38 Evaluation of Sorghum Phenolic Compounds for Their Antimicrobial Activities Against Liver Abscess Causing Pathogens in Feedlot Cattle.
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Liver abscesses occur in finishing cattle fed high-grain, low-roughage diets. Cattle with abscessed livers seldom show any clinical signs and are detected only at the time of slaughter. Liver abscesses are of significant economic concern to the feedlot industry. Liver abscesses comprise, on average, 67% of all liver abnormalities in cattle slaughtered in the United States with a prevalence of 10–20% and may reduce the value of the beef carcass up to $38 per animal with the most severe abscesses. There are four causative agents of the disease including the two subspecies of Fusobacterium necrophorum, ssp. necrophorum and ssp. funduliforme, Trueperella pyogenes, and Salmonella enterica. Tylosin, supplemented in the feed, is the most commonly used antibiotic in the feedlot industry to prevent liver abscesses. Because of the concerns about antimicrobial resistance, there is a need to find an effective alternative to this antibiotic, and sorghum grain extracts, which are high in phenolic compounds, may have the potential to be used as natural antibiotic alternatives. Our objectives were to investigate the efficacy of phenolic extracts from black, sumac, brown, and burgundy sorghums on liver abscess pathogens. The sorghum phenolics were extracted using 75% aqueous acetone and total phenolic content was determined by spectrophotometrically. Bacterial strains were cultured in Mueller-Hinton broth (Salmonella and Trueperella pyogenes) or anaerobic brain-heart infusion broth (Fusobacterium) with and without sorghum extracts (1 mg/ml) at 12, 24, and 48 hours and bacterial concentrations were determined. If the compound was inhibitory, a micro-broth dilution method was used to quantify the inhibitory activity. Both black and sumac sorghum phenolics inhibited growth of all four bacterial species. Further studies are ongoing to investigate different concentrations and phenolic compounds from varieties of sorghum grains on the liver abscess pathogens.

Keywords: liver abscess, feedlot cattle, sorghum phenolic compounds, antibiotic alternatives

36 Evaluation of Compensatory Growth of 90-kg Finishing Pigs Previously Fed a Low Lysine Diet.
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A total of 346 pigs (241×600, DNA, Columbus, NE; initially 88.6 kg) were used in a 44-day trial to evaluate compensatory growth of pigs previously fed very low lysine diets. Two diets [control and corn (98% corn and 2% vitamins and minerals)] were arranged into 4 nutritional strategies. One group of pigs (control) was fed the control diet from d 0 to 44. The other three groups of pigs were fed the corn diet for 14, 21, or 28-d and then fed the control diet until day 44. The control and corn diets contained 0.70 and 0.18% standardized ileal digestible Lys, respectively. Pens were assigned to nutritional strategies in a randomized complete block design based on initial BW with 9 pens per treatment. On average, pigs fed the corn diet grew 49% slower than the control. Pigs previously fed the corn diet had 28% increased ($P < 0.05$) ADG during the first week of switching to the control diet and 12% faster ($P < 0.05$) ADG than the control for the rest of the trial. Despite this increase in ADG, final BW on d 44 was lower ($P < 0.05$) compared to the control for pigs fed the corn diet for 21 or 28-d. From d 0 to 44, control pigs and pigs fed the corn diet for only 14-d had increased ($P < 0.05$) ADG compared to pigs fed the corn diet for 21 and 28-d. Feed efficiency was decreased ($P < 0.05$) when the corn diet was fed and increased ($P < 0.05$) during the period of compensatory growth; however, overall G:F decreased ($P < 0.05$) as pigs were fed the corn diet longer. The data suggest that compensatory growth was observed when pigs fed the corn diet for 21 or 28-d followed by the control diet within a 6-week-period, but overall growth performance was still reduced compared to the control.

Table 1. Evaluation of compensatory growth of 90-kg finishing pigs previously fed a low lysine diet [1,2]

d 0 to 14	Control	Corn			
d 14 to 21	Control	Control	Corn		
d 21 to 28	Control	Control	Control	Corn	
d 28 to 44	Control	Control	Control	Control	SEM
d 0 to 14 (stage 1)					
ADG, kg	0.79[a]		0.23[b]		≤ 0.025[3]
ADFI, kg	2.48[a]		2.18[b]		≤ 0.048[3]
G:F	0.317[a]		0.103[b]		≤ 0.0093[3]
d 14 to 21 (stage 2)					
ADG, kg	0.89[b]	1.34[a]	0.76[b]		≤ 0.050[3]
ADFI, kg	2.63[b]	3.01[a]	2.73[b]		≤ 0.076[3]
G:F	0.336[b]	0.446[a]	0.280[c]		≤ 0.0179[3]
d 21 to 28 (stage 3)					
ADG, kg	0.95[b]	1.09[ab]	1.23[a]	0.56[c]	0.062
ADFI, kg	2.59[b]	2.87[ab]	2.98[a]	2.78[ab]	0.091
G:F	0.365[a]	0.378[a]	0.412[a]	0.201[b]	0.0152
d 28 to 44 (stage 4)					
d 44 BW, kg	126.0[a]	123.9[a]	120.8[b]	118.5[b]	1.12
ADG, kg	0.83[c]	0.94[b]	0.94[b]	1.06[a]	0.021
ADFI, kg	2.67	2.80	2.75	2.85	0.122
G:F	0.311[c]	0.336[b]	0.342[b]	0.374[a]	0.0053
d 0 to 44					
ADG, kg	0.85[a]	0.80[a]	0.73[b]	0.67[b]	0.018
ADFI, kg	2.59	2.65	2.59	2.61	0.041
G:F	0.325[a]	0.301[b]	0.280[c]	0.257[d]	0.0036

[a,b,c,d] Means within a row with different superscripts differ ($P \leq 0.05$).
[1]BW = body weight. ADG = average daily gain. ADFI = average daily feed intake. G:F = feed efficiency.
[2]SID lysine (%) was 0.70 for control diet and 0.18 for corn diet.
[3]Heterogenous variance.

Keywords: compensatory growth, growth rate, late-finishing pigs, lysine

41 Effect of Biochar Supplementation in Beef Cattle Finishing Diets on Greenhouse Gas Emissions and Carcass Performance.

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The objective of this experiment was to evaluate the effect of feeding biochar in a finishing diet on cattle performance, carcass quality, methane (CH_4) and carbon dioxide (CO_2) emissions. Biochar was sourced from ponderosa pine wood waste (High Plains Biochar, Laramie, WY) and was 83% C with 426 m^2/g surface area. Crossbred steers (n = 128; initial BW = 480 kg ± 82 kg) were utilized in a randomized block design (blocked by BW), steers assigned randomly to pen (n = 16), and pen was assigned randomly to treatment. Two treatments were evaluated, a finisher control (CON) without biochar and the same finisher with biochar included at 1.0% of diet dry matter replacing corn (CHAR). Four pen replications per treatment were paired within BW block and rotated randomly through an emissions barn with two chambers (each treatment evaluated simultaneously) to capture average weekly emissions of CH_4 and CO_2. Pen was experimental unit and chamber was included as a fixed effect for emissions data. Dry matter intake (DMI; $P < 0.01$) and average daily gain (ADG; $P = 0.02$) were 2.4 and 5.9% lower for CHAR steers, respectively. Feed efficiency ($P = 0.22$) and production of CO_2 and CH_4 ($P \geq 0.60$) did not differ between treatments. Methane production was numerically lower for CHAR steers when reported as g per day (1.8% lower) or g per kg of DMI (4.8% lower). Hot carcass weight tended to be lighter ($P = 0.10$) and calculated USDA yield grade was decreased ($P = 0.02$) for CHAR steers. There was no difference between treatments for LM area, USDA quality grade, or 12th rib fat ($P \geq 0.12$). In conclusion, biochar supplementation at 1.0% of diet DM reduced DMI and ADG and had no effect on CH_4 and CO_2 emissions in finishing steers.

Keywords: beef cattle, biochar, methane