Hard Cider Production

OBJECTIVE
To create a craft-brewed hard cider with a new flavor profile.

BACKGROUND
- Increased interest in hard cider has led to an expanding market
- Current industry is predominantly run by a few big name brands
- Increased interest in local manufacturers

UNIT OPERATIONS

<table>
<thead>
<tr>
<th>Unit Operation</th>
<th>Optimization Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressing</td>
<td>Pressure &amp; Time</td>
</tr>
<tr>
<td>Filtering</td>
<td>Volumetric Flow</td>
</tr>
<tr>
<td>Fermentation</td>
<td>Tank Size, Temperature</td>
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<tr>
<td>Pasteurization</td>
<td>Temperature</td>
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</tbody>
</table>

EVALUATION OF ALTERNATIVES

1. Apples: dessert apples vs cider apples
2. Pressing: belt filter press vs rotary press
3. Filtering: vibrating screen vs rotary sieves
4. Pasteurization: tunnel pasteurization vs UV light treatment
5. Fermentation: unstirred with temperature control vs without temperature control

IMPACT & SUSTAINABILITY
- Promote responsible drinking
- Ethically and locally sourced raw materials
- Genetically modified apples
- Waste disposal
- Abundance of raw materials
- Job creation
- Highly demanded product
- International expansion

FINAL DESIGN

Product Composition
- Serving Size 1 Bottle (12 fl oz)
- Servings per Batch 10
- Musselman’s 100% Apple Cider 1 gal
- Packed Light Brown Sugar 100 g
- Wine Tannins 1/4 tsp
- Acid Blends 1/4 tsp
- Pectic Enzyme 1/2 tsp
- Yeast Nutrient 1/4 tsp
- Red Star Champagne Yeast 1 g
- ABV 8%

PRODUCTION PROTOTYPES

<table>
<thead>
<tr>
<th>Batch</th>
<th>Unique Feature</th>
<th>ABV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sugar</td>
<td>8%</td>
</tr>
<tr>
<td>2</td>
<td>Apple Juice Concentrate</td>
<td>7.5%</td>
</tr>
<tr>
<td>3</td>
<td>No Added Sugars</td>
<td>6%</td>
</tr>
<tr>
<td>4</td>
<td>Added Honey</td>
<td>12%</td>
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ECONOMIC ANALYSIS

- Yearly Production: 50,000 gal/year
- Total Capital Investment: $486,316.81
- Fixed Charges (12%): $58,358.02
- Variable Cost per Unit: $879,141.98
- Yearly Profit: $34,722.22

RECOMMENDATIONS

- Experiment with different apple varieties
- Add different flavor extracts