**Introduction**

- Kimchi, a fermented vegetable commonly consumed in Korea, has a lot of naturally occurring lactic acid bacteria (LAB).
- These LAB has been shown to have antimicrobial properties.
- I will isolate different strains of LAB from Kimchi and test their antimicrobial properties against the foodborne pathogens *Escherichia coli* O157:H7 and *Listeria monocytogenes*.
- *E. coli O157:H7* and *L. monocytogenes* are common agents of food poisoning related to consumption of meat products

**Method**

- Add kimchi to saline solution to encourage growth of LAB while inhibiting growth of other microorganisms.
- Isolate LAB through diluting samples and agar plating, and incubate for 24 h at 37°C under anaerobic conditions.
- Run a PCR to amplify 16S rDNA and run a gel to identify the LAB isolates.
- Spot each LAB isolate onto an agar plate with hard agar. Pour soft agar containing *E. coli O157:H7* or *L. monocytogenes* onto the hard agar (which has the LAB spotted) and incubate under anaerobic conditions.
- Check in 24 hours and measure the size of the ring of inhibition, recording the length and width. The bigger the ring of inhibition, the better the LAB isolate was at inhibiting the growth of *E. coli O157:H7* or *L. monocytogenes*.
- Calculate the area of the ring of inhibition using measurements collected.

**Results**

Results from running a gel allowed us to sequence the 16S rDNA to identify some of each isolate.

<table>
<thead>
<tr>
<th>Isolate</th>
<th>Identity</th>
<th>Width [cm]</th>
<th>Height [cm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Lactobacillus sakei</td>
<td>3.8</td>
<td>2.2</td>
</tr>
<tr>
<td>B</td>
<td>Rhodococcus erythropolis</td>
<td>2.9</td>
<td>1.6</td>
</tr>
<tr>
<td>C</td>
<td>Rhodococcus erythropolis</td>
<td>2.6</td>
<td>1.7</td>
</tr>
<tr>
<td>D</td>
<td>Lactobacillus curvatus</td>
<td>1.8</td>
<td>1.5</td>
</tr>
<tr>
<td>E</td>
<td>Could not identify</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Could not identify</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Leuconostoc mesenteroides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Lactobacillus spp.</td>
<td>2.5</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Due to time constraints, Isolate E and F could not be identified.

Measuring the ring of inhibition allowed us to see how each isolate inhibited the growth of *E. coli O157:H7* and *L. monocytogenes*.

**Discussion**

- Strain E was the worse for inhibition for both *L. monocytogenes* and *E. coli* O157:H7.
- *E. coli O157:H7* inhibition
  - Strain F was better at *E. coli* inhibition compared to *R. erythropolis*, *L. curvatus* and strain E.
  - Strain E was the worse, noticeably.
- *L. monocytogenes* inhibition
  - *Lactobacillus curvatus* and *Leuconostoc mesenteroides* worked best at inhibiting growth of *L. monocytogenes*.
  - Strain E was the worse, noticeably.

Lactic acid strains splatted while being pipetted on paper disc, causing splatter patterns around the disc. They were ignored when measuring the size of inhibition rings. Zones of inhibition for *L. monocytogenes* were not as clearly defined as *E. coli* O157:H7.

**Applications & Future Research**

- *E. coli* and *L. monocytogenes* are common food poisoning agents in ready-to-eat meats like summer sausages and dry fermented sausages. This puts consumers at risk.
- Strains of LAB that show inhibition against these microbes can be added to ready-to-eat meats as an additional layer of defense.
- These strains of LAB could also potentially replace N-nitrosamines as a preservative in processed meats to reduce risk of cancer.
- Further research can be done in various areas, such as:
  - How using more than one strain of LAB and altering their relative concentrations can affect inhibition rates.
  - Effect of LAB strains on sensory properties of these ready-to-eat meat products.

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