

HACCP Case Study

Meat pie



1. Introduction

A family-owned medium size bakery has been asked by local retail customers to provide a HACCP Plan for one of the product, Meat pie.

2. Terms of reference

The HACCP study covers all types of food safety hazards, biological, chemical and physical. It did not include any cleaning and sanit5ation operations which are covered by the bakery Good Manufacturing Practice procedures and Good Hygiene practice.

3. Product Description

3.1. General

Meat pie is most popular product in Macedonia and in some other countries around Macedonia. It is a traditional Macedonian food and it is produced by flour, goat's meat, onion, salt and water. It bake dough which is developed in layers. Meat and onion are fried on vegetable oil. It's filing each crust and rolls in pie. Scour line up in round pans. Ready-made pie be stored in a cool or bake immediately.

3.2. Ingredients

White flour, goat's meat, onion, salt , palms oil and water.

3.3. Process

See Figure 1 and 2 - Generic Flow diagram of Meat pie production

3.4. Product specifications

Microbiological. See Table 1.

3.5. Package

Vacuum packed in 1 kg.

3.6. Shelf life

Frozen unbaked meat pie - 6 (six) mounts

Baked meat pie - 4 (four) hours.



3.7. Nutrition values

Energy: 250 Kcal/100g, Proteins: 15%, Fat: 20%, Sugar: 12%

3.8. Intended use

Consumers: General public, ages between 7 and 60 mainly.

3.9. Uses

Can be used for breakfast and diner. Also can be used before main meal.

3.10. Consumer instructions are as follows

Keep frozen < -18 °C

Baked on temperature > 200 °C for 20 minutes.



Table 1. Microbiological Critical Points

	n	c	m	M
<i>Staphylococcus aureus</i>	5	2	10 ² cfu/g	10 ³ cfu/g
<i>Salmonella</i> spp.	5	0	Absence in 10g	Absence in 10g
<i>E. coli</i> O157:H7	5	0	Absence in 25g	Absence in 25g
<i>Yersinia enterocolitica</i>	5	0	Absence in 25g	Absence in 25g
<i>Bacillus cereus</i>	5	1	10 ³ cfu/g	10 ⁴ cfu/g

n = number of sample units comprising the sample;

m = threshold value for the number of bacteria; the result is considered satisfactory if the number of bacteria in all sample units does not exceed "m"

M = maximum value for the number of bacteria; the result is considered unsatisfactory if the number of bacteria in one or more sample units is "M", or more;

c = number of sample units where the bacteria count may be between "m" and "M"; the sample being considered acceptable if the bacteria count of the other sample units is "m" or less.



4. Process Flow Diagram 1

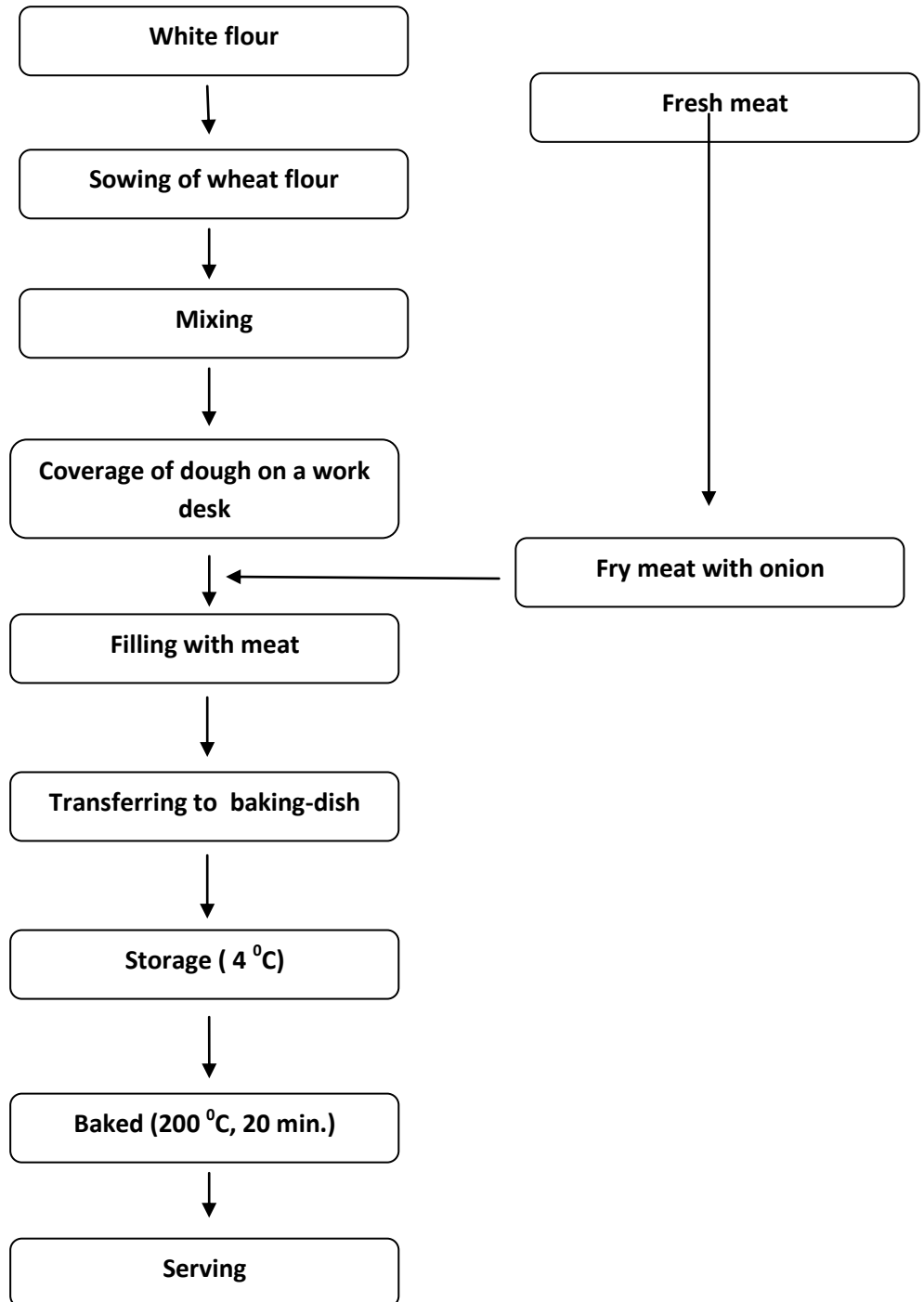


Figure 1. Flow diagram of Meat pie production - to Serving



Process Flow Diagram 2

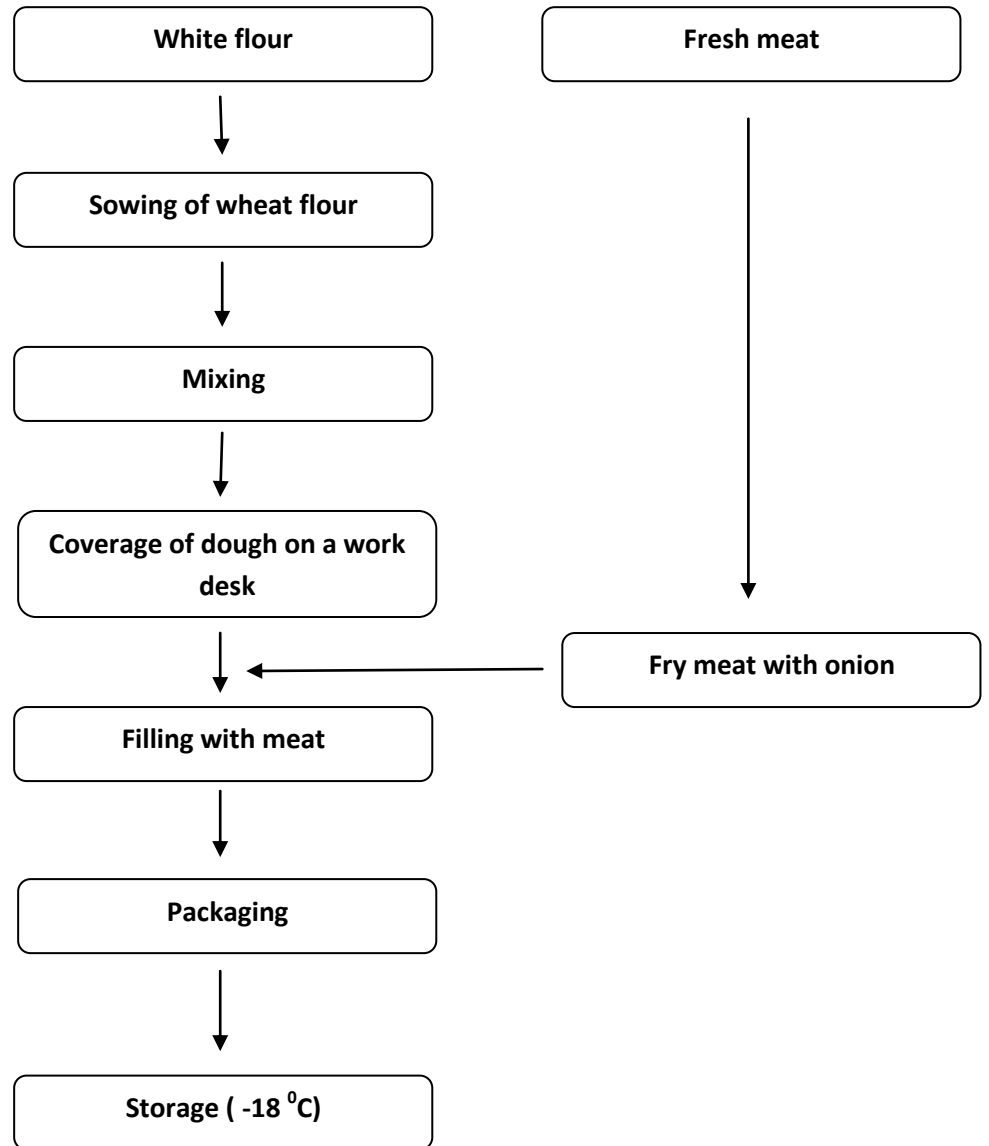


Figure 2. Flow diagram of Meat pie production - to Storage



4.1. Raw material - White flour

White flour for meat pie making should be stored in the dry storage above the floor. The flour must not contain Mould, yeast and pesticides. Before using you must make visual check for presents of mould. From time to time you must to perform External laboratory analysis for presents of pesticides.

The Pesticide Maximum Residue Limits (MRLs) for flour are presented below for each pesticide (Table 3). Pesticide residue analysis in flour should be carried out according to what is commonly used in each region.

Table 3: MRLs	
Methidathion	0.02 mg/kg
Methomyl thiodicarb	0.05 mg/kg
Methoxychlor	0.01 mg/kg
Metsylfuron-methyl	0.05 mg/kg

4.2. Raw material - fresh meat (CCP)

Fresh meat is sensitive raw materials, and required high level of control. Fresh meat should not be stored for longer than 24h and always at temperature < 4°C to avoid pathogen bacteria growth. It should be tested for: a) antibiotics, b) pesticides, c) microbiological tests.

Antibiotics should be absent. In EC countries the maximum tolerance limit for Amoxicyllin and Ampicilin in meat is 50 µg/kg.

The Pesticide Maximum Residue Limits (MRLs) for fresh meat are presented below for each pesticide (Table 4). Pesticide residue analysis in flour should be carried out according to what is commonly used in each region.

Fresh meat must always be received at temperature < 8°C.

Table 4: MRLs	
Metalaxul	0.05 mg/kg
Methacrifos	0.01 mg/kg
Methamidorhos	0.01 mg/kg
Metahidathion	0.02 mg/kg



4.3. Sowing of wheat flour

Physical hazard, the presence of foreign materials. Mechanical sowing through stainless steel bolter. Daily cleaning and visual inspection of the bolter is necessary.

4.4. Mixing

Mixing the ingredients (flour, water, salt) in electric mixer until getting compact dough. Daily cleaning and visual inspection of Electric mixer is necessary for avoiding of pathogen bacteria and mould growth.

4.5. Coverage of dough on a work desk

After mixing in electric mixer, the compact dough is transferred on work desk for additional processing. The work desk must be clean and disinfected. Cleaning, disinfection and visual inspection after using the desk is necessary. Microbiological tests on work desk is necessary in every 4 mounts.

4.6. Fry meat with onion (CCP)

Cooking (frying) of meat is the most important step of the manufacturing process regarding microbiological safety. Temperature and time control is very important. Cooked meat must show a negative microbiological test for coli-forms bacteria. Cook the filling thoroughly. Core temperature of filling should reach 75⁰C or above.

4.7. Filing with meat

Physical hazard, the presence of foreign materials from personal.

4.8. Transferring to baking-dish

Physical hazard, the presence of foreign materials from personal. Chemical hazard, possible cross-contamination from the cleaning chemicals. Wash baking-dishes thoroughly. Good Manufacturing Practice must be applied, mainly cleaning and sterilization.

4.9. Storage in refrigerator 4⁰C (CCP)

Cool storage is very important for microbiological safe from pathogenic bacteria which may be present as a result of cross contamination. The temperature should be constantly monitored and temperature in refrigerator must be under 4⁰C.

4.10. Baking on 200⁰C more than 20 min. (CCP)

Baking of meat pie is the most important step of the manufacturing process regarding microbiological safety. Temperature and time control is very important. Baked meat pie



must show a negative microbiological test for pathogens bacteria. Core temperature of meat pie should reach 75⁰C or above.

4.11. Hot storage (CCP)

Hot storage is very important for microbiological safe from pathogenic bacteria which may be present as a result of cross contamination. The temperature and time of storage should be constantly monitored and temperature must be over 65⁰C in time of 2 hours.

4.12. Serving

Good Manufacturing Practice must be applied, mainly cleaning and sterilization.

4.13. Packaging

Physical hazard, the presence of foreign materials from personal.

4.14. Storage in freezer -18⁰C (CCP)

Frozen storage is very important for microbiological safe from pathogenic bacteria which may be present as a result of cross contamination. The temperature should be constantly monitored and temperature in freezer must be under -18⁰C. Temperature above -15⁰C may to cause growth of mould.

Table 5: Identification of CCPs

No	Process Step	Potential hazards and possible causes		Control measures	*	*	*	CCP
					Q1	Q2	Q3	Y/N
1	White flour	B	Mould and yeast	Visual control before using	Y	Y	N	N
		C	Pesticides	External lab. analysis	Y	Y	N	N
2	Fresh Meat	B	Pathogen bacteria	Temperature for receiving of meet must be under 8 ⁰ C	Y	N	-	Y
		C	Antibiotics	External lab. analysis	Y	Y	N	N



3	Sowing of wheat flour	P	Foreign materials	Inspection	Y	N	N	N
4	Mixing	B	Pathogen contamination from personal	Medical check	Y	N	N	N
		B	Mould and yeast because of un-proper cleaning of mixing machine	GMP, GHP - Cleaning and Sanitation	Y	N	N	N
5	Coverage of dough on a work desk	B	Pathogen bacteria	GMP and GHP - Cleaning and Sanitation	Y	N	N	N
6	Fry meat with onion	B	Pathogen bacteria	Core temperature of cooking must be over 75 ⁰ C	Y	N	Y	Y
7	Filing with meat	P	Foreign materials	Inspection	Y	N	N	N
8	Transferring to baking-dish	C	Cross-contamination	GMP and GHP - Cleaning and Sanitation	Y	N	N	N
9	Storage in refrigerator 4 ⁰ C and -18 ⁰ C	B	Pathogen bacteria	Temperature of cool storage must be under 4 ⁰ C or -18 ⁰ C for frozen pie	Y	Y	-	Y
10	Baking on 200 ⁰ C more than 20 min	B	Pathogen bacteria	Core temperature of baking must be over 75 ⁰ C	Y	N	Y	Y
11	Hot storage > 65 ⁰ C	B	Pathogen bacteria	Temperature of hot storage must be above 65 ⁰ C	Y	Y	-	Y



12	Serving	C	Cross-contamination	GMP, GHP - Cleaning and Sanitation	Y	N	N	N
13	Packaging	P	Foreign materials	Inspection	Y	N	N	N

B: Biological, C: Chemical, P: Physical

*** Questions of the Decision Tree for raw material**

Q1: Is there a hazard associated with these raw materials??

Yes: Go to Q2 / No: Proceed to next raw material

Q2: Are you the consumer going to process these hazards out of the product in a subsequent step?

Yes: Go to Q3 / No: CCP. Sensitive raw material, high level of control required

Q3: Is there a cross-contamination risk to the facility or to other products which will no be controlled?

Yes: CCP Sensitive raw materials, high level of control required. / No: Proceed to next raw material.

*** Questions of the Decision Tree for process**

Q1: Is there a control measure for the defined hazard?

Yes: Go to Q2 / No: Proceed to next step

Q2: Is the step designed to eliminate or reduce the possible occurrence of a hazard to an acceptable level?

Yes: CCP / No: Proceed to next step

Q3: Could contamination with a hazard exceed acceptable level(s) or increase to unacceptable level(s)?

Yes: Go to Q4 / No: Proceed to next step

Q4: Will a subsequent step eliminate identified hazard(s) or reduce likely occurrence to acceptable level(s)?

Yes: Stop / No: CCP. High level of control is required



Table 6: Controlling of CCPs

Process Step	Hazard	Monitoring	Frequency	Critical Points
Fresh Meat	B	Control of temperature in the moment of receiving; Storage on 4 ⁰ C.	With every receiving of fresh meat	< 8 ⁰ C Absence of pathogen bacteria; > 4 ⁰ C.
Fry meat with onion	B	Control of cooking temperature	With every cooking	Cook the filling thoroughly. (Core temperature of filling should reach 75 ⁰ C or above).
Storage in refrigerator 4 ⁰ C and -18 ⁰ C	B	Temperature	2 or 3 time every day	<= 4 ⁰ C for refrigerator; <= -18 ⁰ C for frozen pie;
Hot storage on 65 ⁰ C		Temperature and time		>65 ⁰ C no more than 2 hours
Baking on 200 ⁰ C more than 20 min	B	Control of baking temperature	With every backing	Meat pie must be baked thoroughly. (Core temperature of meat stuffing should reach 75 ⁰ C or above).

B: Biological, C: Chemical, P: Physical

