



**CURRICULUM
OF
MEAT TECHNOLOGY
(LEVEL - 4)**

Assistant Meat Processor / Assistant Supervisor



TABLE OF CONTENTS

SR.NO	CONTENTS	PAGES
1.	Introduction	1
2.	Purpose of the training program	1
3.	Overall objectives of training program	2
4.	Competencies to be gained after completion of course	2
5.	Job opportunities available immediately and later in the future	3
6.	Trainee entry level	3
7.	Minimum qualification of trainer	3
8.	Recommended trainer: trainee ratio	3
9.	Medium of instruction i.e. language of instruction	3
10.	Curriculum Development Committee	4
11.	Duration of course (total time, theory and practical)	5
12.	Summary of Competency Standards	5
13.	Summary - Overview of the curriculum	6 - 7
SEQUENCE OF CURRICULUM MODULES		
0721MT01	Receive Meat and Other Raw Materials	8 – 9
0721MT02	Coordinate Meat Analysis	10 – 13
0721MT03	Assist in Shelf life Determination of Meat	14 – 16
0721MT04	Assist in Value-added Product Development	17 – 21
0721MT05	Manage Canning Process	22 – 24
0721MT06	Maintain Chilling and Freezing Process	25 – 27
0721MT07	Apply Meat Preservation Techniques	28 – 32
0721MT08	Implement Quality Management System	33 – 35
0721MT09	Assist in HACCP Implementation	36 – 43

1. INTRODUCTION

The agriculture sector is playing pivotal role to maintain the economy of the Pakistan where large number of individuals are directly or indirectly related to this sector to earn their livelihood. Amongst the agriculture, livestock and meat industry are the vital sectors that are providing quality food especially protein to the masses. Meat Industry is one of the largest employers in Pakistan, and demand for processed meat has shown tremendous increase due to busy life and increased awareness about meat safety and hygiene. Production of skilled human resources in the area of meat processing and preservation will help to create business opportunities as well as jobs at the local community levels alongside ensuring safe meat production for the consumers.

The present Federal Government has rightly recognized the immense potential of meat processing and preservation in Pakistan and is now taking steps to tap this potential to overcome the shortfalls in this sector. Pakistan's meat processing industry is broadly categorized into different sectors like Halal slaughtering and handling of carcass, poultry processing, seafood processing, meat production and frozen meat processing. The goal of this course is to provide students with a fundamental understanding of meat technology and to ensure that students are technically sound in practical and problem-solving approaches for entrepreneurial startups and/or jobs in the meat industry. Notably, students are stimulated to polish their entrepreneurial skills and explore new horizons of the meat processing industry.

Preservation of meat can be done by chilling, freezing, canning, fermentation, dehydration, smoking, by different chemical agents, and various non-thermal techniques. Production of a range of meat products using these preservation techniques and processes is adopted by the meat industries. In this context, the students will also develop an understanding of shelf life and nutritional consequences of meat preservation techniques.

This course will provide opportunity to the students to learn different methods to process and preserve various types of meat, sampling and handling techniques, GMPs, HACCP, different meat contaminations, meat quality control, quality assurance, meat storage, and meat shipping etc.

The main goal of this course on meat technology is to prepare a student as skilled personnel for efficient meat processing to increase the productivity with effective quality control and to preserve the environment while fulfilling consumer expectations.

To improve the quality and relevancy of this training program, National Vocational & Technical Training Commission via Qualification Development Committee (QDC) developed National Competency Standards Level 4 for Meat Technology. The learning outcomes through this curriculum provide enough grounds to enrich the meat industry with demand-driven trained personnel in line with the latest industrial needs. Furthermore, this curriculum can be implemented in different sectorial pathways with flexibility in both public and private sector institutes.

2. PURPOSE OF THE TRAINING PROGRAMME

The purpose of this qualification is to give the trainee a thorough understanding of meat processing and preservation in meat industry with effective quality control and safety of the meat products. Meat processing and preservation are diversified methods and continuously subject to changes over time. It is therefore important to stress the need for a multidisciplinary approach to meet the challenges within this sector. Upon successful completion of this course the trainees should be able to:

- Explain the core elements of meat processing and preservation techniques
- Understand the chemistry underlying the properties and reactions of various meat components
- Understand basic principles behind analytical techniques associated with meat
- Be able to use the laboratory techniques common to basic and applied meat chemistry
- Understand the basic principles and practices of cleaning and sanitation in meat processing operations
- Apply the principles of meat science to control and assure the quality and safety of meat products
- Be aware of current topics of importance to the meat industry
- Work effectively with others; provide supervision in a variety of situations and can deal with individual and/or group conflict

3. Overall objectives of training course

The primary objective of this training program is to provide the trainees with up-to-date knowledge and skills required by the meat processing sector in a comprehensive way to cope the challenges of the food industries. After qualifying the course at different levels (Level 2 – 5), the students will be able to get job in the meat handling and processing industries and be able to function as entrepreneurs. The contents of the course are specifically designed in such a way that it covers all the major sectors in meat industry hence, the students are sufficiently exposed to operational requirements of these sectors and are ready to perform their duties confidently.

The overall objectives of developing this qualification are to:

- Improve the overall quality of training delivery and setting national benchmarks for training of Meat Technology (Level 5) in the country
- Provide flexible and progressive learning opportunity for trainees to receive relevant and up-to-date skills in meat industry
- Provide basis for competency-based assessment which is recognized and accepted by employers in modern days
- Establish a standardized and sustainable training in consultation with the meat industry

4. Competencies to be gained after completion of course

After completing this course, the students will be capable of performing different food processing operations decently in the food industries. Furthermore, this skilled training program enables the students to develop multispectral competencies such as creative thinking, problem solving, research skills, personal and group management, presentation and communication skills, technical and professional negotiations related to food processing operations. The below listed competencies imprinted by this training program are quite prominent to the students' profile to enhance their employability in their career in food sector:

- Knowledge and concepts of processing operations in meat industry
- Creative thinking and troubleshooting skills in food manufacturing
- Potential to translate theoretical knowledge into practice

- Identify and explore potential areas of opportunities in meat sector
- Develop strategies to maintain quality and safety of meat products
- Time management, working in teams and conflict handling among co-workers
- Safe and secure use of workplace tools, techniques and materials at worksites
- Digital documentation and effective communication skills
- Working in commercial setups and meeting the timelines

5. Job opportunities available immediately and in the future

The successful pass outs of this course may avail entrepreneurial opportunities and/or fetch job/employment in food sectors as

- Assistant Slaughterer / Helper (Level-II)
- Meat Cutter / Meat Packer / Butcher (Level-III)
- Assistant Meat Processor / Assistant Supervisor (Level-IV)
- Supervisor/ Assistant Line Inspector (Level-V)

6. Trainee Entry Level

- Level – 3 qualified in Meat Technology.

7. Minimum Qualification of Trainer

- 2-5 years of professional experience in food/meat industry after DAE (Food Technology)/ Bachelor degree [BS/ B.Sc.(Hons)] Food Science and Technology/ Meat Science and Technology

8. Recommended Trainer: Trainee Ratio

- The recommended trainer and trainee ratio is 1:25 per class

9. Medium of Instruction

- Urdu, English or Local Language

10. Curriculum Validation Committee

The following members participated in the Validation of Curriculum meeting for the trade “Meat Technology” from November 21-25, 2022 at Park Lane Hotel, Lahore:

Sr.	Name	Designation
1.	Mr. Muhammad Nasir Khan	Ex DD NAVTTC DACUM Facilitator
2.	Ms. Saima Asghar	DACUM Expert, Lahore
3.	Mr. Muhammad Aasim	Assistant Director NAVTTC Coordinator
4.	Dr. Shinawar Waseem Ali	Associate Professor/Chairman, Department of Food Sciences, University of the Punjab, Lahore Ex-Quality Assurance Officer K&N Pakistan
5.	Mr. Ibrahim Anwar	Lecturer Food Technology, GCT Nowshera Representative KP-TEVTA
6.	Mr. Muhammad Shahzad Javed	Senior Research Officer, PBTE
7.	Mr. Muhammad Ahmad	Technical Auditor Halal Food Punjab, Lahore
8.	Dr. Iahtisham-Ul-Haq	Assistant Professor, Kauser Abdulla Malik School of Life Science, Forman Christian College (A Chartered University), Lahore
9.	Dr. Muhammad Sohaib	Assistant Professor, Dept. of Food Science and Human Nutrition, University of Veterinary and Animal Sciences, Lahore
10.	Dr. Kashif Nauman	Assistant Professor, Dept. of Meat Science and Technology, University of Veterinary and Animal Sciences, Lahore
11.	Dr. Tabussam Tufail	Assistant Professor, Department of Food Science and Human Nutrition, University of Lahore
12.	Muhammad Saeed Ahmed	Farm Manager, Farm Manager Office, University of Veterinary and Animal Sciences Lahore
13.	Mr. Shakir Manzoor	Manager Operations, Professional Quality Solutions, Lahore

11. Duration of Course (Total time, theory & practical) [20:80]

Module #	Title	Theory Total (Hours)	Practical Total (Hours)	Total (Hours)	Credit hours
1.	Receive Meat and Other Raw Materials	18	72	90	9
2.	Coordinate Meat Analysis	24	96	120	12
3.	Assist in Shelf life Determination of Meat	24	96	120	12
4.	Assist in Value-added Product Development	42	168	210	21
5.	Manage Canning Process	24	96	120	12
6.	Maintain Chilling and Freezing Process	18	72	90	9
7.	Apply Meat Preservation Techniques	24	96	120	12
8.	Implement Quality Management System	24	96	120	12
9.	Assist in HACCP Implementation	24	96	120	12
10.	Create Technical Documentation	18	72	90	9
Total		240	960	1200	120

12. Summary of Competency Standards:

The proposed curriculum is composed of 10 modules that will be covered in 1200 hrs. It is proposed that the course may be delivered in one (01) year period. The distribution of contact hours (practical & theory) is given below:

- **Theory:** (20%) **Practical** (80%)
- **Theory:** 240 hours
- **Practical:** 960 hours

13. SUMMARY – OVERVIEW OF THE CURRICULUM

Module Title	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 01. Receive Meat and Other Raw Materials	LU1. Inspect meat and other materials at receiving LU2. Store meat and other material as per requirements LU3. Maintain records	18	72	90
Module 02. Coordinate Meat Analysis	LU1. Arrange Meat sampling materials LU2. Coordinate for meat sampling (Physicochemical Analysis) LU3. Perform sampling for microbiological analysis LU4. Deliver samples to lab LU5. Obtain results	24	96	120
Module 03. Assist in Shelf life Determination of Meat	LU1. Prepare meat sample for shelf life determination LU2. Examine changes in physical properties LU3. Dispatch meat samples and receive results	24	96	120
Module 04. Assist in Value-added Product Development	LU1. Receive and inspect raw materials LU2. Supervise mixing LU3. Perform cooking process LU4. Perform different stuffing and packaging techniques LU5. Chill and store the meat products LU6. Operate processing machinery	42	168	210
Module 05. Manage Canning Process	LU1. Supervise preparatory operations LU2. Supervise functioning of packaging machinery LU3. Perform retort process	24	96	120

Module 06. Maintain Chilling and Freezing Process	LU1. Supervise pre-chill area LU2. Supervise functioning of chiller and freezer LU3. Supervise temperature for meat products LU4. Maintain Records	18	72	90
Module 07. Apply Meat Preservation Techniques	LU1. Arrange processing equipment for curing LU2. Prepare meat / ingredients for curing LU3. Prepare brines LU4. Operate curing equipment LU5. Prepare meat / ingredients for smoking LU6. Smoke the meat products LU7. Chill the meat products	24	96	120
Module 08. Implement Quality Management System	LU1. Monitor Quality in Work area LU2. Assist in Internal Audits LU3. Assist in meat quality policy implementation LU4. Maintain meat quality records	24	96	120
Module 09. Assist in HACCP Implementation	LU1. Apply Prerequisite Program LU2. Assist in conducting Hazard Analysis LU3. Assist in determining Critical Control Points (CCPs) LU4. Assist in establishing Critical Control Limits LU5. Assist in establishing monitoring procedures LU6. Assist in establishing corrective Actions LU7. Assist in establishing verification procedures LU8. Assist in establishing record and documentation procedures	24	96	120

Module 1: Receive Meat and Other Raw Materials

Objective: After completing this module, the learner will be able to demonstrate the understanding of the basic applications of receiving meat and other raw materials. Trainee will be able to perform the inspection and storage activities associated with receiving of meat and other raw materials.

Duration:	Total hours	90	Practical	72	Theory	18
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Inspect meat and other raw materials at receiving	- Check meat and other raw materials vehicle's transport - Inspect conditions and integrity of the packaging of meat and other materials - Check pests infestation in meat and other materials - Record temperature of meat	- Describe types of transports for meat - Knowledge of hygiene requirements for meat transport vehicle - packaging requirements for raw meat - Describe integrity for meat packaging - Knowledge of pest infestation in meat <u>Practical Activity:</u> - Demonstrate temperature measurement for meat - Practice to check pest infestation in meat at receiving	06 hours Theory 24 hours Practical Total:30 hours	Weighing scale, Probe thermometer Magnifying glass Record sheets	Class Room and workplace

		Practice inspection of meat transport vehicle and packaging			
LU2. Store meat and other material as per requirements	- Store meat and other materials in required conditions - Maintain conditions for spices and other ingredients at room temperature and controlled humidity	- Knowledge of first expire first out (FEFO), First in first out (FIFO), Last in first out (LIFO) - Define types of storage for meat - Define humidity and controlled atmosphere storage - Describe storage conditions for spices and other raw materials - Check humidity and temperature of environment and raw materials <u>Practical Activity:</u> - Demonstrate freezing operations	06 hours Theory 24 hours Practical Total:30 hours	Probe Thermometer Freezer Chiller Humidity meter Humidifier Refrigerator	Class Room and workplace
LU3. Maintain records	- Maintain log book - Record information in a standard format	- Define logbook - Describe importance of maintaining records <u>Practical Activity:</u> - Demonstrate record keeping	06 hours Theory 24 hours Practical Total:30 hours	Logbook Log sheets	Class Room and workplace

Module 2: Coordinate Meat Analysis

Objective: After completing this module, the learner will be able to coordinate meat analysis. The learner will have knowledge and skills required to coordinate meat analysis as per specifications. This includes performing meat sampling, arranging samples, recording physical observations.

Duration:	Total hours	120	Practical	96	Theory	24
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Arrange Meat sampling materials	- Organize materials for tagging and recording sample - Store samples in freezer and/or cold store	- Define tagging of samples - Describe importance of tagging - Describe importance of record keeping <u>Practical Activity:</u> - Demonstrate tagging of samples - Demonstrate frozen storage of tagged samples - Demonstrate cold storage of tagged samples	04 hours Theory 18 hours Practical Total:22 hours	Tags Freezer Refrigerator Logbook	Class Room and workplace
LU2. Coordinate for meat sampling (Physicochemical Analysis)	- Collect meat samples for physical analysis - Analyze the color and smell of meat sample	Knowledge of physicochemical parameters of meat and related ingredients	05 hours Theory 18 hours	Colorimeter Weighing machine	Class Room and

	- Record the physical observations - Maintain required conditions	- Define sampling methods - Describe different sampling techniques for physicochemical analysis of meat - Explain importance of organoleptic characteristics for meat quality <u>Practical Activity:</u> - Demonstrate collection and physical analysis of meat samples - Perform organoleptic evaluation of meat samples - Demonstrate record keeping	Practical Total:23 hours		workpl ace
LU3. Perform sampling for microbiological analysis	- Apply suitable sampling technique - Collect sample for microbial analysis - Transfer the sample to relevant lab for analysis	- Define common microbes growing on meat - Differentiate between gram positive and gram-negative bacteria - Describe different sampling techniques for microbiological analysis of meat	06 hours Theory 27 hours Practical Total:33 hours	Glassware Swab Test tubes Aseptic bags Autoclave Microbiological growth media Lab coat Mask Hairnet Gloves Logbook	Class Room and workpl ace

		• Knowledge of sample storage conditions • Define swab test • Describe requirements for transfer of samples to relevant lab for microbial analysis <u>Practical Activity:</u> • Demonstrate swab test • Demonstrate sample collection for microbial analysis • Demonstrate microbial analysis of meat samples • Prepare sample for storage			
LU4. Deliver samples to lab	• Pack sample in sterile bags • Timely deliver sample at required conditions	• Knowledge of handling of samples for microbial analysis • Describe requirements for packaging of samples • Importance of timely delivery of samples <u>Practical Activity:</u> • Demonstrate safe handling and transfer of samples to relevant labs	05 hours Theory 15 hours Practical Total:20 hours	Aseptic bags Lab coat Mask Gloves Hairnet Logbook	Class Room and workpl ace

LU5. Obtain results	• Collect results from lab • Report results/data • Maintain record as per procedure	• Define requirements for collection of results from relevant lab • Describe importance of timely reporting of results to the concerned person <u>Practical Activity:</u> • Perform record keeping	04 hours Theory 18 hours Practical Total:22 hours	Lab coat Hairnet Mask Gloves Stationary Logbook	
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Module 3: Assist in Shelf life Determination of Meat

Objective: After completing this module, the learner will be capable to apply skills and knowledge to assist in shelf life determination of meat. The trainees will be able to enhance skills related to shelf life determination of meat samples.

Duration:	Total hours	120	Practical	96	Theory	24
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Prepare meat sample for shelf life determination	- Perform sorting and grading of received meat cuts - Perform slicing and shaping - Maintain environmental conditions as per procedure	- Define sorting - Define grading - Differentiate between sorting and grading - Describe meat cuts - Define slicing of meat - Define shaping of meat cuts - Knowledge of environmental conditions for safe handling of meat cut samples <u>Practical Activity:</u> - Demonstrate sorting and	08 hours Theory 33 hours Practical Total:41 hours	Meat Cutter Meat Slicer Butcher's knife Wood log Metal Safety Gloves Apron Safety Shoes	Class Room and workplace

		grading of meat cuts Demonstrate slicing and shaping of meat cuts			
LU2. Examine changes in physical properties	- Observe color and smell of carcass and meat cuts - Record observed physical parameters	- Explain organoleptic standards for meat carcass - Describe physical properties of meat cuts <u>Practical Activity:</u> - Demonstrate assessment of physical traits in meat carcass and meat cuts - Perform record keeping	08 hours Theory 33 hours Practical Total:41 hours	Colorimeter Mask Lab coat Gloves Stationary Logbook Record sheets	Class Room and workplace
LU3. Dispatch meat samples and receive results	- Perform sampling for lab analysis - Tag and transfer sample in controlled conditions to lab - Maintain sample record	- Explain SOPs for sampling of meat cuts and carcass for lab analysis - Describe SOPs for tagging of samples - Elaborate controlled	08 hours Theory 30 hours Practical Total:38 hours	Glassware Swab Test tubes Aseptic bags Lab coat Mask Gloves hairnet Logbook	Class Room and workplace

	• Collect result report from lab • Maintain relevant records	conditions for sample handling during transfer to lab • Describe requirements for collection of results from relevant lab at different intervals • Elaborate importance of timely reporting of results to the concerned person <u>Practical Activity:</u> • Demonstrate dispatch of meat samples to the lab • Perform record keeping			
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Module 4: Assist in Value-added Product Development

Objective: After completing this module, the learner will be able to assist in meat value-added product development. The learner will understand and learn about the principles about different processes in value-added product development of meat.

Duration:	Total hours	210	Practical	168	Theory	42
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Receive and inspect raw materials	- Inspect transport conditions - Check meat quality parameters (pH, sensory evaluation) - Check additives with their quality parameters	- Describe inspection of transport vehicle - Elaborate transport conditions for receiving of raw materials - Describe pH and its importance - Explain sensory evaluation - Define food additives - Enlist different food additives - Differentiate between adulterants and contaminants - Enlist different adulterants in meat - Elaborate quality attributes of food additives	06 hours Theory 18 hours Practical Total:24 hours	PPEs pH meter probe thermometer Sieves of different mesh sizes Titration apparatus Weighing balance Record sheets	Class Room and workplace

		- Explain SOPs for receiving and inspection of raw materials <u>Practical Activity:</u> - Perform inspection of raw materials - Perform adulterants testing			
LU2. Supervise mixing	- Arrange the ingredients according to master recipe - Check equipment's functionality for mixing - Arrange Sorting, Cutting, Mincing, Slicing machines as per requirements - Perform comminution	- Define master recipe - Describe recipe standardization and its importance - Define mixing - Describe different mixing methods - Explain requirements for sorting, cutting, mincing and slicing of meat and other raw materials - Define comminution <u>Practical Activity:</u> - Supervise sorting, cutting, mincing, slicing operations - Supervise mixing of ingredients - Perform comminution	06 hours Theory 27 hours Practical Total:33 hours	Mixer Mincer Cutter Slicer Knife Gloves Metal gloves Apron Hairnet Weighing balance	Class Room and workplace

LU3. Perform cooking process	• Arrange different coating as per product's needs • Check heat treatment as per product's need • Record the process specifications	• Define coating • Define breadng • Describe composition of coating as per product needs • Elaborate different coating techniques • Understanding of heat processing • Describe different heat processing techniques • Elaborate advantages and disadvantages of different heat processing techniques • Describe process specification for respective heat processing techniques <u>Practical Activity:</u> • Perform coating operations • Perform heat processing operations • Perform record keeping	08 hours Theory 39 hours Practical Total:47 hours	Cooking utensils Hairnet Apron Stove Gloves Probe thermometer Rollers Record sheets Cooking Range Fume Hood	Class Room and workplace
LU4. Perform different stuffing and packaging techniques	• Provide material for stuffing and packaging process	• Define casing • Describe types of casings • Define molding	08 hours Theory 36 hours Practical	Hairnet Apron Stove Gloves Casings	Class Room and workplace

	- Inspect molding to achieve required shape and size - Perform stuffing as per product needs - Inspect packaging as per product needs	- Describe different types of molding techniques - Define stuffing - Describe techniques of stuffing - Describe selection of packaging material as per product need <u>Practical Activity:</u> - Perform molding to achieve required shape and size - Perform stuffing as per product need - Perform packaging operation	Total:44 hours	Moulders Shrink wraps	
LU5. Chill and store the meat products	- Check packaged products meet specification - Check and Operate freezer / chiller specifications	- Define chilling - Define freezing - Describe SOP for chilling - Describe SOPs for freezing process - Elaborate packaging specification for meat products - Define SOPs for storage of packed meat products <u>Practical Activity:</u> - Perform chilling process	06 hours Theory 18 hours Practical Total:24 hours	Hairnet Apron Gloves Chiller Freezer Probe thermometer Packaging material	Class Room and workplace

	• Store the packed product as per the SOPs	• Demonstrate freezing process • Store packed meat products			
LU6. Operate processing machinery	• Check functioning of processing machinery • Check cleaning and disinfection of machine / equipment • Operate retort for production • Operate mixer and homogenizer	• Define functions of a retort machine • Explain cleaning • Elaborate cleaning methods • Describe disinfection • Elaborate disinfection techniques • Describe mixing and homogenization procedures <u>Practical Activity:</u> • Perform cleaning of machinery • Perform disinfection of processing machinery • Operate retort • Operate homogenizer • Operate mixer	08 hours Theory 30 hours Practical Total:38 hours	Food grade cleaning agents, Disinfecting agents, Retort Mixer Homogenizer	Class Room and workplace

Module 5: Manage Canning Process

Objective: After completing this module, the learner will be able to apply skills and specific knowledge to manage canning process. The learner will be able to understand about packaging and retort process in meat canning process.

Duration:	Total hours	120	Practical	96	Theory	24
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Supervise preparatory operations	- Check functionality of Sorting, Cutting, Mincing, Slicing machinery - Check required mixing time and temperature	- Define Canning - Elaborate unit operations in canning - Explain sorting, cutting, mincing, slicing - Elaborate Mixing techniques <u>Practical Activity:</u> - Check functionality of sorting, cutting, mincing and slicing operations - Check functionality of mixing operations	08 hours Theory 27 hours Practical Total:35 hours	Hairnet Apron Gloves Sorter Mixer Cutter Slicer Probe thermometer	Class Room and workplace

LU2. Supervise functioning of packaging machinery	• Check functioning of packaging machinery • Check oil levels and lubrication status • Check hygienic parameters	• Elaborate packaging pre-to operate packaging machinery • Define lubrication and its importance • Enlist lubricants for packaging machinery • Elaborate hygiene parameters for packaging machinery <u>Practical Activity:</u> • Check oiling and lubrication process • Check hygiene status of packaging machinery	08 hours Theory 30 hours Practical Total:38 hours	Packaging machinery Packaging materials Lubricants	Class Room and workplace
LU3. Perform retort process	• Check temperature, pressure, water supply and intact seals of machine	• Define retort • Explain conditions for retort processing • Elaborate control measures for	08 hours Theory 39 hours Practical	Thermometer Retort processing equipment	Class Room and workplace

	• Check sealing integrity of cans • Operate retort • Perform random sampling for process verification • Check finished product specification • Record workplace information in the standard format	temperature, pressure, water supply and intact seals of machine • Define sealing of cans • Define clinching • Define seaming and double seaming • Elaborate SOPs for verification of effective canning <u>Practical Activity:</u> • Perform clinching and seaming of cans • Perform retort operation • Perform sampling for process verification • Perform seal and can integrity after processing • Perform record keeping	Total:47 hours	Sealer Cans Clincher Seaming machine Record sheets	
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Module 6: Maintain Chilling and Freezing Process

Objective: After completing this module, the learner will be able to understand the chilling and freezing process. The learner will also know about the requirements for pre-chill area for meat storage, functioning of freezers and chillers, and optimum conditions to store meat products for long and short periods.

Duration:	Total hours	90	Practical	72	Theory	18
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Supervise pre-chill area	- Inspect the pre-chill area - Check hygienic shifting of product to pre-chill area - Maintain the hygienic condition of pre-chill area	- Define pre-chilling - Explain pre-chilling process requirements - Differentiate between chilling and freezing - Elaborate SOPs for inspection of pre-chill area - Knowledge of hygiene standards of pre-chill area <u>Practical Activity:</u> - Inspect pre-chill area - Inspect hygiene status of pre-chill area	03 hours Theory 15 hours Practical Total:18 hours	Chiller Freezer Record sheets	Class Room and workplace

LU2. Supervise functioning of chiller and freezer	• Monitor temperature of chiller and freezer • Monitor cleaning of chiller and freezer • Record data in standard format	• Define SOPs for chilling and freezing processes • Describe cleaning operations of chiller and freezers <u>Practical Activity:</u> • Supervise cleanliness of chiller and freezer • Perform record keeping	06 hours Theory 21 hours Practical Total:27 hours	Thermometer Cleaning Chiller Freezer Record sheets	Class Room and workplace
LU3. Supervise temperature for meat products	• Check required product temperature and equipment conditions • Coordinate maintenance schedule with concerned department	• Understanding of chilling and freezing conditions for different meat products • Knowledge of SOPs to monitor temperature requirements for meat products • Explain maintenance schedule for chilling and freezing <u>Practical Activity:</u> • Practice monitoring of chilling and	06 hours Theory 21 hours Practical Total:27 hours	Thermometer Chiller Freezer Meat products Maintenance schedules Record sheets	Class Room and workplace

		freezing status of meat products • Demonstrate SOPs for coordinating maintenance schedule			
LU4. Maintain Records	• Check temperature • Assist in calculating efficiency of the freezer and chiller to maintenance department • Report to supervisor	• Define efficiency • Differentiate between chilling and freezing effectiveness and efficiency • Elaborate reporting procedure <u>Practical Activity:</u> • Perform record keeping of temperature • Check freezer/ chiller efficiency	03 hours Theory 15 hours Practical Total:18 hours	Freezer Chiller Record sheets	Class Room and workplace

Module 7: Apply Meat Preservation Techniques

Objective: After completing this module, the learner will be able to apply skills and knowledge to apply meat preservation techniques. The trainees will be able to enhance skills for brine preparation and meat curing and smoking process.

Duration:	Total hours	120	Practical	96	Theory	24
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Arrange processing equipment for curing	- Prepare required equipment - Clean processing equipment according to the manufacturer's instructions.	- Define Curing - Explain Curing methods - Knowledge of equipment required for curing <u>Practical Activity:</u> - Demonstrate readiness of equipment for curing - Practice cleaning of curing equipment	03 hours Theory 12 hours Practical Total:15 hours	Cleaning and disinfecting agents Scrubber Brushes Cleaning cloth Curing equipment Record Sheets	Class Room and workplace
LU2. Prepare meat / ingredients for curing	- Select meat cuts according to product specifications. - Prepare ingredients according to product specifications.	- Define curing ingredients - Describe product specification for curing purpose	04 hours Theory 15 hours Practical	Weighing balance Sieves of different mesh sizes Curing ingredients	Class Room and workplace

		- Enlist product specific ingredients required for curing <u>Practical Activity:</u> - Demonstrate preparation of meat/ ingredients for curing	Total:19 hours	Meat cuts	
LU3. Prepare brines	- Mix ingredients according to product specifications - Check strength of brine solution	- Define Brine - Explain brining process - Elaborate specifications for brining solutions for meat curing <u>Practical Activity:</u> - Demonstrate brine preparation - Evaluate strength of brine solution	04 hours Theory 15 hours Practical Total:19 hours	Salt Water Salometer Curing ingredients Weighing balance	Class Room and workplace
LU4. Operate curing equipment	- Perform curing according to product specifications - Monitor equipment efficiency accordingly - Make adjustments to the process as required to	- Explain steps in curing - Elaborate curing requirements as per product needs - Knowledge of SOPs for monitoring of curing equipment	04 hours Theory 15 hours Practical Total:19 hours	Curing equipment Record sheet Refrigerator Chiller Freezer	Class Room and workplace

	achieve product specifications • Store product according to product specifications	• Explain storage requirements for cured meat products <u>Practical Activity:</u> • Demonstrate adjustments to curing process as per product needs • Demonstrate storage of cured meat products			
LU5. Prepare meat / ingredients for smoking	• Select meat cuts according to product specifications. • Prepare ingredients according to product specifications	• Define smoking of meat • Describe product specification for smoking purpose • Advantages and disadvantages of meat smoking • Enlist product specific ingredients required for smoking <u>Practical Activity:</u> • Demonstrate preparation of meat/ ingredients for smoking	03 hours Theory 12 hours Practical Total:15 hours	Meat smoker Coal/ wood chips Meat smoking ingredients Weighing balance Sieves of different mesh sizes Grinder Blender	Class Room and workplace

LU6. Smoke the meat products	• Check correct spacing prior to loading. • Monitor temperature of smoking chamber according to the product specifications. • Operate meat smoker.	• Explain steps in meat smoking • Elaborate meat smoking requirements as per product specifications • Explain SOPs for monitoring of smoking equipment <u>Practical Activity:</u> • Demonstrate meat smoking process • Demonstrate adjustments to smoking process as per product specifications	03 hours Theory 15 hours Practical Total:18 hours	Meat smoker Coal/ wood chips Meat smoking ingredients	Class Room and workplace
LU7. Chill the meat products	• Chill product according to product specifications. • Stack the product according to product specifications • Store product according to product specifications.	• Explain chilling • Define stacking • Explain SOPs for chilling of meat products • Explain storage requirements for processed meat products <u>Practical Activity:</u>	03 hours Theory 12 hours Practical Total:15 hours	Chiller Freezer Record sheets	Class Room and workplace

		• Perform chilling operation • Demonstrate stacking of products • Demonstrate storage of processed meat products			
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Module 8: Implement Quality Management System

Objective: After completing this module, the learner will be able to apply skills and required knowledge to demonstrate the implementation of quality management system in work area. The learner will also be able to assist in internal audits and learn about the concepts of continual improvement.

Duration:	Total hours	120	Practical	96	Theory	24
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Monitor quality in work area	- Check Good Hygiene Practices (GHP) - Monitor Good Manufacturing Practices (GMP) - Identify deviations - Contribute to continual improvement - Follow instructions for corrections and corrective actions. - Record and report deviations	- Define GHP and GMP - Differentiate between correction and corrective actions. - Knowledge of control of operations and deviations - Describe the importance of recording and reporting process deviations - Knowledge of tools and procedures for root cause analysis	06 hours Theory 24 hours Practical Total:30 hours	Monitoring Performa Record sheets	Class Room and workplace

		<u>Practical Activity:</u> • Demonstrate implementation of cleaning program • Perform Root cause analysis			
LU2. Assist in Internal Audits	• Participate in developing an audit plan • Organize audit documents • Assist in Root Cause Analysis • Assist in maintaining Corrective Action / Preventive Action reports • Record and maintain information	• Differentiate between inspection and audit • Define audit and its types • Differentiate between an audit plan and audit program • Enlist documents required for internal audit • Documents used for root cause analysis • Differentiate between corrective and preventive actions • Describe the record keeping procedure for internal audit <u>Practical Activity:</u> • Construct an internal audit program	06 hours Theory 24 hours Practical Total:30 hours	Internal audit plan sheets Record sheets	Class Room and workplace

		Construct an internal audit plan			
LU3. Assist in meat quality policy implementation	- Dispatch product as per demand/order - Assist in implementation of meat quality & safety standards	- Define a quality policy and its importance - Enlist requirements for meat quality and safety <u>Practical Activity:</u> - Perform dispatch procedure according to meat quality and safety standards - Demonstrate meat quality policy	06 hours Theory 24 hours Practical Total:30 hours	Dispatch criteria plans Meat quality policy Record sheets	
LU4. Maintain meat quality records	- Assist in implementation of traceability system - Maintain records as legal requirements related documentation - Keep records and documentation	- Define traceability system - Differentiate between traceability and reverse traceability - Describe legal requirements related to documentation for meat quality <u>Practical Activity:</u> - Perform in-house product traceability - Perform record keeping procedure	06 hours Theory 24 hours Practical Total:30 hours	Record sheets	

Module 9: Assist in HACCP Implementation

Objective: After completing this module, the learner will be able to assist in HACCP implementation at work area. The trainees will be capable to apply pre-requisite programs (PRPs).

Duration:	Total hours	120	Practical	96	Theory	24
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Apply Prerequisite Program	- Monitor Good Manufacturing practices (GMP) - Monitor Good hygiene practices (GHP)	- Describe PRPs and their importance - Enlist elements of PRPs in facility - Importance of PRPs implementation in facility. - Define stages of HACCP - Describe principles of HACCP <u>Practical Activity:</u> - Demonstrate implementation of PRPs	02 hours Theory 12 hours Practical Total:14 hours	PRP Performa Record sheets	Class Room and workplace

		• Monitor good hygiene practices in work area			
LU2. Assist in conducting Hazard Analysis	• Assist in developing list of hazards associated with raw materials • Assist in developing list of hazards associated with processing • Assist in developing list of hazards associated with packaging and storage.	• Describe process flow diagram • Hazard and its types • Enlist hazards associated with raw material • Enlist hazards associated in meat processing • Enlist hazards associated in packaging and storage • Describe likelihood of a hazard • Describe severity of a hazard • Describe characterization of hazards based	04 hours Theory 12 hours Practical Total:16 hours	Risk assessment matrix charts Record sheets physical, chemical and biological hazard samples for identification	Class Room and workplace

		on severity and likelihood <u>Practical Activity:</u> • Demonstrate risk assessment matrix • Identify significant risks			
LU3. Assist in determining Critical Control Points (CCPs)	• Assist in developing critical control points for each hazard associated with raw materials • Assist in developing critical control points for each hazard associated with processing • Assist in developing critical control points for each hazard associated with packaging and storage • Assist in developing acceptable levels for each point	• Define critical control point in a process • Elaborate CCPs associated with raw materials • Describe CCPs associated with processing • Enlist CCPs associated with packaging and storage • Define different levels of acceptance <u>Practical Activity:</u> • Demonstrate decision tree for	03 hours Theory 12 hours Practical Total:15 hours	CCP determinant charts Record sheets	Class Room and workplace

		CCP identification at various levels of processing and packaging Develop acceptable levels according to processing operations			
LU4. Assist in establishing Critical Control Limits	- Assist in establishing critical control limits for critical control points associated with raw material - Assist in establishing critical limits for critical control points associated with processing - Assist in establishing critical limits for critical control points associated with packaging and storage	- Define critical control limits - Describe standard critical control limits for CCPs associated with raw materials - Elaborate critical control limits for CCPs associated with processing - Describe critical control limits for CCPs associated with packaging and storage - Define control charts	03 hours Theory 12 hours Practical Total:15 hours	CCL criteria Control charts Record sheets	Class Room and workplace

		<u>Practical Activity:</u> • Demonstrate establishment of critical control limits • Demonstrate control chart observations			
LU5. Assist in establishing monitoring procedures	• Assist in establishing monitoring procedures for critical control limits associated with raw materials • Assist in establishing monitoring procedures for critical control limits associated with processing • Assist in establishing monitoring procedures for critical control limits associated with packaging and storage	• Define monitoring procedures • Explain monitoring procedures for CCLs associated with raw materials • Describe monitoring procedures for CCLs associated with processing • Explain monitoring procedures for CCLs associated with packaging and storage <u>Practical Activity:</u> • Demonstrate monitoring	03 hours Theory 12 hours Practical Total:15 hours	CCL standards Control charts Monitoring sheets Record sheets	Class Room and workplace

		procedures for CCLs			
LU6. Assist in establishing corrective Actions	- Assist in establishing corrective actions for deviating critical control limits associated with raw materials - Assist in establishing corrective actions for deviating critical control limits associated with processing - Assist in establishing corrective actions for deviating critical control limits associated with packaging and storage	- Define loss of control - Describe corrective actions for CCLs associated with raw materials - Elaborate corrective actions for CCLs associated with processing - Explain corrective actions for CCLs associated packaging and storage <u>Practical Activity:</u> - Demonstrate corrective actions for process deviations during production, packaging and storage	03 hours Theory 12 hours Practical Total:15 hours	Corrective action plans Record sheets	Class Room and workplace

LU7. Assist in establishing verification procedures	- Assist in establishing verification procedures for corrective actions associated with raw materials - Assist in establishing verification procedures for corrective actions associated with processing - Assist in establishing verification procedures for corrective actions associated with packaging and storage	- Elaborate verification procedures for corrective actions associated with raw materials - Explain verification procedures for corrective actions associated with processing - Describe verification procedures for corrective actions associated with packaging and storage <u>Practical Activity:</u> - Demonstrate verification procedure for meat products in different process operations	03 hours Theory 12 hours Practical Total:15 hours	Verification plans Record sheets	Class Room and workplace
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LU8. Assist in establishing record and documentation procedures	• Assist in establishing documentation procedures for processes associated with raw materials • Assist in establishing documentation procedures for processes associated with processing • Assist in establishing documentation procedures for processes associated with packaging and storage	• Describe record and documentation procedure for processes associated with raw materials • Explain record and documentation procedure for process steps associated with processing • Elaborate record and documentation procedure for processes associated with packaging and storage <u>Practical Activity:</u> • Demonstrate record keeping and documentation procedure	03 hours Theory 12 hours Practical Total:15 hours	Record Sheets	Class Room and workplace
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Materials, Tools and Equipment Required	
Sr. No.	Description
1.	Apron
2.	Aseptic bags
3.	Autoclave
4.	Blender
5.	Brushes
6.	Butcher's knife
7.	Cans
8.	Casings
9.	CCL criteria
10.	CCL standards
11.	CCP determinant charts
12.	Chiller
13.	Cleaning agents
14.	Cleaning cloth
15.	Clincher
16.	Coal/ wood chips
17.	Colorimeter
18.	Control charts
19.	Cooking Range Fume Hood
20.	Cooking utensils
21.	Corrective action plans
22.	Curing equipment
23.	Curing ingredients
24.	Cutter
25.	Disinfecting agents
26.	Dispatch criteria plans
27.	Food grade cleaning agents,
28.	Freezer
29.	Glassware

30.	Gloves
31.	Grinder
32.	Hairnet
33.	Homogenizer
34.	Humidifier
35.	Humidity meter
36.	Internal audit plan sheets
37.	Knife
38.	Lab coat
39.	Log sheets
40.	Logbook
41.	Lubricants
42.	Magnifying glass
43.	Maintenance schedules
44.	Mask
45.	Meat cuts
46.	Meat Cutter
47.	Meat products
48.	Meat quality policy
49.	Meat Slicer
50.	Meat smoker
51.	Meat smoking ingredients
52.	Metal Safety Gloves
53.	Microbiological growth media
54.	Mincer
55.	Mixer
56.	Monitoring Performa
57.	Monitoring sheets
58.	Moulders
59.	Packaging machinery
60.	Packaging materials

61.	pH meter
62.	physical, chemical and biological hazard samples for identification
63.	PPEs
64.	Probe thermometer
65.	PRP Performa
66.	Record Sheets
67.	Refrigerator
68.	Retort processing equipment
69.	Risk assessment matrix charts
70.	Rollers
71.	Safety Shoes
72.	Salometer
73.	Salt
74.	Scrubber
75.	Sealer
76.	Seaming machine
77.	Shrink wraps
78.	Sieves of different mesh sizes
79.	Slicer
80.	Sorter
81.	Stationary
82.	Stove
83.	Swab
84.	Tags
85.	Test tubes
86.	Thermometer
87.	Titration apparatus
88.	Verification plans
89.	Water
90.	Weighing balance
91.	Weighing machine

92.	Weighing scale
93.	Wood log