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# Application of hazard analysis critical control point in liquor production

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**Abstract.** In order to explore the hazard analysis critical control point (HACCP, an internationally recognized food safety detection system) effect on food quality in liquor production, affecting the liquor five hazards monitoring, determine the key point is under control and discusses the relevant follow-up work, determine the HACCP work-flow, and discusses the implementation of HACCP, faithfully record the production process, put forward the critical limits, and strict monitoring, ensure the safety of liquor products stability, provide a reference for liquor enterprise production management.

## 1. Introduction

People take food as the sky. People's requirements for food are not just food and clothing. Health has become the mainstream of food pursuit. Food safety has not been the health of people from word of mouth, nor is it based on the occurrence of great adverse reactions. The "Provisional Regulations on Food Hygiene Management" promulgated in 1965 implies that our food safety issues cannot be ignored. After many years of repeated revisions, today's Food Safety Law marks the continuous improvement of China's food safety management system and the requirements of the entire system from raw materials to the dining table in all aspects. For enterprises, how to improve their products on the premise of ensuring compliance. To improve the competitiveness of the industry in which they are working is a problem they need to consider and solve. Nowadays, the system used globally to prevent food safety problems is the quality management system, which solves the quality problems that consumers care about from the source. This is why the ultimate goal of a company to implement a quality management system.

Hazard Analysis Critical Control Point (HACCP) [1], it is a system for the prevention of food safety problems and the correction of food safety problems. It consists of two parts: food hazard analysis and key control points. It is recognized as the most effective management system for ensuring food safety. It covers food ingredients, production and finished products. Analysis of chemical, biological, physical and other hazards involved in the whole process [2]. At the same time, HACCP is an effective food safety risk management tool, and implementer can better identify potential food safety risks during food processing, and timely develop effective and comprehensive countermeasures to prevent and control potential risks. Avoiding food quality production accidents, so that every aspect



of food production is under the supervision of the HACCP system. Therefore, the application and practice of the HACCP system in food companies not only has an important guarantee for product quality, but also trusts the brand of the product. It has a very good help value. This system will reduce or even eliminate hazards to ensure food safety and provide consumers with safe and useful food[3]. In order to ensure the quality and safety of the developed products produced on the actual production line, a quality management system such as HACCP must be formulated in combination with the actual production of the enterprise.

Liquor is produced by using grain (sorghum, rice, wheat, barley, corn, and peas) as fermentation materials, and Daqu, Xiaoqu, etc. as fermentation strains. It is produced by liquid bilateral mixed fermentation, liquid fermentation, and semi-solid fermentation. Higher alcohol content is a practical liquid for human beings. Due to the increase in demand for liquor and the emergence of various liquor food safety issues, consumers are gradually paying attention to its food safety issues. The HACCP system on liquor application has appeared in Luzhou type [4], Sauce [5], Fragrance [6], Hexiang type [7]. It has value in other types of liquor [8]. These different liquor processing factories have set up a system suitable for the factory. According to the liquor production process, a corresponding management system is set up to reasonably analyze the biological, chemical, and physical hazards that may occur during the production process [9]. Summarized the specific steps of hazard occurrence, and carried out a series of records of preventive measures and corrective measures, and organized them into a book, effectively improving the flavor of liquor under the premise of ensuring the safety of liquor food, protecting the health of consumers, and increasing their competitiveness in the liquor industry To achieve a win-win result of word of mouth and output.

## **2. HACCP prerequisite work**

### *2.1. Meet the prerequisites of HACCP*

In order to ensure that HACCP can run effectively, it must meet at least the two requirements of GMP and SSOP [10].

### *2.2. Formation of the HACCP team*

The formation of the HACCP team must consist of field operators and management personnel, including those who have contact with the product, including those who have direct and indirect contact, and they must have corresponding certificates of competency; have food expertise, and operate the production process of the product Understanding of maturity, relatively complete solutions to sudden problems, and proficiency in GMP and SSOP.

## **3. Construction of liquor HACCP food safety system**

### *3.1. Liquor production process flow chart*

The production process of liquor is as follows: Raw material selection → screening → crushing → ingredients → pre-steaming and pasting → cooling → adding koji (stirring, decoration) → fermentation → distillation (removing tailings) → wine cellar storage → first base wine blending → light inspection → labeling → finished product wine → laboratory → bottling → inspection → warehouse.

### *3.2. Analysis of harm points in liquor production process.*

According to the principles and requirements of the HACCP management system, the hazard risks involved in the production and processing of liquor are analyzed. The factors that cause the harm of liquor quality problems through analysis are: biological hazards, chemical hazards, physical hazards [11]. The analysis of the harmful points in the production and processing of liquor is shown in Table 1.

**Table 1.** Analysis of hazardous points in liquor production process

Processing procedure	Potential Hazard Points	Whether it is a significant risk point	Criteria for identifying the severity of hazard risk points	Effective control measures and procedures	Whether it is CCP
Procurement and transportation of raw materials	Dirt, stones, plastics, metals; molds, yeasts, pathogens, parasites; pesticides, antibiotics, pesticides, heavy metals, bacterial toxins	Yes	Raw materials brought into storage or rotten during storage and transportation; mixed with auxiliary materials during production and transportation; lack of food standards and legal knowledge	Limit the use of pesticides and fertilizers; research Whether there is environmental pollution in the place of origin of raw materials	Yes
Clean	Washing water does not meet water standards	Yes	Water in the water plant is not up to standard	Regular water quality inspections and standard drinking water must be used in the later stages of cleaning	Yes
Fermentation	Microbiological or germ contamination	Yes	The fermentation koji was brought in, the equipment was not clean	Guarantee the quality of raw materials and koji, protect production Environment and equipment hygiene, control fermentation temperature	Yes
Blending	Microbiological or germ contamination	Yes	Water in the water plant is not up to standard	Regular water quality inspections and standard drinking water must be used in the later stages of cleaning	Yes
Filling	Metals; microbial contamination	Yes	Metal objects in contact with the equipment are damaged; whether the filling equipment and pipes are autoclaved	Strictly aseptic operation and timely cleaning of filling equipment	Yes

3.2.1. *Biohazard*. Biohazard, as the name suggests, is biological harm to the object, and is a biological factor that causes consumers to have physical problems, including harmful bacteria, viruses, molds, yeast, parasites, pathogenic bacteria and other harm to the product liquor [12].

3.2.2. *Chemical hazard*. Chemical reagents, pesticide residues, heavy metal substances [13]. Causes Liquor quality problems. These problems mainly affect the product by affecting the quality of the raw materials, so the detection and screening of the raw materials can be avoided; but the impact of the metal can not only affect the raw materials, but also pass through the equipment and pipeline in the product generation process. Some parts break or fall off. Some molds and algae can produce harmful toxins. Generally, this batch of toxins is also attributed to chemical hazards.

3.2.3. *Physical hazard*. Physical hazards mainly refer to other substances other than raw materials such as sand, soil, hair, etc., which should not appear in the product.

### 3.3. HACCP schedule

The HACCP plan of liquor production process is shown in Table 2.

**Table 2.** HACCP schedule of liquor production process

Critical control point CCP	Significant harm	Critical limit	monitor Object	method	frequency	personnel	Corrective Action
Raw materials	Pesticide residues, heavy metal elements	health standard	Health Monitoring Report	Contrast with national standards	Per batch	Purchase inspector	Supply of raw materials
Clean	Contamination with pathogenic bacteria	SSOP	Temperature and time		Each	Operator	Rewash
Fermentation	Pathogenic bacteria	20°C /4~5d	Temperature and microorganisms		Each	Quality controller	Adjust in time
Blending	Bacteria, etc.	Domestic water standard	Bacteria, pH, hardness		every day	Quality controller	Change water
Filling	Pathogen contamination Metal object	Sealed without leakage Detection by metal detector	Sealed condition Metal content	Against production standards	Per can	operator	Repackage product isolation reassessment post-processing

Note: The remaining two common process: 1) recording: CCP record; 2) verification: audit record.

### 3.4. Critical control point (CCP) determination

According to the basic principles of HACCP and the liquor production process and production process to determine the possibility of each hazard, the control of the hazard points is called key point control, and finally the purpose of prevention is achieved.

*3.4.1. Procurement and transportation of raw materials (CCP1).* The brewing raw materials are the key points that must be and are unavoidable in winemaking. The quality and type of liquor produced by different raw materials are also different. When selecting raw materials, it is required that the origin is not polluted, the raw materials are not moldy, and the soil and sand are not the best. It is tested by the professional department of the winery.

*3.4.2. Cleaning (CCP2).* The general cleaning water can be used as the source water by the municipal water supply, and the sanitary indicators refer to the "Sanitary Standard for Drinking Water"

*3.4.3. Fermentation (CCP3).* Ensure the quality of raw materials and koji, protect the production environment and equipment hygiene, and control the fermentation temperature.

*3.4.4. Blending (CCP4).* The formulation process involves more raw materials and auxiliary materials, among which the safety risks are mainly the quality of the auxiliary materials and the usage and dosage of the food additives. One is the auxiliary materials that do not meet the requirements, such as expired raw materials; the second is the use of chemical additives as food additives; Third, they are unfamiliar with the characteristics of the raw materials. These risk points will not only affect the product quality, but also cause harm to consumers. Therefore, strict monitoring must be carried out. Any outdated raw materials and additives that are arbitrarily added to the food additives and other violations of production requirements should be immediately Product isolation is handled by the quality control department.

*3.4.5. Filling (CCP5).* Shelf life is affected by many factors, of which sterilization is the more important part. Although the longer the liquor is placed, the better the shelf life is, that is, the shelf life is not important to him, but the sterilization operation is also a step that cannot be ignored. High temperature sensitivity effectively kills microorganisms [14]. Sterilize the packaging.

Metal foreign substances in food may cause physical damage to the human body. Therefore, the metal detection is set as the CCP point, and the key limit set is based on the reference technical data "FDA-ORA Compliance Policy Guide 555.425", technology and past production experience. And conducted verification experiments.

#### **4. HACCP follow-up work**

##### *4.1. Establish a monitoring plan*

Supervise every critical step that may occur, and ensure that each step is under control [15]. To ensure that HACCP is running effectively, monitoring must be accurate to the specific time, recording person, method, monitoring interval, and recording and archiving of monitoring.

##### *4.2. Establishing corrective action*

Deviations inevitably occur during the actual operation. At this time, we should take corrective measures to understand the time of the error, the specific problem, etc. to find the key to the error, and then discuss the specific solutions to correct the value, so that the product is produced. It can return to normal level. After the product returns to normal, it will take a period of time to monitor to ensure that the corrective actions have been implemented accurately and stably. Finally, the entire process will be recorded in detail and archived [16].

When performing hazard analysis, you must receive packaged liquor from raw wheat, sorghum and other inspections, and analyze each process. Understand the degree of harm caused by the error of each process, and the subsequent impact of the hazard, and handle the measures to establish the corresponding Error analysis table. The staff concentrates on maintaining a sense of mission during the operation, and the working environment is clean and tidy to avoid physical hazards.

#### 4.3. Establishing verification procedures

In order to understand whether the HACCP system has correctly achieved the expected goals, whether the plan needs to be changed, whether there is an error in the measurement of the instrument, etc., the system must be tested, calibrated, or other evaluation methods to verify the system. The verification activities of the CCP include the review of the calibration and calibration records, Review of CCP records, targeted sampling and testing [17]. The verification frequency is at least once a year, and the verification frequency is adjusted according to the number of failures or process changes.

#### 4.4. Establish and maintain documents and records

In order to prove the effective operation of the HACCP system, during the establishment and implementation of the system, an effective record and file management system must be established. The monitoring, error correction, and verification of each dangerous point have accurate verification, and other relevant documents are uniformly archived and managed. It is stored for a certain period of time according to regulations for retrospection, inspection and review at any time.

### 5. Conclusion

Through the HACCP quality management system, the hazards of the liquor production process were analyzed, the potential hazard risks affecting the quality and safety of plant protein beverages were identified, and the procurement and transportation of raw materials, cleaning, fermentation, blending, and filling were identified. Key control points; combined with the actual production and product quality standard requirements, the control limits and corrective measures for liquor production were determined, the production plan for liquor was established, and the verification and record-keeping procedures were strictly implemented, which can improve product quality in practice And competitiveness to ensure consumers' health after consumption and increase consumer confidence in liquor products [18].

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