**Introduction**

Liver abscesses
- Liver abscesses occur in finishing cattle fed high-grain, low-roughage diets.
- The prevalence of liver abscesses is highly variable, but the average ranges from 10 to 20%.
- Liver abscesses in cattle continue to be of significant economic concern to the feedlot industry.
- Fusobacterium necrophorum, particularly of the subsp. necrophorum, which originates from the rumen, is the primary etiologic agent.
- Trueperella (formerly Arcanobacterium) pyogenes is the secondary pathogen.
- A recent study has reported on isolation of Salmonella from liver abscesses of Holstein cattle.
- Tylosin is the most widely used feed additive to prevent liver abscesses.
- The future of tylosin use as a feed additive in feedlot cattle is uncertain due to it being added to the VFD in 2017.

Phytophenols
- Phytophenols are known to have antimicrobial/anti-inflammatory/antioxidant properties.
- High in phenolic compounds, thus, these plant extracts may have the potential to be used as natural antibiotic alternatives.
- The mechanism of antibacterial action of phenolic compounds is not yet fully understood.

**Objectives**

- Our objectives were to investigate antimicrobial activities of plant-based phenolic compounds on the liver abscess causing bacterial pathogens.

**Materials and Methods**

Extraction of Phytophenols
- Black sorghum, sumac sorghum, green tea extract, grape seed extract, and rosemary extracts were used for testing.
- The phytophenols were extracted using 75% aqueous acetone and total phenolic content was determined in a spectrophotometer.

**Results**

Total Phytophenolic Content (TPC) of phytophenols extracted from black sorghum bran, sumac sorghum bran, rosemary, green tea, and grapeseed

<table>
<thead>
<tr>
<th>Plant extracts</th>
<th>TPC (mg GAE/g)</th>
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<tbody>
<tr>
<td>Green tea extract</td>
<td>878.4</td>
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<tr>
<td>Grape seed extract</td>
<td>614.1</td>
</tr>
<tr>
<td>Sumac sorghum bran</td>
<td>374.9</td>
</tr>
<tr>
<td>Black sorghum bran</td>
<td>258.3</td>
</tr>
<tr>
<td>Rosemary extract</td>
<td>153.8</td>
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</tbody>
</table>

Broth Macro dilution Method
- Bacteria were cultured in Mueller-Hinton broth (Salmonella and Trueperella) or anaerobic brain-heart infusion broth (Fusobacterium) with and without phytophenols.
- At 6, 12, 24, and 48 hours and bacterial concentrations were determined by reading optical density then doing serial dilution followed by spread plating to determine the viable bacterial count.

Minimum Inhibitory Concentrations of phytophenols
- Microbroth dilution method was also used to quantify the inhibition.

Statistical analysis
- Data were analyzed using SAS (v. 9.4; Cary, NC). The PROCGLM procedure was used to fit the least squares in a linear model. The model included the fixed effect of tested phenolic extracts and replication as a random effect.
- Analysis of variance was performed on the log transformed MIC values.

**Summary**

- Phytophenols from green tea, grape seed, rosemary, sumac sorghum and black sorghum inhibited T. pyogenes.
- Inhibitory effects of these extracts were directly correlated to their total phenolic content.
- Black sorghum phenolic compound had more inhibitory effect when compared to phenolic compound from sumac sorghum.
- Phytophenols that inhibit the pathogens may have the potential to control liver abscesses.
- Further studies are ongoing to investigate different concentrations of phenolic compounds on the liver abscess pathogens.

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