HACCP PLAN FOR GREEN TEA PRODUCT OF PT GT AND ITS IMPLEMENTATION

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ABSTRACT

HACCP plan for green tea product of PT GT is established in this research. The scope of the study covers the production process starting from receiving raw material at the factory until the packaging step. Determination of Critical Control Point(s) (CCPs) refers to the decision tree in CAC (2003). Critical Control Points in green tea production in PT GT lay on the final drying by ball tea and the sorting process based on density by section winnower. Critical limits in the first CCP are ball tea temperature ranging from 100 to 150°C, mass of tea leaves in a batch is 600 kg for grade A and 550 kg for grade B, and the drying time ranging from 8 to 10 hours. The critical limit in the second CCP is no metal component detected by the final metal detector at section winnower. An audit has been carried out to verify the implementation of the HACCP plan. Based on the audit, the CCP monitoring and corrective action form that has been arranged needed some correction so that the operator and supervisor will be able to fill the form better. Key words: HACCP, green tea, Critical Control Point(s), critical limit, audit Reference: 11 (1995-2009).

PREFACE

Background

Food industries are encountering many challenges, especially in the case of food safety. Some of the challenges are the increasing number of new food pathogens; chemical contamination of food which can be caused by the usage of non permitted food additives or comes from antibiotic residue, pesticide residue, and excessive usage of disinfectant; and the remarkable growth of food products and processes diversity, so the effort needed to ensure food safety also increases. In addition to that, the international trade demands for
worldwide equivalence of food safety. Therefore, a food industry that wants its products to be constantly safe and survive in the international trade must implement international food safety standard as well.

HACCP (Hazard Analysis Critical Control Point(s)) is a system adopted by Codex Alimentarius Commission as an international food safety standard. In the beginning, HACCP is adopted by FDA (Food and Drug Administration) from a program developed in the 1960s as a system to ensure the safety of food for astronauts. At that time, the food safety control system in food industries commonly depended on final product testing which could not assure thorough food safety. Therefore, the food safety system adopted by FDA, which is now known as HACCP, is implemented in food industries. This system is proactive and focuses on preventing hazard in the entire process chain, starts from raw material until finished product, according to its initial concept. This method is far more efficient than the traditional method, which rely on final product testing, because every point at which there is any possibility of hazard occurrence is controlled strictly. This preventive system also gives advantage to food industries in which it can reduce waste.

The implementation of HACCP in this research is focused on green tea product of PT GT. PT GT is a food industry that manufactures some tea products, including black tea, green tea, and white tea. The products are distributed not only in Indonesia, but also in other countries, thus making the implementation of HACCP in PT GT is crucial.

Objective

The general objectives of this research are to design and implement HACCP for green tea product of PT GT. The specific objectives of this research are to produce a HACCP plan for green tea product of PT GT and to observe its implementation through an audit.

METHODOLOGY

The method used in this research is qualitative descriptive method. The types of data that want to be obtained are primary data, secondary data, and tertiary data. The methods used to obtain primary data include conduct direct surveys to the factory, of the production process of green tea starting from raw material, receiving until the packaging stage of final product, observe Standard Operating Procedures (SOP) which are implemented in PT GT, and interview the staffs and employees in PT GT. The methods used to obtain secondary data include literature review, especially the subject of HACCP and production process of green tea; collection of data from the industry. The method used to obtain tertiary data is conducting literature review of national and international standard. The following steps are completed to get the data:

1) develop a questionnaire which can accommodate the data collection,
2) develop a HACCP team and determine the scope of the study,
3) describe the product,
4) identify the product's intended use,
5) draw up a detailed flow diagram of green tea production conducted in PT GT,
6) verify the flow diagram on-site,
7) identify and analyze hazards,
8) determine the Critical Control Point(s) (CCPs),
9) establish critical limits for each CCP,
10) determine monitoring procedure,
11) determine corrective action,
12) develop monitoring CCPs and corrective action forms,
13) implement HACCP in the production process of green tea in PT GT,
14) verify the implementation by conducting an audit.
Approach for Food Safety Management

The worldwide equivalence of food safety. Therefore, a food industry that wants its products to be constantly safe and survive in the international trade must implement international food safety standards as well.

HACCP (Hazard Analysis Critical Control Point(s)) is a system recommended by Codex Alimentarius Commission as an international food safety standard. In the beginning, HACCP is adopted by FDA (Food Drug Administration) from a program developed in the 1960s as a system to ensure the safety of food for astronauts. At that time, the safety control system in food industries commonly depended on product testing which could not assure thorough food safety. Therefore, the food safety system adopted by FDA, which is now known as HACCP, is implemented in food industries. This system is active and focuses on preventing hazard in the entire process, starts from raw materials until finished product, according to its concept. This method is far more efficient than the traditional method, which relies on final product testing, because every point at which there is any possibility of hazard occurrence is controlled. This preventive system also gives advantage to food industries in which it can reduce waste.

The implementation of HACCP in this research is focused on green tea products of PT GT. PT GT is a food industry that manufactures some tea products, including black tea, green tea, and oolong tea. The products are distributed not only in Indonesia, but also in other countries, thus making the implementation of HACCP in PT GT crucial.

HODODOLOGY

The method used in this research is qualitative descriptive analysis. The types of data that want to be obtained are primary data, secondary data, and tertiary data. The methods used to obtain primary data include conduct direct surveys to the factory, observe the production process of green tea starting from raw material receiving until the packaging stage of final product, observe the Standard Operating Procedures (SOP) which are implemented in PT GT, and interview the staffs and employees in PT GT. The methods used to obtain secondary data include literature review, especially on the subject of HACCP and production process of green tea, and collection of data from the industry. The method used to obtain tertiary data is conducting literature review of national and international standard. The following steps are completed to process the data:

1. develop a questionnaire which can accommodate the data collection,
2. develop a HACCP team and determine the scope of the study,
3. describe the product,
4. identify the product's intended use,
5. draw up a detailed flow diagram of green tea production conducted in PT GT,
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7. identify and analyze hazards,
8. determine the Critical Control Point(s) (CCPs),
9. establish critical limits for each CCP,
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11. determine corrective action,
12. develop monitoring CCPs and corrective action forms,
13. implement HACCP in the production process of green tea in PT GT,
14. verify the implementation by conducting an audit.
RESULT AND DISCUSSION

Scope of the Study

1. A food safety management system for green tea product.
2. This system covers the production process starting from receiving of tea leaves at the factory until the packaging of final product.*

HACCP Objective

1. Ensure the safety of green tea product.
2. Ensure that the quality of green tea product complies with the international standard.
3. Increase consumer’s trust.
4. Enhance the employees’ knowledge about the product handling and safety.

*Note: The storage of green tea product is not included in this system because generally the products are delivered to the consumer right after they are produced. Excess of production is usually happened only in raining season.

Product Description

<table>
<thead>
<tr>
<th>Product name</th>
<th>Green tea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical and chemical properties</td>
<td>According to SNI-01-3945-1995: Appearance of tea (dry): Color: greenish black (B); Form: rolled/twisted (B); Aroma: normal (A); Texture: solid (A); Size uniformity: uniform (B); Foreign material: none (A); Conclusion: good (B); Water extract Color: greenish yellow (SNI 01-3945:1995: red and bright [A]; Taste: between good and very good (4); Residue Appearance: green (SNI 01-3945:1995: bright and coppery [B]); Result: 43/B/4/B [according to SNI at Green Tea (SNI 01-3945-1995)]; aw = 0.523 Moisture content = 3-7%; all water extract = 5.30%</td>
</tr>
<tr>
<td>Preservation method</td>
<td>Gradually dried until moisture content reaches 3-7%</td>
</tr>
</tbody>
</table>

Packaging method: By using paper sack (with aluminium foil [inside]), Woven Plastic Polyethylene (WPPE single plastic bag, WPPE double plastic bag, WPPE single and double plastic bag with HDPE inner liner). No specific requirement, but should be avoided from direct sunlight and kept in a dry and cool place.

Storage condition: By using open-top truck which is covered by tarpaulin.

Shelf life: 2 years from the manufacturing date.

Distribution method: By using open-top truck which is covered by tarpaulin.

Preparation and usage by consumer: Can be consumed directly by boiling it in water or can be further processed to produce aror tea (for example jasmine tea), packed tea and extract.

Product’s Intended Use

Target: This green tea product can be consumed by men and female, all age, and commonly is further processed by jasmine tea factory - beverage factory extraction factory.
ce-Based Approach for Food Safety Management

**ULT AND DISCUSSION**

**Objectives of the Study**

<table>
<thead>
<tr>
<th>CP Objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A food safety management system for green tea product.</td>
<td>The storage of green tea product is not included in this system because all the products are delivered to the consumer right after they are produced. So production is usually happened only in raining season.</td>
</tr>
<tr>
<td>2. This system covers the production process starting from receiving of tea leaves at the factory until the packaging of final product.</td>
<td></td>
</tr>
<tr>
<td>3. Ensure the safety of green tea product.</td>
<td></td>
</tr>
<tr>
<td>4. Ensure that the quality of green tea product complies with the international standard.</td>
<td></td>
</tr>
<tr>
<td>5. Increase consumer’s trust.</td>
<td></td>
</tr>
<tr>
<td>6. Enhance the employees’ knowledge about the product handling and safety.</td>
<td></td>
</tr>
</tbody>
</table>

**Packaging method**
- By using paper sack [with aluminium foil lining inside], Woven Plastic Polyethylene (WPPE) single plastic bag, WPPE double plastic bag, WPPE single and double plastic bag with High Density Polyethylene (HDPE) inner liner

**Storage condition**
- No specific requirement, but should be avoided from direct sunlight and kept in a dry and clean place.

**Distribution method**
- By using open-top truck which is covered by tarpaulin.

**Shelf life**
- 2 years from the manufacturing date

**Specific requirement in labeling**
- None

**Preparation and usage by consumer**
- Can be consumed directly by boiling it in water or can be further processed to produce aromatic tea (for example jasmine tea), packed tea drink, and extract.

**Product's Intended Use**

| Target | This green tea product can be consumed by male and female, all age, and commonly is further processed by jasmine tea factory, beverage factory, extraction factory |

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**Product Description**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradually dried until moisture content reaches 3.7%</td>
<td></td>
</tr>
</tbody>
</table>

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**Ult AND DISCUSSION**

Proceeding of International Seminar: Current Issues and Challenges in Food Safety
### Flow Diagram of Production Process of Green Tea in PT GT and The Critical Control Points (CCPs)

<table>
<thead>
<tr>
<th>CCPs</th>
<th>Hazard</th>
<th>Critical Limits</th>
<th>Monitoring Procedure</th>
<th>Corrective Action</th>
<th>Verification Procedure</th>
<th>Record Keeping</th>
</tr>
</thead>
</table>
| Final drying by    | Mold includes *Aspergillus* species with    | Ball tea        | What Ball tea temperature: 100-150°C Periodical inspection of temperature. When ECP and ball tea room. When: Every hour for each batch of Ball drying. When: Operator ECP + RT and supervision ECP + RT. | - Contact the operator of the mill in charge to manage the wood filling so that Ball tea temperature reaches 100-150°C.  
- Final drying time is adjusted according to conditions of final product. | Laboratory testing of the presence of mold.  
- Evaluation of "Record of Ball Tea Temperature Inspection and Corrective Action"  
- Evaluation of "Record of Final Drying Inspections and Corrective Action" | Microbiology test revealed in laboratory.  
Record official Ball Tea Temperature Inspection and Corrective Action, Record official Drying Inspection and Corrective Action |
| ball tea           | known capacity for (grade A and adhesion production) (Habbelt, 2008) | temperature     |                                                                                      |                                                                                      |                                                                                        |                                 |
|                    | Weight of tea leaves dried in ball tea for |                 |                                                                                      |                                                                                      |                                                                                        |                                 |
|                    | each batch = 600 kg (grade A), 550 kg (grade B), Drying time = 9-10 hours |                 |                                                                                      |                                                                                      |                                                                                        |                                 |
|                    | Weight of tea leaves for each batch: drying time: How much of dried weight of tea leaves and calculation of final drying time. |                 |                                                                                      |                                                                                      |                                                                                        |                                 |
|                    | Where: ECP and ball tea room. When: Before and after final drying (for each batch) Where: Operator ECP + RT |                 |                                                                                      |                                                                                      |                                                                                        |                                 |

- Re-weigh  
- Check the balance which is used in weighing  
- Check the condition of the final product (final drying time is adjusted according to the condition of final product)
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Verification Procedure</th>
<th>Corrective Action</th>
<th>Monitoring Procedure</th>
<th>Critical Limit</th>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 h</td>
<td>Begin</td>
<td>Laboratory testing at the properties of mold (Oxidation Degree)</td>
<td>Contact the operator of the mold to manage the wood filling in the batch</td>
<td>Daily hygrometer reading of the mold temperature</td>
<td>Mold (includes Aspergillus species with known capacity for oxidation and aflatoxin production)</td>
<td>Mold</td>
</tr>
<tr>
<td>1 h</td>
<td>End</td>
<td>Laboratory testing at the properties of mold (Oxidation Degree)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 h</td>
<td>Begin</td>
<td>Laboratory testing at the properties of mold (Oxidation Degree)</td>
<td>Contact the operator of the mold to manage the wood filling in the batch</td>
<td>Daily hygrometer reading of the mold temperature</td>
<td>Mold (includes Aspergillus species with known capacity for oxidation and aflatoxin production)</td>
<td>Mold</td>
</tr>
<tr>
<td>3 h</td>
<td>End</td>
<td>Laboratory testing at the properties of mold (Oxidation Degree)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Processing of International Seminar current issues and Challenges in Food Safety
After the development of HACCP plan for green tea products in PT GT, the factory has tried to implement the HACCP plan for a period of weeks. The implementation is specific to CCP 1 (final drying by ball tea). The implementation was then audited and evaluated in order to improve the HACCP plan. Based on the audit result, the HACCP has been implemented by PT GT, but the CCP monitoring corrective action form that has been arranged needed correction so that the operator and supervisor will be able to fill the form better.

**CONCLUSION**

Based on the HACCP plan, it can be concluded that there are Critical Control Points (CCPs) in the production process of green tea in PT GT. The First CCP is the final drying by ball tea, which is used to control the biological hazard, i.e. mold, including *Aspergillus* sp. with known capacity for ochratoxin A and aflatoxin production. The second CCP is the sorting process based on density by a winnower, which is used to control physical hazard, i.e. a component from roller, ECP, and disc mill. The audit of implementation of CCP 1 showed that the CCP monitoring corrective action that has been arranged needed some correction so that the operator and supervisor will be able to fill the form better.

**References**


Audit Result toward HACCP Implementation for Green Tea Product of PT GT

After the development of HACCP plan for green tea product of PT GT, the factory has tried to implement the HACCP plan for about 2 weeks. The implementation is specific to CCP 1 (final drying by ball tea). The implementation was then audited and evaluated in order to improve the HACCP plan. Based on the audit result, the HACCP plan has been implemented by PT GT, but the CCP monitoring and corrective action form that has been arranged needed some correction so that the operator and supervisor will be able to fill the form better.

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Based on the HACCP plan, it can be concluded that there are two Critical Control Points (CCPs) in the production process of green tea in PT GT. The first CCP is the final drying by ball tea, which is used to control the biological hazard, i.e., mold, including Aspergillus species with known capacity for ochratoxin A and aflatoxin production. The second CCP is the sorting process based on density by section winnower, which is used to control physical hazard, i.e., metal component from roller, ECP, and disc mill. The audit on the implementation of CCP 1 showed that the CCP monitoring and corrective action that has been arranged needed some correction so that the operator and supervisor will be able to fill the form better.

References


ABSTRACT

Implementation of sanitation will be more focus on with more detail Standard Operating Procedures (SSOP) for each production and production supporting facilities, and surrounding environment. The purpose of this research is to arrange SSOP as an implementation of sanitation standard procedure in achieving higher quality. Research methods are the use of qualitative and quantitative data, sanitation practical and SSOP arrangement in detail, and SSOP evaluation by using qualitative data. The research result showed that the total microbes on production stage starts from the tip of fresh tea leaves were $3.0 \times 10^4$ g (tip of tea leaf), $1.9 \times 10^3$ cfu/25 g (rotary panner machine), 8.5 cfu/25 g (jackson machine), 2.3 $\times 10^3$ cfu/25 g (SSC), 3.0 $\times 10^3$ cfu/25 g (Machine number III), 1.7 $\times 10^3$ (ball tea machine). SSOP implementation can be done in a few production area comprise of hair gauze installment to prevent animal, usage of closed shoes in productive area, usage of special slippers when the workers are in toilet, and usage of closed shoes in productive area. The research result showed that the total microbes on production stage starts from the tip of fresh tea leaves were $3.0 \times 10^4$ g (tip of tea leaf), $1.9 \times 10^3$ cfu/25 g (rotary panner machine), 8.5 cfu/25 g (jackson machine), 2.3 $\times 10^3$ cfu/25 g (SSC), 3.0 $\times 10^3$ cfu/25 g (Machine number III), 1.7 $\times 10^3$ (ball tea machine). SSOP implementation can be done in a few production area comprise of hair gauze installment to prevent animal, usage of closed shoes in productive area, usage of special slippers when the workers are in toilet, and usage of closed shoes in productive area. The research result showed that the total microbes on production stage starts from the tip of fresh tea leaves were $3.0 \times 10^4$ g (tip of tea leaf), $1.9 \times 10^3$ cfu/25 g (rotary panner machine), 8.5 cfu/25 g (jackson machine), 2.3 $\times 10^3$ cfu/25 g (SSC), 3.0 $\times 10^3$ cfu/25 g (Machine number III), 1.7 $\times 10^3$ (ball tea machine). SSOP implementation can be done in a few production area comprise of hair gauze installment to prevent animal, usage of closed shoes in productive area, usage of special slippers when the workers are in toilet, and usage of closed shoes in productive area.