HACCP in Traditional Arabic Foods

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A number of traditional foods have been developed through the years in the Arab countries to accommodate with the needs and conditions prevailing in the region.
• Traditional foods constitute a major part of everyday meals
• These foods are generally simple in preparation, and their ingredients are widely available
From a hygienic point of view, however, traditional foods are characterized by

- being intensively handled by workers,
- often prepared in premises that:
  - do not adhere to hygiene standards and
  - lack control measures that may help reduce and/or eliminate microbial hazards prior to consumption.
Traditional foods as microbial ecosystems
Traditional foods as microbial ecosystems

Internal conditions that affect microbial activity:
- pH, $a_w$, O/R potential and nutrient content

External conditions that affect microbial activity:
- Storage conditions and technological properties
Traditional foods as microbial ecosystems

Microbial flora of each food and the content of indicator bacteria and pathogenic microorganisms
Examples to traditional Arabic foods

Hummus
Fuul (fava beans)
Falafel
Green salads
Shawerma
Meat pastries
Tahini
Halawa
Kunafa
Tamarind drink
Sous drink
Laban drink
Labaneh
The HACCP system
It is the role of governments to uphold the safety and security of food. It is the responsibility of producers to ensure the safety of their products. So. Producers are to adopt and apply the HACCP system to ensure food safety.
Logic sequence for application of HACCP
(Steps 6–12 are the application of the seven principles of the HACCP system)
Evolution of the concept of hazard analysis and the identification and monitoring of critical control points in a system to ensure food safety
Generic HACCP models
A principal characteristic of the HACCP system is that it is applied to each process of food production individually. This makes it possible to prepare generic HACCP models that can be applied to the production process of a particular food.
The idea of developing generic HACCP models is that these models, after being adopted by a regulatory or private agency engaged with food safety, can be used as templates for all relevant food sectors. In this way establishments concerned with the implementation are spared the time, effort and cost of developing the system themselves. Furthermore, implementing generic models has the advantage of creating a high level of uniformity among those who apply the system.
Generic models can be used as a part of the material for training in the HACCP system, and as a reference for inspection. Experience gained in the first implementations of generic models, including avenues for improvement, can be incorporated into later applications of the model.
Generic models are to help producers, regulators, trainers and others concerned with the safety of traditional foods.

Form the basis for the development of food safety programs in these areas.
Development of generic HACCP models
The concept of developing generic HACCP system models by governmental agencies responsible for control of food safety has been internationally acknowledged. The USA, Canada, and New Zealand are among the countries in which generic HACCP models have been developed.
The first generic HACCP models to be developed were the American and the Canadian models for high risk foods (mostly of animal origin). These products are often for export, and are more frequently associated with foodborne illness outbreaks.
The application of HACCP system to the production of traditional Arabic foods in a generic form
The Codex Alimentarius Commission Guidelines were followed in the application of HACCP System to the production of the traditional foods: “Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its Application. Annex to CAC \ RCP-1 (1969), Rev. 4 (2003), Joint FAO \ WHO Food Standards Programme.”
Logic sequence for application of HACCP
(Steps 6–12 are the application of the seven principles of the HACCP system)
Prerequisites for the application of HACCP
Food hygiene requirements and measures
Conditions and measures of good manufacturing practice (GMP), which constitute a prerequisite for the HACCP system implementation have been taken in consideration
Hygiene and sanitation requirements outlined in the following references may be used in developing the prerequisite programs:

- Codex Alimentarius Commission, *Recommended international code of practice – general principles of food hygiene* (CAC/RCP 1-1969, Rev. 4 (2003)) [1];

- United States Food and Drug Administration, *Current good manufacturing practice in manufacturing, packing, or holding human food*, 21 CFR Part 110 [4];

- National corresponding standards, especially those based on CAC/RCP 1-1969, Rev.4 (2003) [1], such as those developed in Jordan, Syria and member countries of the Gulf Cooperation Council.
These include

- Supplier control
- Production equipment and controls
- Maintenance, cleaning and sanitation
- Pest control
- Waste management
- Personal hygiene
- Health status
- Personal behaviour
- Visitors
- Receiving, storage and shipping
- Cross-contamination
- Packaging
- Training
Generic HACCP models for some traditional Arabic foods
In each HACCP plan (e.g., hummus)
I. Product description

<table>
<thead>
<tr>
<th>Product name(s)</th>
<th><em>Hummus</em> (houmous, humous, humus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important product</td>
<td>Average composition of <em>hummus</em> per 100 g of edible portion is 49.5 g water, 9.6 g protein and 19.7 g fat. pH is 5.1. No preservatives are used.</td>
</tr>
<tr>
<td>characteristics</td>
<td></td>
</tr>
<tr>
<td>Intended use</td>
<td><em>Hummus</em> is prepared for immediate consumption. It is served as a snack or as a sandwich using Arabic bread. Consumed by general public.</td>
</tr>
<tr>
<td>Packaging</td>
<td>Served and dispensed on plates or bowls. Sold as takeaway in plastic containers (100 g – 300 g).</td>
</tr>
<tr>
<td>Shelf life</td>
<td>24 h in the refrigerator (below 5°C*).</td>
</tr>
<tr>
<td>Prepared / sold in</td>
<td>Restaurants, hotels, homes.</td>
</tr>
<tr>
<td>Labelling instructions</td>
<td>Keep refrigerated (below 5°C*).</td>
</tr>
<tr>
<td>Special distribution control</td>
<td>Transport, store, and display refrigerated (below 5°C) under hygienic conditions.</td>
</tr>
</tbody>
</table>
## 2. Ingredients of hummus

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickpeas</td>
<td>As per CODEX STAN 171-1989 [10]</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>Powder&lt;br&gt;No Codex standard available(^{(b)})</td>
</tr>
<tr>
<td>Tahini</td>
<td>Packaged in plastic or metallic containers&lt;br&gt;No Codex standard available(^{(a)})</td>
</tr>
<tr>
<td>Salt</td>
<td>As per CODEX STAN 150-1985 [10](^{(c)})</td>
</tr>
<tr>
<td>Citric acid</td>
<td>Dried white&lt;br&gt;Food Chemicals Codex(^{(d)})</td>
</tr>
<tr>
<td>Lemon juice</td>
<td>Fresh (sometimes used instead of citric acid)&lt;br&gt;No Codex standard available(^{(e)})</td>
</tr>
<tr>
<td>Water</td>
<td>As per WHO Guidelines for drinking-water quality [5]</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Related national standard, e.g., Jordanian Institute for Standardization and Meteorology (JISM) 1124:2003 [11]


\(^{(c)}\) Related national standard, e.g., JISM 32:1995 [11]


\(^{(e)}\) Related national standard, e.g., JISM 627:2001 [11]
4. Process flow chart for *hummus* production

- **Salinization (CCP 2)**
- **Citric acid**
- **Sodium bicarbonate**
- **Dried chickpeas**
- **Watersoaking (CCP 1)**

**Flow**:
- Removal of visible foreign bodies
- Washing
- Soaking overnight
- Straining (CP)
- Boiling
- Cooling with cold water or ice (CP)
- Storing in refrigerator (CCP 3)

**CCP 4**
- Blending and pH adjustment

**Flow**:
- Transferring to storage container (CP)
- Storing in refrigerator (CCP 3)
- Serving (CP)
## 5. HACCP chart for *hummus* production

<table>
<thead>
<tr>
<th>Step</th>
<th>Hazard</th>
<th>Control measure</th>
<th>CCP</th>
<th>Critical limit</th>
<th>Monitoring</th>
<th>Frequency</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Biological: Disease-causing microorganisms</td>
<td>• Use a potable supply from the local authority</td>
<td>1</td>
<td>Coliforms not detectable in 100-ml samples*</td>
<td>Estimation of coliforms count</td>
<td>Every month</td>
<td>• Discard contaminated water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensure adequacy of filters, tanks and hydrants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Sanitize tanks and filters</td>
</tr>
<tr>
<td>Salt</td>
<td>Physical: Foreign matter</td>
<td>Sieving</td>
<td>2</td>
<td>Mesh size of sieve</td>
<td>Visual examination</td>
<td>Each batch</td>
<td>Re-sieve salt</td>
</tr>
<tr>
<td>Storing in refrigerator</td>
<td>Biological: Growth of disease-causing</td>
<td>• Control refrigeration (below 5°C for 24 h)</td>
<td>3</td>
<td>• Temperature: &lt; 5°C</td>
<td>Continuous</td>
<td></td>
<td>• Investigate root cause and eliminate</td>
</tr>
<tr>
<td></td>
<td>microorganisms</td>
<td>• Date code of batches</td>
<td></td>
<td>• Time: 24 h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blending and pH adjustment</td>
<td>Biological: Growth of disease-causing</td>
<td>Adjust pH to below 5</td>
<td>4</td>
<td>pH &lt; 5</td>
<td>Check pH using a calibrated pH meter</td>
<td>Each batch</td>
<td>• Readjust the pH</td>
</tr>
<tr>
<td></td>
<td>microorganisms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Investigate root cause and eliminate</td>
</tr>
</tbody>
</table>
Application of the generic HACCP models
It is expected that most producers of the traditional foods will have little or no knowledge of the HACCP system, so to expect them to implement the relevant models alone would not be realistic.
Rather, governmental or non-governmental agencies engaged in health, food control, or safety of the environment will need to help groups of producers in implementing the models in their plants.
Application steps for the generic HACCP models
Traditional food groups
Group Food
1 *Hummus, fuul, falafel* and salads
2 *Shawarma* and salads
3 Meat pastries and salads
4 *Tahini* and *halawa*
5 *Kunafa* (incl. Nabulsi)
6 Tamarind, *sous* and *laban* drink
7 *Labaneh*
Considerations to the Application of the generic HACCP models
The generic models are not intended for direct use in all plants, but should instead be adapted to reflect the conditions specific to each process and plant. So the generic models should be reviewed and refined, and applied only after making adjustments to meet the needs and peculiarities of the establishment applying the system.
Differences in production steps, capabilities and resources between establishments will lead to differences in HACCP plans development and implementation for the same foods. This is evident, for example, when dealing with raw materials.
Bigger establishments can specify their requirements for raw materials (for example sugar, flour, milk powder, cereals, etc.), which are usually reflected as critical limits. To ensure compliance, such plants usually require suppliers to provide them with certificates and test results, and carry out their own analyses and quality systems audits at the supplier’s premises.
However most traditional food producers are small producers and do not have such capabilities, so the procurement of raw materials is not assumed to be a CCP in the generic models, but merely a control point (CP). For the small producer, awareness of hazards and critical limits, buying from reputable suppliers, visual inspection, and proper storage of raw materials are acceptable means of control at the procurement of raw materials CP.
Documentation (HACCP principle 7) is also a potential issue. It is neither realistic nor practical to expect a high level of documentation in small restaurants and small plants. Nevertheless it is imperative that all establishments, both large and small, have properly documented HACCP plans for their products, along with the necessary documentation to demonstrate proper implementation of the system.
Producers should be made aware that maintenance and continual improvement of the system are an integral part of its implementation. A good way of verifying the proper implementation and maintenance of the system would be to review HACCP plans and perform internal and third party audits and inspections of the system, especially regarding monitoring of the CCPs and implementation of GMPs, at short and regular intervals.
The same applies to the prerequisite programs, especially:

- Personal hygiene (cleanliness, behavior, hand washing, etc.)
- Cleaning and disinfection of equipment and premises.
- Temperature control
- Control of cross contamination