Quality Assessment of Water Available for Food Processing

Maqsood Popal, Neman Mohammadi, Mosa Mojadadary, Sulaiman Barak
Introduction

• Food quality and safety is often dependent on water quality

• High quality water is necessary if water is used as an ingredient

• High quality is also necessary for proper sanitation and hygiene

• There are two main sources of water in Herat
  – Wells
  – Piped or municipal water
Objective

- Measure the quality of water available in Herat for food processing
  - Chemical contaminants
    - Arsenic
    - Nitrates/Nitrites
    - Phosphates
    - Lead
  - Biological contaminants
    - Coliforms
    - *E. coli*
  - Hardness and pH

Procedures

- Collected over 200 water samples from wells and taps throughout Herat City and the surrounding area
Materials and Methods
Procedures

Several measurements were done using a spectrophotometer:

- Phosphate
- Nitrate
- Nitrite
- Arsenic
- Lead

*E. coli* and total coliforms were measured using a vacuum/plating technique. Concentrations were measured in CFU/mL.
# Results-General

**General Water Characteristic.**

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>pH</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well</td>
<td>7.45</td>
<td>603.9</td>
</tr>
<tr>
<td>Tap</td>
<td>7.54</td>
<td>461.1</td>
</tr>
</tbody>
</table>
Results-Microbiology

Percentage of water samples above the maximum contamination level.

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>E. coli</th>
<th>Coliforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well</td>
<td>27.5</td>
<td>54.6</td>
</tr>
<tr>
<td>Tap</td>
<td>20.8</td>
<td>50.6</td>
</tr>
</tbody>
</table>

Samples from both sources frequently tested positive for bacteria
## Results-Chemistry

Percentage of water samples above the maximum contamination level.

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>PO$_4$</th>
<th>NO$_3$</th>
<th>NO$_2$</th>
<th>Pb</th>
<th>Arsenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well</td>
<td>62.2</td>
<td>22.0</td>
<td>4.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Tap</td>
<td>78.8</td>
<td>7.4</td>
<td>2.9</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Discussion

• Herat water is very “hard” containing high amounts of minerals
  – Not a health concern
  – May be a concern for equipment

• Both types of water frequently contained bacteria
  – Businesses that rely on water as an ingredient may pursue filtration or other systems
THANK YOU SO MUCH FOR YOUR ATTENTION