Assessing the Quality of Eggs Available in Herat City.
Department of Food Technology, Herat University

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Introduction

• The global laying egg population has reached volume of about 6.5 billion birds (Windhorst et al., 2013)
• There are about 13 million hens in Afghanistan (VOA XXXX)
• 350 million eggs are imported to Afghanistan each year (MAIL 2009)
Introduction

Eggs are an excellent source of nutrition:
• High in vitamins
• Can aid in weight loss
• Contain essential minerals
• High quality and low-calorie protein
• May help in preventing breast cancer
Introduction

• Afghans have access to a variety of eggs in local markets
• Research Objective: compare the quality of eggs produced in three different manners:
  • Iranian Industrially Produced
  • Afghan Industrially Produced
  • Afghan Locally Produced
Procedures

Collected and analyzed 222 total eggs

Measured:

• External defects
• Air cell
• Egg weight
• Albumin height
• Haugh Score

• Haugh Score
• Internal defects
• Yolk characteristics
• Shell thickness
• Salmonella
Testing Salmonella

1. Washed shell with sterile sponge
2. Incubated sponge in Tetrathionate broth
3. Plated on XLT4 agar plates
4. Black colonies = *Salmonella*
Candling

1. Identify cracks
2. Other shell defects
3. (checking meat/blood spot & Cracking)
4. Measure air cell
Hough measurement

1. Measure weight (g)
2. Measure albumin height (mm)
3. Assign grade based on the formula:
   \[ HU = 100 \times \log_{10} (h - 1.7w^{0.37} + 7.6) \]
Shell Thickness

• Indication of shell strength
• Measured with a micrometer
what we saw.

Table 1. Weight, Albumin Height, and Haugh score of Iranian Industrial, Afghan Industrial, and Afghan Local Eggs Available in Herat City, Afghanistan.

<table>
<thead>
<tr>
<th>Source</th>
<th>Weight, g (std. dev.)</th>
<th>Albumin, mm (std. dev.)</th>
<th>Haugh Score (std. dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iranian Industrial</td>
<td>48.9 a (3.3)</td>
<td>3.6 a (2.1)</td>
<td>58.2 a (9.9)</td>
</tr>
<tr>
<td>Afghan Industrial</td>
<td>55.2 b (7.3)</td>
<td>4.8 b (0.9)</td>
<td>68.7 b (8.3)</td>
</tr>
<tr>
<td>Afghan Local</td>
<td>47.4 a (7.5)</td>
<td>4.9 b (1.8)</td>
<td>71.3 b (13.1)</td>
</tr>
</tbody>
</table>

Numbers with different superscripts are significantly different at $P < 0.05$

All Afghan eggs had higher Haugh scores than imported eggs
what we saw.

Table 2. Internal Quality Characteristics of Iranian Industrial, Afghan Industrial, and Afghan Local Eggs Available in Herat City, Afghanistan.

<table>
<thead>
<tr>
<th>Source</th>
<th>Yolk Color</th>
<th>Yolk Score</th>
<th>Meat/Blood Spots</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yellow (%)</td>
<td>Orange (%)</td>
<td>1</td>
</tr>
<tr>
<td>Iranian Industrial</td>
<td>100.0 b</td>
<td>0.0 a</td>
<td>37.8 b</td>
</tr>
<tr>
<td>Afghan Industrial</td>
<td>84.4 a</td>
<td>15.6 b</td>
<td>18.8 a</td>
</tr>
<tr>
<td>Afghan Local</td>
<td>87.2 a</td>
<td>12.8 b</td>
<td>11.5 b</td>
</tr>
</tbody>
</table>

Yolk score: 1 = soft, flat; 2 = medium; 3 = compact, tall; numbers with different superscripts are significantly different at P < 0.05.

Afghan locally produced eggs had much higher yolk quality than all other eggs.
what we saw.

**Table 3.** Air Cell and Shell Characteristics of Iranian Industrial, Afghan Industrial, and Afghan Local Eggs Available in Herat City, Afghanistan.

<table>
<thead>
<tr>
<th>Source</th>
<th>Air Cell Size</th>
<th>Cracked Shells (%)</th>
<th>Shell Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iranian Industrial</td>
<td>1.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.38&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Afghan Industrial</td>
<td>1.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.37&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Afghan Local</td>
<td>1.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>12.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.36&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Air Cell Size: 1 = small; 2 = medium; 3 = large; numbers with different superscripts are significantly different at P < 0.05.*

Afghan eggs tended to have more cracks than imported eggs.
Discussion

Ranking of Quality
A. Afghan Locally Produced
B. Afghan Industrially Produced
C. Iranian Industrially Produced
Discussion

Economics

- Iranian industrially Produced(6 AF) = 0.11AF/gr
- Afghan Industrially Produced(7AF) = 0.12AF/gr
- Afghan Locally Produced(9-10AF) = 0.19-0.20AF/gr

Up to Afghan consumers to decide if increased quality justifies increased price