

STUDY GUIDE:
GAME MEAT EXAMINATION

In Collaboration with the Directorate Veterinary Services
National Department of Agriculture

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PROJECTS

Part 1 - Project no. 1

Critically discuss the following, explaining the correct method of operation. Describe corrective actions to be taken in cases of non-compliance – give examples.

- Receiving and offloading of animals at the abattoir
- Vehicle inspection
- Procedures for handling dead animals.
- Ante mortem procedures and use of ante mortem findings in post mortem inspections
- Structure of lairages
- Humane handling of animals e.g.: food, water, bedding, cleanliness and behaviour of lairage staff

Part 1 - Project no. 2

Why is it important to separate clean and dirty areas, functions and products? Give examples.

Part 1 - Project no. 3

Discuss general structural requirements to eliminate contamination

Part 2 - Project no. 1

Illustrate the harvesting and dressing processing steps for game with the help of flow diagrams. Indicate the most likely points where contamination may occur and discuss control measures to prevent such contamination.

Part 2 - Project no. 2

Using the same flow diagram, indicate the steps where meat inspection must be performed – provide 5 examples of diseases and conditions at each inspection point.

Part 2 - Project no. 3

Draw up a basic sanitation program for your project abattoir and provide corrective actions for the program in use.

Part 2 - Project no. 4

Assist in routine hygiene monitoring by means of the HAS form and write a report on your findings (shortcomings as well as positive aspects) giving comments and recommendations (corrective actions) where applicable. Submit the HAS form as well.

Part 2 - Project no. 5

Draw an organogram of management in a high throughput abattoir. Indicate where meat inspection and quality control fits in.

Part 2 - Project no. 6

Draw up a thermo control program for your project abattoir. Make a list of all temperatures that must be monitored in the abattoir including:

Water temperature (hot /cold)

Room temperatures (chiller/freezer)

Product temperature (chilled/frozen)

Describe the methods used.

**PART 1 – ABATTOIR PRACTICE
MODULE 1**

MICROBIOLOGY

OBJECTIVE

To introduce learners to the science of microbiology relating to abattoirs

Study aim

At the end of this theme you must be able to:

1. INTRODUCTION, TYPES OF ORGANISMS, IMPORTANCE OF BACTERIA AND ELEMENTARY BACTERIOLOGY

- Describe the size, shapes and habits of bacteria
- Name the requirements for bacterial growth
- Shortly name the 4 phases of the growth cycle.

2. GROUPS OF BACTERIA, BACTERIAL SPORES, BACTERIA ISOLATED FROM MEAT

- Name some food-borne pathogens
- Briefly discuss spoilage bacteria and give an example
- Name some bacteria isolated from poultry.

3. SPOILAGE BACTERIA

- Name one spoilage bacteria
- Explain the importance of spoilage bacteria in the meat industry
- Explain the importance of chilling of meat in relation to meat spoilage.

4. FOODBORNE DISEASES

- Define food borne diseases
- Name the agents of food borne diseases
- Discuss events necessary for food - borne illness to occur.

5. FOOD POISONING

- Define food poisoning and name symptoms
- Distinguish between the main types of food poisoning
- Discuss preventative measures for food poisoning

6. BACTERIA MOST FREQUENTLY ASSOCIATED WITH FOOD-BORNE DISEASES

- Name 5 of the most common pathogens causing food borne illness.
- Discuss the source, mechanism, foods involved, symptoms and preventative measures for the food poisoning organisms mentioned in the manual

**PART 1 – ABATTOIR PRACTICE
MODULE 2**

GENERAL ABATTOIR LAYOUT AND CONSTRUCTION

OBJECTIVE

To acquaint candidates with the structural requirements, the product flow and the use of water in an abattoir

Study aims

At the end of this theme you must be able to:

1. INTRODUCTION

- What is the definition of an abattoir in the Regulations under the Meat Safety Act.

2. LAYOUT, CLEAN AND DIRTY PRODUCTS AND AREAS

- Distinguish between “dirty” and “clean” areas of an abattoir
- Distinguish between clean and dirty products – give examples

3. BUILDING AN ABATTOIR, REQUIREMENTS FOR PREMISES, FACTORS AFFECTING ABATTOIR WORK AREAS, FACILITIES FOR STAFF

- Explain the factors to be considered when building an abattoir
- Discuss the requirements for premises
- Discuss the factors affecting abattoir work areas
- Discuss the requirements for “facilities for staff”

4. USE OF WATER IN THE ABATTOIR

- Discuss the legal aspects regarding the use of water in abattoirs
- Discuss the guidelines for the testing of water in abattoirs (what tests and how often).

5. DISPOSAL OF ABATTOIR EFFLUENT AND SEPTIC TANK SYSTEMS

- Briefly discuss the regulatory requirements for the disposal of abattoir effluent
- Discuss the functions of the components of septic tank systems

**PART 1 – ABATTOIR PRACTICE
MODULE 3**

PERSONAL HYGIENE

OBJECTIVE

To inform the candidate about the importance of personal hygiene

Study aims

At the end of this theme you must be able to:

1. INTRODUCTION

- Explain why food handlers must be healthy
- Explain why food handlers must wear clean protective clothes

2. HEALTH REQUIREMENTS FOR WORKERS

- Discuss the legal requirements regarding the health and hygiene of workers
- Distinguish between pre-employment medical examination and daily fitness checks

3. SOME PRACTICAL WAYS TO IMPROVE PERSONAL HYGIENE AND NEATNESS

- Name some practical ways to improve personal hygiene and neatness in the abattoir

4. PROTECTIVE CLOTHING

- Explain the importance of protective clothing and the responsibility of the workers towards it
- Name the different components of protective clothing.

5. PERSONAL EQUIPMENT

- Discuss the personal equipment used in an abattoir
- Name 4 uses for knives.

6. CLEANING OF HAND EQUIPMENT

- Explain how hand equipment must be cleaned
- Explain the meaning of employment medical examination
- Explain the difference between pre-employment medical examination and daily fitness checks
- Explain when additional medical examination is required
- Explain the importance of personal hygiene and hygiene of personal equipment
- Give at least 5 examples of when workers must wash their hands in an abattoir
- Discuss what must be done in case of an injury
- Discuss the requirements for the washing of hands
- Name a few undesirable hygienic practices workers tend to do in an abattoir
- Pre-slaughter inspections regarding the personal hygiene of workers are carried out daily. What things should be noted?

**PART 1 – ABATTOIR PRACTICE
MODULE 4**

HANDLING OF WASTE & CONDEMNED MATERIAL

OBJECTIVE

To give the candidate an understanding of the handling of waste & condemned/ inedible material and the disposal thereof

Study aims

At the end of this theme you must be able to:

1. LEGAL ASPECTS REGARDING CONDEMNED MATERIAL

- Draw a diagram to indicate which types of waste and by products can derive from an abattoir
- Describe handling condemned material in the abattoir
- Describe the different methods of disposal of condemned material
- Discuss the requirements for sterilising plants including the unclean and clean areas
- Describe the requirements for vehicles transporting condemned material
- List the 4 points that must be indicated in writing when removing specimens from an abattoir
- Discuss requirements for the personnel working in the dirty area of a sterilisation plant
- Discuss the requirements that the facilities for condemned/ detained material should comply with
- Discuss the marking of condemned material and containers
- Discuss the requirements that the “unclean” and “clean” areas of a sterilizing plant should comply with

2. METHOD OF PREPARING ANIMAL FEED AND CONDEMNED MEAT FOR APPROVAL FOR ANIMAL FEED

- Describe which materials can be used to recover for the manufacture of animal feed

3. RENDERING AND THE COLLECTION OF RENDERING BLOOD.

- Describe the principles of collection of rendering blood
- Describe the principles of rendering and the different methods of rendering

4. FLOW DIAGRAM OF STERILISATION PLANT

- Draw a flow diagram to indicate the different process steps at a sterilisation plant

5. DISPOSAL OF ABATTOIR EFFLUENT AND SEPTIC TANK SYSTEMS

- Briefly discuss the regulatory requirements for the disposal of abattoir effluent
- Discuss the functions of the components of septic tank systems

**PART 1 – ABATTOIR PRACTICE
MODULE 5**

PEST CONTROL

OBJECTIVE

To acquaint candidates with the practice of pest control in an abattoir

Study aims:

At the end of this theme you must be able to:

- Describe preventing of pests through design
- Describe preventing pest entry to the food facility
- Describe preventing pests through good sanitation
- Describe preventing pests through good housekeeping
- Describe storage practice
- Describe thresholds
- Describe self assessment or auditing programs
- Describe bird management procedures
- Describe recognizing rat and mouse signs
- Describe rodent management procedures
- Recognize cockroach infestations
- Recognize stored product pests
- Describe domestic fly control programs
- Understand occasional pests

**PART 1 – ABATTOIR PRACTICE
MODULE 6**

SANITATION

OBJECTIVE

To acquaint candidates with the practice of cleaning and sanitizing an abattoir

Study aims

At the end of this theme you must be able to:

1. DEFINITIONS

1.1 Define/ explain the following:

- Sanitation
- Disinfection
- Detergents
- Disinfectants/ Sanitizers

2. REQUIREMENTS FOR CLEANING AND DISINFECTING THE ABATTOIR AND EQUIPMENT

- Discuss the requirements for cleaning and disinfecting the abattoir and equipment

3. SOURCES OF CONTAMINATION

Name and discuss sources of contamination

4. THE PRACTICE OF CLEANING AND DISINFECTION

- Discuss the 7 basic steps of cleaning and disinfecting
- Explain the importance of slaughtering “clean” animals/birds
- Distinguish between detergents and disinfectants/ sanitizers
- Explain the importance of the pre-slaughter sanitation inspection and bacteriological monitoring

**PART 1 – ABATTOIR PRACTICE
MODULE 7**

MEAT QUALITY AND SAFETY

OBJECTIVE

To make students aware of the need for quality control, record keeping as well as the importance of HACCP, HAS and HMS

Study aim

At the end of this theme you must be able to:

1. DEFINITIONS

- Define:
 - Quality
 - Quality assurance (QA)
 - Good manufacturing practice (GMP)
 - HACCP
 - CCP

2. THE NEED FOR QUALITY SYSTEMS, HACCP AS A FOOD SAFETY MANAGEMENT SYSTEM, QUALITY SYSTEMS AS PRE-REQUISITES FOR HACCP

- Explain the need for quality systems
- Discuss HACCP as a food safety management system
- Name the quality systems needed as pre-requisites for HACCP
- Name the 7 principles of HACCP
- Name the 12 stages of HACCP

3. HYGIENE MANAGEMENT SYSTEMS (HMS)

- Discuss the management responsibilities in terms of Hygiene Management Systems
- Name and discuss the Hygiene Control Programs that must form part of the Hygiene Management System

4. KEEPING OF RECORDS

- Briefly discuss the keeping of records

5. HAS

- Explain what HAS is
- Name the 10 areas covered by the HAS
- Do a Hygiene assessment at your abattoir using the HAS forms provided
- Discuss water monitoring as a prerequisite for HACCP
- Explain which steps correspond to the different principles
- Explain how a CCP is determined
- Distinguish between QA and GMP
- Draw examples of check registers

**PART 2 – MEAT INSPECTION
MODULE I**

ABATTOIR LAYOUT AND CONSTRUCTION: GAME MEAT ABATTOIRS

OBJECTIVE

To acquaint candidates with the structural requirements, the product flow and the use of water in a game meat abattoir

Study aims

At the end of this theme you must be able to:

- 1. SPECIFIC AND ADDITIONAL REQUIREMENTS FOR GAME MEAT ABATTOIRS AND CUTTING AND PROCESSING PLANTS**
 - Discuss the general requirements for premises, structures and equipment
 - Discuss the specific requirements that game meat abattoirs must comply with

- 2. DESIGN DRAWINGS**
 - Evaluate a design drawing of a low throughput game meat abattoir and give comments on the layout

**PART 2 – MEAT INSPECTION
MODULE 2**

SLAUGHTER AND DRESSING

OBJECTIVE

To acquaint candidates with the slaughter process steps and the animal welfare aspects at abattoirs

Study aims

At the end of this theme you must be able to:

1. FLOW DIAGRAM OF GAME HARVESTING STEPS

- Draw a flow diagram of the different game harvesting steps

2. FLOW DIAGRAM OF PROCESS STEPS

- Draw a flow diagram of the different process steps in the dirty and clean areas respectively.

3. SLAUGHTER AND DRESSING PROCESS

- Give a negative effect on the carcass caused by a thoracic shot
- Give a reason why game animals must be effectively killed
- Name 2 advantages of head and neck shots
- Discuss the most undesirable shot and give reasons
- Discuss the difference between stunning slaughter stock and shooting/ killing gameDiscuss the effect that killing an animal instead of rendering it unconscious prior to bleeding will have on the shelf-life of the meat
- Name the timeframe within which game animals must be bled after shooting
- Which blood vessels in the neck must be severed?
- Discuss 2 possible ways of sterilising equipment at the point of bleeding
- Shortly discuss 3 ways of transporting harvested game
- Discuss how, when and where the head of game animals must be removed
- Shortly discuss removal of the feet and explain why they are important to meat inspection
- Name the timeframe within which game animals must be eviscerated after bleeding
- Name an important difference between evisceration of game and domestic slaughter stock and give reasons
- Name some important points to consider during evisceration
- Discuss chilling of the partially dressed game carcass
- Name the important factors to be kept in mind during the removal of the hides or skins
- Explain why carcasses may not be washed before completion of inspection including trimming of contamination

4. OFFAL HANDLING, SPLITTING AND MARKING OF CARCASS

- Discuss red offal handling
- Discuss rough offal handling
- Describe the splitting of a carcass
- Describe specifications for stamps, marks and ink used
- Describe the way game carcasses are marked

**PART 2 – MEAT INSPECTION
MODULE 3**

ANATOMY OF GAME MEAT ANIMALS

OBJECTIVE

To acquaint the candidate with the anatomy of game meat animals in order to assist with meat inspection

Study aim

At the end of this theme you must be able to:

1. ANATOMY OF GAME MEAT ANIMALS

- Discuss the anatomy of game meat animals with regards to:
 - Skeleton
 - Muscular system
 - Blood and vascular system
 - Respiratory system
 - Digestive system
 - Urinary tract
 - Nervous system
 - Fatty tissue
 - Genital tissue
 - Lymphopoietic system
 - Endocrine system (glands of the body)

- Label and discuss the following sketches:
 - Skeleton
 - Heart
 - Digestive tract (tongue, oesophagus, stomach and intestines)
 - Respiratory system (lungs)
 - Liver
 - Kidney
 - Spleen
 - Carcass - indicating lymph nodes

**PART 2 – MEAT INSPECTION
MODULE 4**

PATHOLOGY

OBJECTIVES

- To acquaint the candidate with the pathological conditions that may be harmful to the consumer
- Enabling the candidate to identify the above and to deal with it in the correct manner

Study aim

At the end of this theme you must be able to:

1. GENERAL PATHOLOGY

- Discuss the following conditions in terms of:
 - Definition
 - Cause(s)
 - Symptoms / lesions
 - Judgement

<ul style="list-style-type: none"> • Abscess • Anaemia • Arthritis • Bacteraemia • Bruising • Cachexia/Emaciation • Calcification • Emphysema • Enteritis • Fever versus poor bleeding • Gangrene • Hepatitis 	<ul style="list-style-type: none"> • Hypostasis • Icterus • Incomplete bleeding • Inflammation (all types) • Mastitis • Metastasis • Melanosis • Metritis • Myopathy • Necrosis • Nephritis 	<ul style="list-style-type: none"> • Neoplasm (tumour) • Oedema • Pericarditis • Peritonitis • Petechia, echinosis, suggilations • Pleuritis • Purulent • Rigor mortis • Septicaemia • Toxaemia • Uraemia • Valvular endocarditis
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**PART 2 – MEAT INSPECTION
MODULE 5**

DISEASES AND CONDITIONS

OBJECTIVES

- To acquaint the candidate with the pathology, conditions, diseases and parasitology that may be harmful to the consumer
- Enabling the candidate to identify the above and to deal with it in the correct manner

Study aim

At the end of this theme you must be able to:

1. GAME MEAT DISEASES

- Discuss the following diseases listed below with regards to:
 - Cause
 - Species
 - Symptoms (ante mortem)
 - Post mortem lesions
 - Judgment

Viral diseases	Bacterial diseases	Rickettsiae
<ul style="list-style-type: none"> • African swine fever • Classical Swine fever • Foot and mouth disease • Rabies 	<ul style="list-style-type: none"> • Anthrax • Black quarter • Botulism • Brucellosis • Tuberculosis 	<ul style="list-style-type: none"> • Heart Water
		Protozoal diseases
		<ul style="list-style-type: none"> • Coccidiosis • Sarcosporidia

2. GAME MEAT PARASITOLOGY

- Make a classification of internal parasites
- Discuss the life cycles, final host, intermediate host and importance for meat hygiene and judgement for each of the following:

Tape worms

- *Taenia saginata*
- *Echinococcus granulosus*
- *Stilesia hepatica*

Round worms

- Parafilaria

Flukes

- Fasciola hepatica

3. DIVERSE CONDITIONS

- Discuss the cause, ante mortem symptoms, post mortem lesions and judgement of the following:
 - White muscle disease
 - Wounds/Bruising/Fractures/haematomas
 - Contamination
 - Bone taint
 - Blood splash

4. ZONOSIS

- Define zoonosis
- List the common zoonotic diseases that may spread to workers and name the preventative measures

**PART 2 – MEAT INSPECTION
MODULE 6**

MEAT INSPECTION

OBJECTIVE

To acquaint students regarding the importance of ante-mortem inspection. To demonstrate the primary meat inspection cuts on the different game meat species. To demonstrate the different procedures for secondary meat inspection as well as the laboratory techniques used in the game meat abattoir

Study aim

At the end of this theme you must be able to:

1. ANTE MORTEM INSPECTION

- Discuss the responsibilities of the hunter
- Discuss the responsibilities of the owner of game.
- Discuss the purpose of “ante-mortem inspection”
- Discuss the aims of ante-mortem inspection
- Discuss the regulatory requirements for ante mortem inspection
- Describe the advantages of ante mortem inspection
- Name 10 notifiable diseases
- Discuss the factors to be noted when doing an ante mortem inspection
- Discuss the decisions that can be taken during ante mortem inspection
- Discuss the factors to be considered during ante-mortem examination and explain why is it important to have good communication between the person doing ante mortem and the meat examiners doing primary meat inspection

2. PRIMARY MEAT INSPECTION

- Discuss the routine primary meat inspection in terms of bovine, ovine and caprine, porcine and equine under the following points:
 - Carcass
 - Head
 - Abdominal cavity and viscera
 - Thoracic cavity and viscera
 - Udder
 - Testicles and penis
- Discuss the general aspects to be considered when performing primary meat inspection
- Name the diseases and conditions requiring total condemnation
- Discuss the aim of detaining and the ways in which carcasses and viscera are handled

3. SECONDARY MEAT INSPECTION

- Discuss the 4 kinds of judgements that can be taken with detained carcasses
- Discuss additional examination for Tuberculosis
- Discuss additional examination for Cysticercosis and treatment
- Explain the secondary inspection and handling of a carcass with Cysticercosis

4. LABORATORY TECHNIQUES

- Identify the purpose of the different laboratory tests
- Explain the procedure and purpose for the following tests:
 - Preparation of blood smears
 - Phase test
 - Alcohol - Flotation test
 - Chlorine contents in water
 - pH determination of meat

5. SAMPLING AND SAMPLING METHODS

- Name 6 common surface count methods and briefly discuss each of them.