was observed with ajowan, fennel, and thyme EOs. Cinnamon leaf and citronella EOs showed MIC value of 0.05%. All MIC values were the same as MBC for all EOs. Ajowan, thyme, and cinnamon leaf EOs completely or moderately inhibited *M. haemolytica* in their vapor-phase. Scanning electron microscopy revealed noticeable changes in cell structure between EO treated and non-treated cells. The cells treated with ajowan and thyme EOs displayed the greatest morphological cell damage compared to other EOs. None of the selected EOs exhibited noticeable cytotoxicity on BT cells within the tested concentrations. Our results indicate that ajowan, thyme, and cinnamon leaf EOs may have potential to be used as antibiotic alternatives to control BRD bacterial pathogens.

Key Words: antimicrobial activity, bovine respiratory pathogens, essential oil
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250 Muscle amino acid composition of pigs is influenced by the feeding system and amino acid intake. A. Remus[*1,2,3], M. P. Létourneau Montminy[2], L. Hauschild[4], and C. Pomar[3], *[1]Universidade Estadual Paulista, Jaboticabal, Brazil, [2]Département des sciences animales, Université Laval, Québec, QC, Canada, [3]Agriculture and Agri-Food Canada, Sherbrooke, QC, Canada, [4]Sao Paulo State University, Jaboticabal, Brazil.*

Pigs fed individually with daily tailored diets (PF: precision feeding) may respond differently to amino acid (AA) supply compared to pigs fed under conventional group-phase feeding (GF) systems. The response of growing pigs in PF and GF systems fed with different levels of threonine (70%, 85%, 100%, 115%, and 130% of the ideal threonine-to-lysine ratio of 0.65) was studied in a 21-d experiment. A total of 110 pigs of 25 (±0.8) kg BW were housed in the same pen and fed using electronic feeders. Individual pigs were the experimental unit. Five out of eleven pigs per treatment were slaughtered to obtain organs and muscle composition. The chemical composition of the longissimus dorsi and the pool of other carcass muscles were estimated by near-infrared transmittance, and AA were analyzed by gas chromatography. Data were analyzed by SAS mixed model procedures in a 2 × 5 factorial arrangement. Threonine intake increased linearly ($P < 0.05$) with increasing dietary Thr levels for PF (6.28 to 11.76 g/d) and GF pigs (6.85 to 11.01 g/d). Lysine intake was similar (12.5 g/d) across treatments. Dietary Thr supply did not affect longissimus dorsi CP concentration but increased Thr concentration (g/100 g of CP) in a quadratic manner in PF pigs without effect on GF pigs (interaction $P < 0.05$). Threonine concentrations in the muscle pool presented an interaction between feeding system and Thr level as it changed in a cubic manner (4.56 to 4.38 g; $P < 0.05$) in PF and GF pigs. Muscle pool CP concentration was greater for GF than PF pigs (18.06% vs. 17.79%; $P = 0.05$) and tended ($P < 0.10$) to increase linearly with increasing Thr levels in both systems. Threonine concentrations (g/100 g of CP) in the small intestine (4.62 g) and liver (4.41 g) were similar across dietary Thr levels, confirming that these organs have priority over muscles under Thr restriction. However, Thr liver concentration tended ($P < 0.10$) to be greater in PF than GF pigs (4.44 vs. 4.39 g), showing that AA retention in organs may be more efficient in PF than GF pigs. Threonine restriction can, therefore, modify longissimus dorsi AA composition based on the AA intake. However, muscles respond differently to dietary Thr supply, and, under restriction, organs seem to be prioritized over muscles. These results indicate that feeding systems can affect the way pigs use Thr.

Key Words: ideal protein profile, precision feeding, threonine
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251 Net energy content of camelina cake fed to growing pigs and additivity of energy in mixed diets. J. W. Kim[*] and C. M. Nyachoti, *University of Manitoba, Winnipeg, MB, Canada.*

This experiment was conducted to determine the DE, ME, and NE content of camelina cake (CC) and to test the hypothesis that dietary glucosinolates originating from CC will affect the additivity of energy in mixed diets containing different inclusion levels of corn, soybean meal (SBM), and CC. A total of 30 growing barrows [(Yorkshire × Landrace) × Duroc] with an average body weight (BW) of 16.8 ± 1.4 kg (mean ± SD) were randomly allotted to 1 of 5 treatments with 6 replicates per treatment. Pigs were fed experimental diets for 16 d, including 10 d for adaptation and 6 d for total collection of feces and urine. The 5 experimental diets consisted of 3 corn-based diets to determine the DE, ME, and NE of the 3 ingredients (corn, SBM, and CC) and 2 mixed diets to test the additivity of DE, ME, and NE. The corn diet contained 97.52% corn, the SBM diet contained 67.52% corn and 30.0% SBM, the CC diet contained 67.52% corn and 30.0% CC, the Mixed1 diet contained 67.52% corn, 20.0% SBM, and 10.0% CC, and the Mixed2 diet contained 67.25% corn, 10.0% SBM, and 20.0% CC. Vitamins and minerals were included in the diets to meet or exceed the requirements for growing pigs (NRC, 2012). Pigs were fed their assigned diets at 550 kcal ME/kg $BW^{0.60}$ per day on the basis of BW on d 1, 5, and 10, which was close to ad libitum intake. Pigs had free access to water. Determined DE, ME, and NE contents of corn and SBM were 3,348, 3,254, and 2,579 kcal/kg and 3,626, 3,405, and 2,129 kcal/kg, respectively, whereas, respective values for CC were 3,755, 3,465, and 2,383 kcal/kg. No differences between the predicted and determined DE, ME, and NE were observed in the two mixed diets. Differences between predicted and determined DE, ME, and NE values for the Mixed1 diet were 29, 13, and 20 kcal/kg, respectively. Respective values for the Mixed2 diet were 47, 38, and 38 kcal/kg (as-fed basis), respectively. In conclusion,