HACCP Principle 4

• Establish CCP monitoring requirements. Establish procedures for using the results of monitoring to adjust the process and maintain control.
Monitoring Procedures

• NACMCF Definition (USA)
  – “A planned sequence of observations or measurements to assess whether a CCP is under control and to produce an accurate record for future use in verification.”

• ISO 22000 Definition
  – “Conducting a planned sequence of observations or measurements to assess whether control measures are operating as intended.”
Monitoring

• The purpose of monitoring is to:
  – Track the operation of the process and enable the identification of trends toward a critical limit that may trigger process adjustments
  – Identify when there is a loss of control (a deviation at a CCP)
  – Provide written documentation of the process control system
Examples of Monitoring Activities

**Measurement of:**
- Temperature
- Time
- pH
- Moisture level
- Flow rate

**Visual observation:**
- Fruit culling
- Screen Integrity
Examples of How Critical Limits and Control Measures Can Be Monitored

• Timer
• Thermometer
• pH meter
• Scales
• Water activity meter
• Chemical analytical equipment
Monitoring Procedures

• Type of monitoring procedures (what)
• Procedures used for monitoring (how)
• Frequency or maximum time lapse between application of monitoring procedures (when)
• Identify person(s) responsible for conducting the monitoring procedures (who)
CCP Monitoring

• Continuous

• Discontinuous
  – Attribute sampling
Monitoring and Sampling

• Continuous inspection
  – Automated equipment, sensors, supervision
  – Monitor CCPs
    • Temperature
    • Time
    • pH
    • Moisture
  – Provides assurance that all products produced have met criteria for acceptability
Monitoring and Sampling

• Discontinuous inspection / attribute sampling
  – Used to:
    • Test ingredients (raw materials)
    • Troubleshoot out-of-control CCP
    • Spot check continuous system
  – Statistical sampling of product lot for a defect
  – Probability of detection related to defect level of sampled lot
  – Limited assurance
Summary – Continuous inspection vs. Attribute Sampling

• Continuous inspection
  – assures CCPs are within limits for all product produced

• Attribute sampling
  – provides probable assurance, based on statistical sampling of product, that CCPs are within limits
Person Responsible for Monitoring

• Has clearly defined responsibilities. The person responsible for specific monitoring activities should be designated in the HACCP plan (title, not name).

• Must be adequately trained to perform the monitoring procedures and to prepare the monitoring records.

• Follows clearly delineated procedures.

• Is responsible for documentation of monitoring activities, and signs or initials the monitoring records.
Monitoring Records

• Must include:
  – Actual monitoring information
  – Date and time the activity took place
  – Signature or initials of person conducting the monitoring procedure.
ISO 22000:2005 Monitoring

• A monitoring system shall be established for each CCP to demonstrate that the CCP is in control.

• Monitoring system must include all scheduled measurements or observations relative to the critical limit(s).

• Monitoring methods and frequency must be capable of determining when critical limits have been exceeded in time for the product to be isolated before it is used or consumed.
ISO 22000:2005 Monitoring

• The monitoring system shall include the following:
  – Measurements or observations that provide results within an adequate time frame
  – Monitoring devices used
  – Applicable calibration methods
  – Monitoring frequency
  – Responsibility and authority related to monitoring and evaluation of monitoring results
  – Record requirements and methods
## Monitoring Example

<table>
<thead>
<tr>
<th>Critical Control Point (CCP)</th>
<th>Hazard(s)</th>
<th>Critical Limits</th>
<th>Monitoring</th>
<th>Correcive Action</th>
<th>Verification</th>
<th>Record keeping</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCP 1 Culling</td>
<td>Patulin</td>
<td>No more than 1% by weight rot after culling</td>
<td>Rot in 5000 g sample</td>
<td>Cut rot and weigh rot</td>
<td>Twice per production run</td>
<td>QC staff</td>
</tr>
<tr>
<td>CCP 2 Screen</td>
<td>Metal inclusion</td>
<td>Screen is intact</td>
<td>Integrity of screen</td>
<td>Visual</td>
<td>Daily Pre-op and post-op</td>
<td>Production employee</td>
</tr>
<tr>
<td>CCP 3 Pasteurizer</td>
<td>E. coli O157:H7 and Cryptosporidium parvum</td>
<td>≥160°F for ≥ 6 s</td>
<td>1. Temp. of juice</td>
<td>Temp. recorder</td>
<td>Continuous recording with hourly visual check of record.</td>
<td>Pasteurizer operator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Set pump speed to 5 to deliver ≥ 6 s</td>
<td>Visual check of positive displacement pump at set speed</td>
<td>Visual daily check of MIG thermometer</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Daily at beginning of production</td>
<td></td>
</tr>
</tbody>
</table>
Summary

• Each CCP should have defined
  – the **best** monitoring procedure available under the given circumstances
  – the **frequency** of monitoring
  – the **decision criteria** for acceptable and unacceptable control at CCPs
QUESTIONS?
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