 4.69 vs. 4.75, $P = 0.39$) were observed between UH and CH samples. However, compared to UH, CH milk had a higher fat content (FAT%: 3.55% vs. 4.33%, $P < 0.01$). Milk TAGs were further examined by high-resolution liquid chromatography and mass spectrometry and multivariate data analysis (MDA). The distribution patterns of weekly UH and CH samples in the MDA model indicated that TAGs profiles of UH and CH differed greatly in early weeks of lactation but became much more comparable by week 9. The structures of TAGs markers that differed between UH and CH were elucidated by MSMS fragmentation. Hierarchical clustering analysis of these TAGs markers revealed that oleic acid-containing TAGs were enriched in CH milk while the TAGs containing palmitic acid, short-chain, and medium-chain FAs existed in much higher abundance in UH milk. Overall, these observations indicated that, in early lactation, CH had greater incorporation of mobilized fatty acids than UH, which led to different milk TAG profiles between two genotypes.

Key Words: lipidomics, milk, triacylglycerol

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118 Mob grazing effects on cattle performance in southeast Arkansas. H. L. Bartimus[1,2,*], T. G. Montgomery[3], D. Philipp[1], J. Cater[3], K. P. Coffey[1], B. C. Shanks[2], *[1]University of Arkansas, Division of Agriculture, Fayetteville, [2]Lincoln University, Jefferson City, MO, [3]University of Arkansas-Monticello, Monticello.*

Ultra-high-density stocking or mob grazing management has become increasingly popular with producers. Mob grazing