



## **Project: Technical assistance to improve implementation of food safety standards and disease crisis preparedness**

### **1.2.5 (Task 4.2.2) Contribute to increased capacity of staff of the local chamber of commerce, chamber of food professionals, academy and others**

#### **Training on Food Associated Risks**

**SESSION 6.a : Implementation of HACCP management system:  
Case study of a halloumi factory in Cyprus.**

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# 1. INTRODUCTION



Halloumi is a well-known and accepted traditional product all over the world and is the most widely produced traditional product in TCc. It is produced using both traditional and industrial methods.

In order to increase efficiency and production capacity, efforts are being made to increase production by adhering to industrial methods and traditional production parameters.

Various types of hazards can be introduced during the Halloumi manufacturing process through different processing steps such as raw milk, processing equipment, processing environment, and food handlers.

## 2. Company description



HACCP is a globally recognized, effective, and preventive food safety management system for measuring hazards, estimating risks, and establishing precise control measures that emphasize prevention and control rather than reliance on end-product testing and traditional inspection methods. Implementing HACCP is more effective than traditional quality assurance methods in gaining consumer trust and establishing a good corporate image (Shuvo et al., 2019).

This study was conducted in a Halloumi factory located in Nicosia, Cyprus. It buys approximately 35 tons of milk a day and uses 15 tons of it for Halloumi production.

## 3 HACCP implementation steps



**Principle 1:** Perform hazard analysis (HA) for the identification of physical, chemical, and biological hazards.

**Principle 2:** Identification of critical control points (CCPs) according to the decision tree.

**Principle 3:** Establishing critical limits (CL) to ensure uniformity in the safety analyses of the processes involved.

**Principle 4:** Monitoring each CCP.

**Principle 5:** Establishing corrective actions to be executed when monitoring indicates a deviation from a predefined critical limit.

**Principle 6:** Establishing effective record-keeping procedures.

**Principle 7:** Establishing procedures for verification that the HACCP system is working correctly. In this study **PRPs and OPRPs** are applied along with HACCP plan throughout the whole production process.

## 3.1 Implementation of HACCP plan 3.1.1 Listing the prerequisite (PRP)



**Prior to the HACCP system, PRPs are systematically applied in the food processing sector** to support and improve the system's effectiveness and efficiency. PRP application is considered as the foundation of HACCP system. PRP represents the formalization of GMP and GHP elements (Wallace & Williams, 2001)

**The PRPs were:** PRP environmental hygiene, PRP establishment - design and facilities, PRP premises and rooms, PRP equipment, PRP water supply, PRP drainage and waste disposal, PRP cleaning & sanitation, PRP personnel hygiene facilities and toilets, PRP temperature and air quality control, PRP lighting, PRP handling, storage & transportation, PRP control of operation, PRP pest control, PRP waste management, PRP traceability, and PRP training.

## 3.1.2 Preliminary steps to enable hazard analysis



### 3.1.2.1 The HACCP Team

A team was formed to implement an efficient HACCP system. While assembling the HACCP team for the Halloumi industry, the team was supposed to have six members.

- ✓ HACCP Team Leader
- ✓ HACCP Team Coordinator

- ✓ HACCP team members:

Plant anager, Manufacturing Manager, Quality Assurance Manager Manager - HRM & Compliance Ware House Manager, Maintenance Manager (Electrical), Maintenance Manager, (Mechanical), Supply Chain Manager



### 3.1.2.2 Product characteristics and intended use

Table 1. Product description and intended use of Halloumi

**PRODUCT NAME:** Halloumi  
**RAW MATERIAL:** Milk (cow, goat, sheep), rennet, salt  
**DESCRIPTION OF THE PRODUCT:** The product obtained as a result of pasteurizing milk and processing it according to its technique, adding additives and maturing it when necessary.  
**PRODUCT CONTENT:** Milk, rennet, salt  
**PRODUCT SAFETY INFORMATION:**  
**Microbiological values:**

	Value
	Full Fat Halloumi Cheese
Fat, % (m/m), min.	40
Humidity, % (m/m), max.	45-54
Salt (NaCl) % (m/m), max	3.4
Protein (in 100 g)	20.9
Lead (Pb), mg/kg, max	0,02
Aflatoxin M1 (vg/Kg)	0,05

	n	c	m	M
Salmonella spp.	5	0	Will not be available in 25g	
L. monocytogenes	5	0	Will not be available in 25g	
Coagulase positive Staphylococ (kob/g)	5	2	1.0 x 10 <sup>2</sup>	1.0 x 10 <sup>3</sup>
E.coli	should not be found			

## Product description and intended use of Halloumi Cont.



<b><i>Appearance</i></b>	<b><i>Mass and Structure</i></b>	<b><i>Odour</i></b>	<b><i>Taste</i></b>
Unique bright white, homogeneous and regular prismatic appearance of the mold is intact. The color can be white, yellow, parallel to the natural color of milk, depending on the season.	It is desired to have a regular, smooth, spotless, homogeneous section, not too hard or too soft structure.	Unique odour  Will not have yeasty, sour, animal, bait or moldy odors.	A unique taste. It will not be sour, sweet, bland, salty, metallic or bitter.

**Defect:** Any visible substance other than the product content.

### **If there is a Legal Parameter Related to the Product;**

Turkish Food Codex Cheese Communiqué (Communiqué No: 2015/6) Official Gazette No: 29261 Date 08.02.2015 et seq.

**Storage and distribution conditions:** max 6° C. It is stored in warehouses with appropriate insulation, tightly closed doors, shelf system storage rules, appropriate distance from the wall, and stacked in a way that the evaporator's condensation water does not come into contact.

**Shelf life:** 1 year

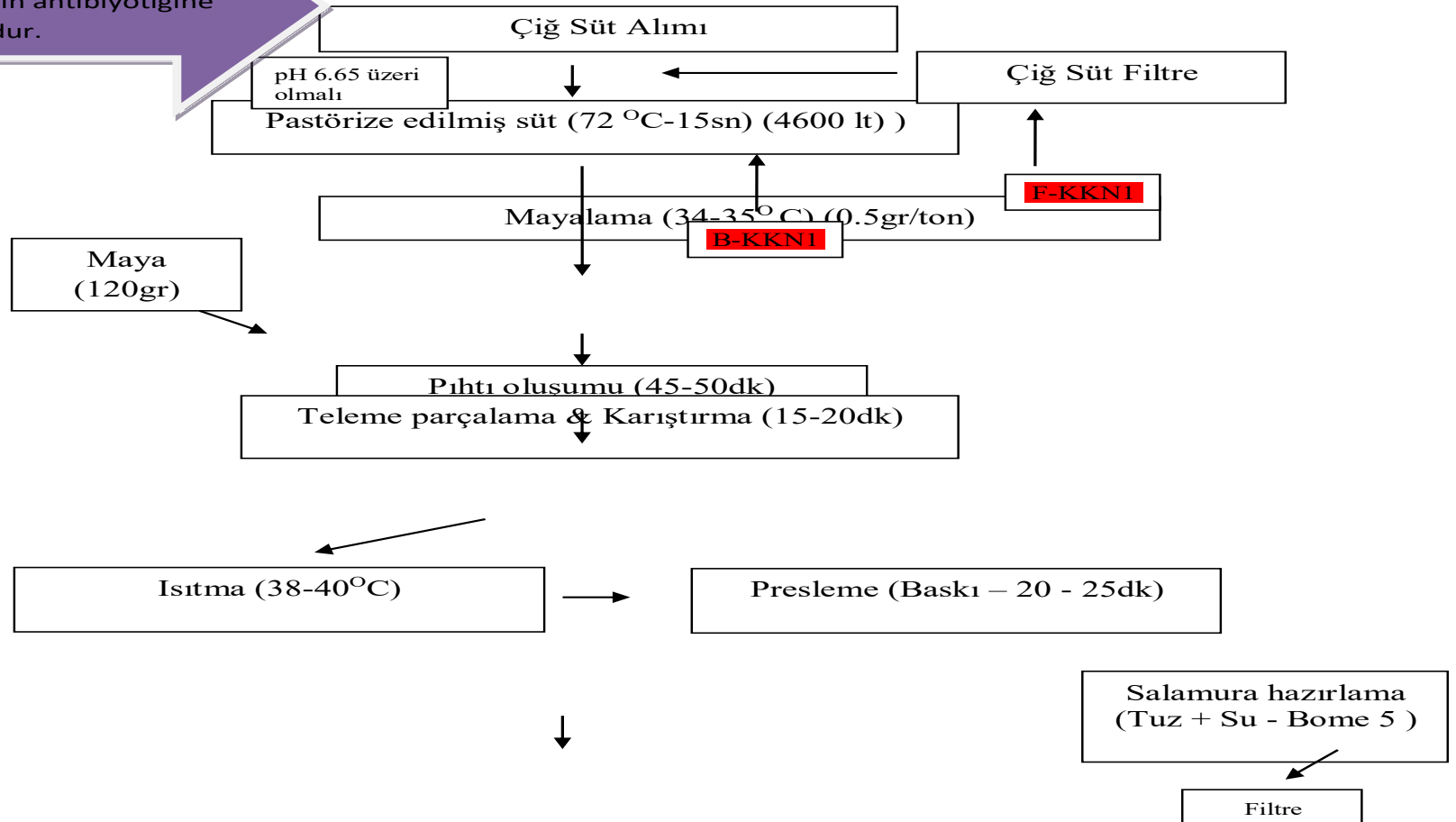


### 3.1.2.3 Construction of flow diagram

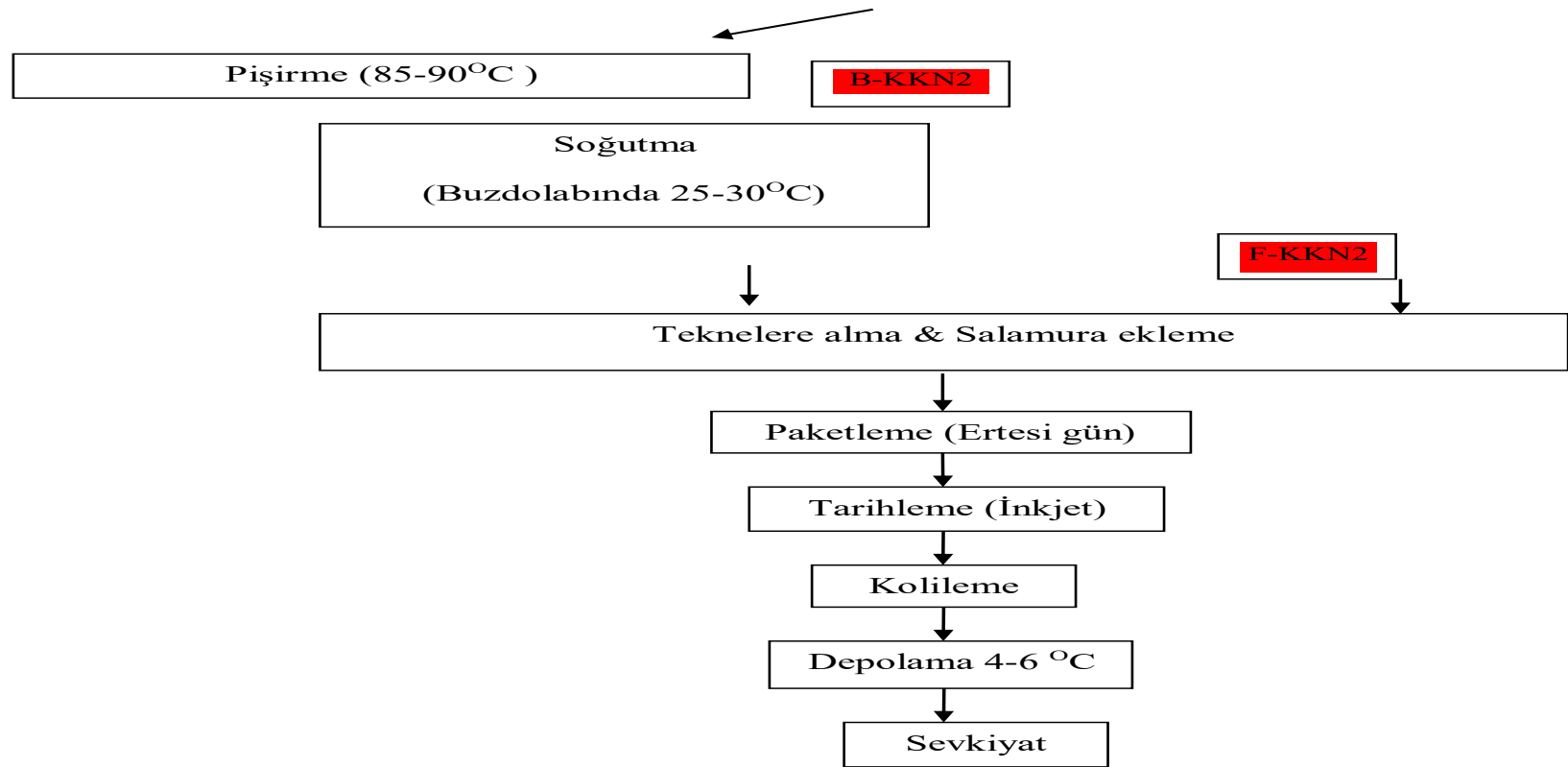


**K-KKN 1 :** Antibiyotik. Fabrikaya kabul edilen sütlerin antibiyotiğine bakılması zorunludur.

#### Hellim İş Akış Şeması



## Flow Chart Cont.



### 3.1.3 Hazard analysis, identification of CCP's and oPRPs



Raw Material										
Raw Milk	Risk of pesticide residue contamination in milk due to the presence of pesticides in the water and feed consumed by animals	K	2	4	8	H				O-ÖGP1 Pesticide residue in raw milk ÖGP: Supplier (producer) training (uncontrolled danger within the business is analyzed regularly according to the GSMS Verification and validation plan.)
	Risk of contamination of milk with heavy metal residues as a result of their presence in water and feed consumed by animals	K	2	4	8	H				O-ÖGP2 Heavy metal residue in raw milk ÖGP: Supplier (producer) training (uncontrolled danger within the business is analyzed regularly according to the GGYS Verification and validation plan.)
	Risk of aflatoxin residue contamination in milk due to the presence of aflatoxin in the feed consumed by animals	K	2	4	8	H				O-ÖGP3 Aflatoxin residue in raw milk ÖGP: Supplier (producer) training (uncontrolled danger within the business is analyzed regularly according to the GSMS Verification and validation plan.)
	Danger of antibiotics in milk after adding antibiotic-containing milk to healthy milk	K	3	4	12	E	H			C-CCP1: Raw milk acceptance, presence of antibiotics ÖGP: Supplier training ÖGP: Employee training ÖGP: Raw milk control
	Biological contamination as a result of milking from a diseased breast (mastitis) (excessive somatic cell count) and unclean milk coming from the producer	B	3	3	9	H				O-ÖGP4 Somatic cell count in raw milk ÖGP: Employee training ÖGP: Supplier training ÖGP: Raw milk control

# Risk assessment



## Risk assessment

Each hazard is subjected to risk assessment according to the criteria specified below, ensuring that different hazards are assessed on the same basis. The accepted criteria for the severity of the hazards, the probability of impact and the impact on human health are:

**Probability :**

**Severity:**

*1 Impossible*

*1 Insignificant*

*2 Sparse*

*2 Ordinary*

*3 Periodic*

*3 Dangerous*

*4 Frequently*

*4 Critical*

*5 Definite*

*5 Disasters*

5	10	15	20	25
4	8	12	16	20
3	6	9	12	15
2	4	6	8	10
1	2	3	4	5

**Risk: Probability  
x Severity**

**Risk score  $1 \leq \text{risk level} \leq 3$**

→ No Risk No Control  
Measurements Needed

**Risk score  $4 \leq \text{risk level} \leq 9$**

→ Low Risk (Control Measurements  
Should Be Performed When  
Appropriate)

**Risk score  $10 \leq \text{risk level} \leq 12$**

→ Medium Risk (Control Measures  
Should Be Implemented)

**Risk score  $15 \leq \text{risk level} \leq 25$**

→ High Risk

# Halloumi HACCP Plan



Critical control points CCP	SIGNIFICANT DANGERS	SUPPORTIVE CONTROL MEASURES	LEGAL REGULATORY CRITICAL LIMIT	what	how	frequency	who	record	CORRECTIVE ACTION/CORRECTION	VERIFICATION
<b>C-CCP1</b>	Antibiotic	Supplier Training Employee Training Raw Milk Quality Control	(TS 1018 Raw milk standard)	antibiotic residue	antibiotic test	Mixed in every milk that comes	Quality control officer	Raw milk quality control	In case of antibiotics, raw milk is sent back or destroyed. Additionally, collectors and producers are warned and necessary precautions are taken.	Control of records is carried out by the Food Safety Team Leader. Customer complaints are checked and evaluated by the Food Safety Team. Verification is provided by analysis in external laboratories according to the FSMS Verification and Validation plan.





P-CCP2	Brine Filter	Employee training Production control form for each product	It must be clean, it must be checked at every production and if it is dirty, it must be cleaned by replacing it with a spare..	residues	visual	One per Lot	Quality Control Officer	Halloumi Production Tracking Form	If the filter is damaged and/or has a defect, it is replaced with a new one.	Control of records is carried out by the Food Safety Team Leader. Customer complaints are checked and evaluated by the Food Safety Team.
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**Critical control points change according to the production technique.**

For example, if there is a **metal detector**, its correct operation and control will also be a critical control point.

## CONCLUSION



The HACCP system provides food manufacturers with effective preventive methods for ensuring food safety and improving the quality.

Furthermore, the documentation and records generated by the HACCP system can easily assist in tracing the source of contamination, preventing further production of substandard products and reducing the consumption of manpower, material, and financial resources.

The current study developed a HACCP plan for a Halloumi manufacturing plant in Cyprus in order to improve product safety and quality.



# Contact



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## THANK YOU FOR YOUR ATTENTION



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