****

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**AQUACULTURE MANAGEMENT**

**LEVEL 3**



TVET CDACC

P.O. BOX 15745-00100

NAIROBI

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# FOREWORD

The provision of quality education and training is fundamental to the Government’s overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya’s development blueprint and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted to the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for the Agriculture sector’s growth and sustainable development.

**PRINCIPAL SECRETARY**

**VOCATIONAL AND TECHNICAL TRAINING**

**MINISTRY OF EDUCATION**

# PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle-income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Aquaculture Sector Skills Advisory Committee (SSAC), German International Cooperation and Ministry of Agriculture, Livestock and Fisheries have developed this curriculum. TVET CDACC in conjunction with Micro Enterprises Support Programme Trust (MESPT) reviewed this curriculum and incorporated Food Safety.

This curriculum has been developed following the CBET framework policy; the CBETA standards and guidelines provided by the TVET Authority and the Kenya National Qualification Framework designed by the Kenya National Qualification Authority.

This curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Aquaculture SSAC, expert workers and all those who participated in the development and review of this curriculum.

**CHAIRPERSON**

**TVET CDACC**

# ACKNOWLEDGEMENT

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organisations.

I appreciate NEPAD Planning and Coordinating Agency (NPCA) of the Africa Union Commission and German Ministry of Economic Cooperation and Development (BMZ) through its implementing agency German International Cooperation (GIZ) GmbH which enabled the development of this curriculum through the CAADP ATVET project. I also appreciate the office of the National Coordinator of GIZ CAADP ATVET Project which was instrumental in the cooperation between the project team, Ministry of Agriculture, Livestock and Fisheries (MoALF) and Ministry of Education.

Much gratitude goes to Micro Enterprises Support Program Trust (MESPT) who initiated the review process and the incorporation of Food Safety in the curriculum. I acknowledge the Danish International Development Agency (DANIDA) and the European Union (EU) who sponsored the review process.

I recognize with appreciation the role of the Aquaculture Sector Skills Advisory Committee (SSAC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the Agriculture sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in Aquaculture Management acquire competencies that will enable them to perform their work more efficiently.

**COUNCIL SECRETARY/CEO**

**TVET CDACC**

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# ABBREVIATIONS AND ACRONYMS

AM Aquaculture Management

AQ Aquaculture

ATVET Agricultural Technical and Vocational Education and Training

BC Basic Competency

CAADP Comprehensive Africa Agricultural Development Programme

CDACC Curriculum Development, Assessment and Certification Council

CR Core Competency

CU Curriculum

DANIDA Danish International Development Agency

KCPE Kenya Certificate of Primary Education

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualifications Authority

MESPT Micro Enterprises Support Programme Trust

PPE Personal Protective Equipment

SSAC Sector Skills Advisory Committee

TVET Technical and Vocational Education and Training

# KEY TO UNIT CODE

**AQ /CU/AM/BC/01/ 3/B**

Industry or sector

Curriculum

Occupational area

Type of competency

Competency number

Competency level

Version control

# COURSE OVERVIEW

This course is designed to equip an individual with competencies for preparation of selected pond sites, pond construction, producing both natural as well as on-farm formulated fish feeds. It further aims at equipping the individual with competencies for stocking the ponds and tank with fingerlings and raising them to market size under optimum conditions as well as post-harvest handling of fish.

This course consists of the following basic and core units of learning:

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| AQ/CU/AM/BC/01/3/B | Communication Skills | 15 | 1.5 |
| AQ/CU/AM/BC/02/3/B | Numeracy Skills | 15 | 1.5 |
| AQ/CU/AM/BC/03/3/B | Digital Literacy | 20 | 2 |
| AQ/CU/AM/BC/04/3/B | Entrepreneurial Skills | 40 | 4 |
| AQ/CU/AM/BC/05/3/B | Employability Skills | 20 | 2 |
| AQ/CU/AM/BC/06/3/B | Environmental Literacy | 15 | 1.5 |
| AQ/CU/AM/BC/07/3/B | Occupational Safety and Health Practices | 15 | 1.5 |
| **Total** | | **140** | **14** |

**Core Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| AQ/CU/AM/CR/01/3/B | Fish Pond Construction | 80 | 8 |
| AQ/CU/AM/CR/02/3/B | Fish Feed Production | 60 | 6 |
| AQ/CU/AM/CR/03/3/B | Fish Hatchery Operation | 70 | 7 |
| AQ/CU/AM/CR/04/3/B | Grow-Out Fish Production | 70 | 7 |
| AQ/CU/AM/CR/05/3/B | Post-Harvest Fish Handling | 20 | 2 |
|  | Industrial Attachment | 160 | 16 |
| **Total** | | **460** | **46** |
| **SUBTOTAL** | | **600** | **60** |

**Entry Requirements**

An individual entering this course should have any of the following minimum requirements:

1. Kenya Certificate of Primary Education (KCPE) or Kenya Certificate of Secondary Education (KCSE)

**Or**

1. Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

**Trainer qualification**

A trainer for this course should have a higher qualification than the level 3.

**Industrial attachment**

An individual enrolled in this course will undergo two (2) industrial attachments; one in a hatchery facility and the other in a fish farm, each for a period of two (2) months. An individual enrolled in one of the core units of learning will undergo a one-month attachment either in a hatchery facility or in a fish farm as the case may be.

**Assessment**

The course will be assessed at two levels:

1. **Internal assessment**: conducted continuously by the trainer (internal assessor) who is monitored by an accredited internal verifier
2. **External assessment:** conducted by an accredited external assessor who is monitored by an accredited external verifier

The assessor and verifiers are accredited by TVET CDACC which also coordinates external assessment.

**Certification**

An individual candidate will be awarded a Record of Achievement on demonstration of competence in a unit of competency. To be awarded Certificate in Aquaculture Management Level 3, an individual must demonstrate competence in all the units of competency.

These certificates will be awarded by TVET CDACC in conjunction with the training provider.

# BASIC UNITS OF LEARNING

## COMMUNICATION SKILLS

**UNIT CODE: AQ/CU/AM/BC/01/3/B**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate communication skills. It involves, obtaining and conveying workplace information, speaking English at a basic operational level, participating in workplace meetings and discussions, and completing relevant work-related documents.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Speak English at a basic operational level
3. Participate in workplace meetings and discussions
4. Complete relevant work-related documents

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Obtain and convey workplace information | * Communication process * Modes of communication * Medium of communication * Effective communication * Barriers to communication * Flow of communication * Sources of information * Types of questions * Organizational policies * Workplace etiquette * Ethical work practices in handling communication | * Written tests * Oral questioning |
| 1. Speak English at a basic operational level | * English grammar   + Nouns, verbs, adjectives, adverbs, pronouns prepositions * English speaking   + Pronunciation   + Simple conversations * Taking verbal instructions * Reading and writing in English * Forms of expression in English | * Written tests * Oral * Role play |
| 1. Participate in workplace meetings and discussions | * Nature of workplace meetings * Meeting protocols * Workplace interactions | * Oral questioning * Written tests |
| 1. Complete relevant work-related documents | * Types and purposes of workplace documents and forms * Methods used in filling forms and documents * Recording workplace data * Process of distributing workplace forms and documents * Report writing * Types of workplace reports | * Written tests * Oral questioning |

**Suggested Methods of Instruction**

1. Discussion
2. Role play
3. Brainstorming
4. Viewing of related videos
5. Role play

**Recommended Resources**

* Desktop computers/laptops
* Projectors
* Report writing templates
* Pens
* Notebooks

## NUMERACY SKILLS

**UNIT CODE:** **AQ/CU/AM/BC/02/3/B**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit covers the competencies required to identify and undertake simple numerical processes. The person who is competent in this unit shall be able to use / work with whole numbers and money up to one hundred thousand; Locate, compare and use highly familiar measurement; Use highly familiar maps and diagrams; Identify and use some common 2D shapes; and locate specific Information in highly familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Use whole numbers for work
2. Locate, compare and use highly familiar measurement for work
3. Use highly familiar maps and diagrams for work
4. Identify and use some common 2D shapes for work
5. Locate specific Information in highly familiar tables, graphs and charts for work

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Use whole numbers for work | * Whole numbers * Use of Zeros * Use of halves * Sizes * Grouping of numbers * Addition and subtraction of whole numbers * Numerical information, * Symbols | * Written tests * Assignments * Supervised exercises |
| 1. Locate, compare and use highly familiar measurement for work | * Measurements * Units of measurements and their use * Digital time am and pm * Calendars | * Written tests * Assignments * Supervised exercises |
| 1. Use highly familiar maps and diagrams for work | * Use of Maps and * Diagrams simple * symbols and pictorial * Giving simple oral directions to locate objects | * Oral * Assignments * Supervised exercises |
| 1. Identify and use some common 2D shapes for work | * Two dimensional shapes * Describe common objects in terms of size and shape * Compare objects * Group common objects based on shape, size, color and features | * Written tests * Assignments * Supervised exercises |
| 1. Locate specific Information in highly familiar tables, graphs and charts for work | * Simple tables * Features of simple graphs and charts * Numerical information in tables, graphs & charts | * Oral * Assignments * Supervised exercises |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory.
* Practical demonstration of tasks by trainer
* Role play
* Discussion
* Demonstration by trainees and comments and corrections by trainers

**Recommended Resources**

* Common 2D shapes objects
* Calculator
* Basic measuring instruments
* Mathematical tables

## DIGITAL LITERACY

**UNIT CODE: AQ/CU/AM/BC/03/3/B**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving tasks and applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer hardware and software
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify computer hardware and software | * Definition of a computer * Functions of a computer * Components of a computer * Classification of computers * Computer software | * Written tests * Practice assignments |
| 1. Apply security measures to data, hardware and software | * Data security and control * Security threats and control measures * Types of computer crimes * Detection and protection against computer crimes | * Written tests * Oral presentation |
| 1. Apply computer software in solving tasks | * Operating systems * Word processing * Spread sheets * Data base | * Oral questioning * Practical |
| 1. Apply internet and email in communication at workplace | * Computer networks * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Oral presentation * Written test |

**Suggested Methods of Instruction**

1. Instructor led facilitation of theory
2. Demonstration by trainer
3. Assignments
4. Viewing of related videos
5. Group discussions

**Recommended Resources**

* Desk top computers
* Laptop computers
* Other digital devices
* Printers
* Storage devices
* Internet access
* Computer software

## ENTREPRENEURIAL SKILLS

**UNIT CODE: AQ/CU/AM/BC/04/3/B**

**Relationship to occupational standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 40 hours

**Unit description**

This unit describes the competencies required to demonstrate entrepreneurial competencies. It involves, developing entrepreneurial culture, identifying entrepreneurial opportunities, starting, operating and growing a small business.

**Summary of Learning Outcome**

1. Develop entrepreneurial culture
2. Identify entrepreneurial opportunities
3. Start a small business
4. Operate a small business
5. Grow a small business

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Develop entrepreneurial culture | * Definition of entrepreneur * Importance of entrepreneurship * Common terminologies in entrepreneurship * Entrepreneurship and employment creation * Formal and informal employment * Habits that promote entrepreneurial development * Cultural factors that inhibit entrepreneurship | * Individual/group assignments * Written tests * Oral |
| 1. Identify entrepreneurial opportunities | * Types, characteristics, qualities & role of entrepreneurs * SWOT analysis * Generating Business ideas * Business opportunities * Evaluation of business opportunities | * Individual/group assignments * Written tests * Oral questioning * Oral presentation |
| 1. Start a small business | * Factors to consider when starting a small business * Legal requirement for starting a small business * Procedure of starting a small business * The dos and don’ts of starting a small business * Challenges faced when starting a small business and mitigating factors * Launch of a small business | * Oral questioning * Individual/group assignments * Written tests |
| 1. Operate a small business | * Organizational structure of a small business * Managing small business finances * Book keeping * Business support services * Marketing for small businesses * Basic IT application in small business | * Individual/group assignments * Written tests |
| 1. Grow a small business | * Methods of growing/expanding a small business * Resources for growing small business * Small business growth plan * ICT and business growth | * Individual/group assignments * Written tests |

**Suggested Methods of Instruction**

1. Instructor led facilitation of theory
2. Demonstration by trainer
3. assignments
4. Role play
5. Case study

**Recommended Resources**

* Case studies for small businesses
* Business plan template
* Laptop/ desktop computer
* Internet
* Telephone
* Writing materials

## EMPLOYABILITY SKILLS

**UNIT CODE:** AQ/CU/AM/BC/05/3/B

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Conduct self-management | 1. Self-awareness 2. Formulating personal vision, mission and goals 3. Strategies for overcoming life challenges 4. Emotional intelligence 5. Assertiveness 6. Developing and maintaining high self-esteem 7. Developing and maintaining positive self-image 8. Accountability and responsibility 9. Good work habits 10. Self-awareness 11. Financial literacy 12. Healthy lifestyle practices | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate critical safe work habits | 1. Stress and stress management 2. Punctuality and time consciousness 3. Interpersonal communication 4. Sharing information 5. Resources utilization 6. HIV and AIDS 7. Drug and substance abuse 8. Handling emerging issues | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate workplace learning | 1. Personal training needs identification and assessment 2. Cultural aspects of work 3. Application of learning 4. Safe use of technology 5. Identifying opportunities 6. Workplace innovation 7. Handling emerging issues 8. Future trends and concerns in learning | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate workplace ethics | 1. Meaning of ethics 2. Ethical perspectives 3. Values and beliefs 4. Organization code of ethics 5. Common ethical dilemmas 6. Organization culture 7. Corruption, bribery and conflict of interest 8. Privacy and data protection 9. Harassment and mutual respect 10. Financial responsibility/accountability 11. Etiquette 12. Emerging issues in ethics | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |

**Suggested Methods of Instruction**

* Simulation/Role play
* Group Discussion
* Presentations
* Q&A
* Case studies
* Assignments

**Recommended Resources**

1. Computers
2. Stationery
3. Charts
4. Video clips
5. Audio tapes
6. Radio sets
7. TV sets
8. LCD projectors

## E**NVIRONMENTAL LITERACY**

**UNIT CODE**: **AQ/CU/AM/BC/06/3/A**

**Relationship to Occupational Standards**:

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution and demonstrating sustainable resource use.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard | * Environmental Management and Coordination Act 1999 * Solid Waste Act * Storage of environmentally hazardous materials * Disposal of hazardous wastes * Types and uses of PPEs in line with environmental regulations * Occupational Safety and Health Act 2007 | * Written tests * Oral questions * Observation of work procedures |
| 1. Control environmental pollution | * Types of pollution * Environmental pollution control and management * Procedures for waste management | * Written tests * Oral questions * Observation of work procedures |
| 1. Demonstrate sustainable use of resource | * Types of resources * Sustainable resource use and management * Principles of 3Rs (Reduce, Reuse, Recycle) | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Instructor led facilitation theory
* Discussion
* Demonstration by trainer
* Assignments
* Field trip

**Recommended Resources**

1. Standard operating and/or other workplace procedures manuals
2. Specific job procedures manuals
3. Solid Waste Act
4. Environmental Management and Coordination Act 1999
5. Machine/equipment manufacturer’s specifications and instructions
6. Personal Protective Equipment (PPE)

## OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE: AQ**/CU/AM/BC/07/3/B

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate safety and health practices

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to practice and promote safety and health at work. It entails preparing to practice safety and health at work and complying and promoting compliance of workers to organization’s occupational safety and health instructions and requirements.

**Summary of Learning Outcomes**

1. Prepare to apply workplace safety and health practices
2. Compliance with occupational safety and health Act

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare to apply workplace safety and health practices | * Awareness of legislation that outlines the minimum standards for occupational safety and health requirements/ regulations * Benefits of implementing an occupational safety and health program * Safety requirements/ regulations of own work and of other workers * Workplace standards and procedures for incidents and emergencies * Prevention and Control Measures for accidents, injuries and sickness | * Oral tests * Written questions * Observation of work procedures |
| 2. Compliance with occupational safety and health Act | * Safety instructions and safety signs * Safe handling of tools, equipment and materials * Use of safe guards and safety devices * Reporting of hazards, incidents, injuries and sickness in the workplace | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Assigments
* Discussion
* Q&A
* Role play
* Viewing of related videos

**Recommended Resources**

* Occupational safety and health standards
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Client/supplier instructions
* Organizational or external personnel
* Machine/equipment manufacturer’s specifications and instructions
* Quality standards

# CORE UNITS OF LEARNING

## FISH POND CONSTRUCTION

**UNIT CODE:** AQ/CU/AM/CR/01/3/B

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Construct A Fish Pond

**Duration of Unit:** 80 hours

**Unit Description**

This unit specifies the competencies required to construct a fish pond. It involves the ability to apply food safety measures in fish pond construction, prepare a pond construction site, peg and excavate a pond, construct pond water supply and drainage channels, and also to prepare the pond in readiness for stocking with fish.

**Summary of Learning Outcomes**

1. Apply food safety measures in fish pond construction
2. Prepare pond construction site
3. Excavate fish pond
4. Construct pond drainage system
5. Complete pond construction

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply food safety measures in fish pond construction | * Meaning of food safety * Importance of food safety * Principles of food safety * Prerequisite programmes   + Meaning and importance of prerequisite programmes   + Relevant programmes in fish pond construction * Hazard analysis for fish pond construction   + Types and sources of hazards   + Significance of hazards   + Methods of hazard control * Components of HACCP plan for fish pond construction   + Critical control points   + Critical control limits   + Monitoring procedures on the control limits   + Corrective actions   + Verification and validation   + Record keeping * Standards and legislations of food safety on fish pond construction | * Written tests * Oral questioning * Observation |
| 1. Prepare pond construction site | * Factors to consider before starting   + Availability of extra labour   + Equipment and materials required   + Site related factors * Site clearing   + Importance of site clearing   + Types of wetland vegetation   + Site clearing techniques   + Risks associated with site clearing   + Methods of disposing cleared vegetation | * Written * Oral * Observation |
| 1. Excavate fish pond | * Parts of a fish pond * Pond construction equipment and materials * Steps in pond construction * Pegging * Core trenching * Excavation * Compaction and shaping of dykes * Sloping of the pond bottom * Common mistakes in pond construction * Safety measures * Use of PPEs in pond construction * Basic first aid techniques | * Written tests * Oral presentation * Observation * Projects |
| 1. Construct pond drainage system | * Trenching of supply and drainage channels   + Factors to consider   + Equipment required   + Excavation and levelling * Fitting inlets and outlets   + Types of inlet and outlet systems   + Pipe joining and assembly   + Alignment and fixing * Installation of screening devices in pipes and channels * Control of floods and runoff | * Oral questioning * Observation * Project |
| 1. Complete pond construction | * + Common defects in new ponds   + How to detect common defects in new ponds * Leaking dykes * Falling dykes * Leaking inlets and outlets * Broken pipes * Uneven pond bottoms and dyke tops * Poor drainage   + Dike protection and planting of grass     - Types of grass     - Planting techniques     - Care of newly planted grass * Fencing and levelling of the pond area | * Written tests * Oral presentation * Observation * Projects |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Project
* Group discussions

**Recommended Resources**

**Tools and equipment**

* Tape measure, spirit level, string level, jembes, spades, pangas, pick axe, rake, slashers, hacksaw
* Compactors and rollers, wheelbarrows

**Materials and supplies**

Strings and ropes, liners, pegs, PVC pipes and joints, adhesives, screens, lime, cement, sand, ballast, timber, nails, fencing material

**Personal protective equipment (PPEs)**

* Gloves
* Goggles
* Helmets
* Gum boots
* Overalls
* First aid kits

## FISH FEED PRODUCTION

**UNIT CODE:** AQ/CU/AM/CR/02/3/B

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Produce Fish Feeds

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes the competencies required to produce fish feeds. It involves ability to apply food safety measures in producing fish feeds, promote growth of natural fish foods and produce on-farm formulated feeds.

**Summary of Learning Outcomes**

1. Apply food safety measures in producing fish feeds
2. Promote growth of natural fish foods
3. Produce on-farm formulated fish feeds
4. Package and store fish feeds
5. Keep feeding records

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply food safety measures in producing fish feeds | * Meaning of food safety * Importance of food safety * Principles of food safety * Prerequisite programmes   + Meaning and importance of prerequisite programmes   + Relevant programmes in fish feed production * Hazard analysis for fish feed production   + Types and sources of hazards   + Significance of hazards   + Methods of hazard control * Components of HACCP plan for fish feed production   + Critical control points   + Critical control limits   + Monitoring procedures on the control limits   + Corrective actions   + Verification and validation   + Record keeping * Standards and legislations of food safety on fish feeds production | * Written tests * Oral questioning * Observation |
| 1. Promote growth of natural fish foods | * Types of fish feeds * Natural feeds * Artificial feeds * Nutritional requirement of commonly culture fish species * Use of PPEs in production of natural fish foods * Tools and materials for natural fish food production * Production of natural feeds * Types of fertilizers * Methods of fertilization * Frequency of fertilization * Measuring productivity in ponds | * Written tests * Oral questioning * Practical tests |
| 1. Produce on-farm formulated fish feeds | * Use of PPEs in production of fish feeds * Safety measures to be observed * Uses of fish feed production materials, supplies, tools and equipment * Steps of production of artificial feeds * Milling ingredients * Weighing ingredients * Mixing ingredients * Pelletizing process * Drying methods | * Written tests * Oral questioning * Oral presentation * Practical tests * Projects |
| 1. Package and store fish feeds | * + Types of packaging materials   + Packaging methods   + Labelling information   + Fish feed handling and storage | * Oral questioning * Practical tests * Oral presentation * Written tests |
| 1. Keep feeding records | * Types of farm records * Importance of farm records * Preparation of farm feed records | * Oral questioning * Oral presentation * Practical tests * Written tests |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Projects
* Group discussions

**Recommended Resources**

**Tools and equipment**

* Meat mincers, blenders, grinders, weighing scales, dryer, mixers, containers, bag sealers, ovens, burners, drying racks.

**Materials and supplies**

* Fertilizers, secchi disks,
* Buckets , gunny bags, sticks, stakes
* Packaging bags, drying canvas/ polythene

**Personal protective equipment (PPEs)**

* Safety goggles
* Gum boots
* Helmets
* Gloves
* Dust coats
* First aid kits
* Mouth piece

## FISH HATCHERY OPERATION

**UNIT CODE:** AQ/CU/AM/CR/03/3/B

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Operate Fish Hatchery

**Duration of Unit:**70 hours

**Unit Description**

This unit describes the competencies required to operate fish hatchery.it involves ability to apply food safety measures in fish hatchery operation, prepare fish hatchery for stocking, stock and feed broodstock. It also involves harvesting, packaging and transporting fish fry and fingerlings. It further involves maintenance of fish hatchery.

**Summary of Learning Outcomes**

1. Apply food safety measures in fish hatchery operation
2. Prepare hatchery for stocking
3. Produce fingerlings
4. Feed broodstock
5. Harvest fry
6. Maintain hatchery facility

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply food safety measures in fish hatchery operation | * Meaning of food safety * Importance of food safety * Principles of food safety * Prerequisite programmes   + Meaning and importance of prerequisite programmes   + Relevant programmes in fish hatchery operation * Hazard analysis for fish hatchery operation   + Types and sources of hazards   + Significance of hazards   + Methods of hazard control * Components of HACCP plan for fish hatchery operation   + Critical control points   + Critical control limits   + Monitoring procedures on the control limits   + Corrective actions   + Verification and validation   + Record keeping * Standards and legislations of food safety on fish hatchery operation | * Written tests * Oral questioning * Observation |
| 1. Prepare hatchery for stocking | * Meaning of hatcheries, broodstock * Types of fish holding facilities in a hatchery * Safety measures * Use of PPEs in hatchery operations * Carrying out basic first aid-cuts, CPR, fractures * Handling and use of tools, equipment and materials * Water flow within system | * Written tests * Oral questioning * Practical tests * Oral presentations |
| 1. Produce fingerlings | * Use of PPEs in production of fingerlings * Safety measures to be observed * Use of fingerling production materials, supplies, tools and equipment * Meaning of terms e.g. brooders, spawning, fry, fingerlings * Selection of ripe broodstock * Types of breeding * Natural breeding * Induced breeding without hormone * Nursing fry * Feeding * Grading | * Written tests * Oral questioning * Oral presentations * Practical tests * Projects |
| 1. Feed broodstock | * Types of feeds * Feed rations * Feeding methods * Fish behaviour during feeding | * Written tests * Oral questioning * Oral presentations * Practical tests |
| 1. Harvest fry | * Harvesting tool, equipment and materials * Harvesting techniques * Sorting fry * Packaging procedures for fish seeds | * Written tests * Oral questioning * Oral presentations * Practical tests * Projects |
| 1. Maintain hatchery facility | * + Hatchery sanitation * Cleaning and disinfection * Waste disposal   + Water quality management | * Oral questioning * Practical tests * Oral presentations * Written reports |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Projects
* Group discussions

**Recommended Resources**

**Tools and equipment**

Weighing balance, measuring cylinders, , hatching jars, larval rearing trays, perforators, basins, harvesting gear, happa nets, buckets, scoop nets, water test kits, refrigerators, oxygen cylinder

**Materials and supplies**

Salt, towel, egg substrates, warm water, anaesthesia, feeds, fertilizers, cotton wool, assorted bowls, packaging material

**Personal protective equipment (PPEs)**

* Safety goggles
* Gum boots
* Wading suit
* Gloves
* Dust coats
* First aid kits
* Life ring
* Life jacket

## GROW OUT FISH PRODUCTION

**UNIT CODE:** AQ/CU/AM/CR/04/3/B

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Produce grow out fish

**Duration of Unit:** 70 hours

**Unit Description**

This unit specifies the competencies required to produce grow-out fish. It involves the ability to apply food safety measures in producing grow out fish, prepare fish grow out units, stock them with fingerlings, feed the fish, and monitor signs of disease among the fish being cultured. It also involves the competencies required to control predators, harvest fish and maintain housing structures livestock integrated on the farm.

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**Summary of Learning Outcomes**

1. Apply food safety measures in producing grow out fish
2. Prepare grow out culture units
3. Stock grow out culture units
4. Feed grow out fish
5. Maintain fish farm
6. Monitor signs of stress and disease
7. Control weeds, predators and intrusive animals
8. Harvest fish stock
9. Maintain integrated animals on fish farm

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply food safety measures in producing grow out fish | * Meaning of food safety * Importance of food safety * Principles of food safety * Prerequisite programmes   + Meaning and importance of prerequisite programmes   + Relevant programmes in grow-out fish production * Hazard analysis for grow-out fish production   + Types and sources of hazards   + Significance of hazards   + Methods of hazard control * Components of HACCP plan for grow-out fish production   + Critical control points   + Critical control limits   + Monitoring procedures on the control limits   + Corrective actions   + Verification and validation   + Record keeping * Standards and legislations of food safety on grow-out fish production | * Written tests * Oral questioning * Observation |
| 1. Prepare grow out culture units | * Tools and equipment used in pond preparation * Pond drainage and drying procedures * Pond cleaning * Minor repair of dikes and water-flow systems * Liming of fish ponds   + Types of lime   + Application rates   + Methods of application * Fertilization of fish ponds   + Types of fertilizers   + Application rates   + Methods of application * Basic record keeping and maintenance | * Written tests * Oral questioning * Practical tests |
| 1. Stock grow out culture units | * Care and handling of fingerlings * Fingerling transportation methods * Factors to consider when stocking ponds with fingerlings   + Timing   + Weather   + Water quality   + Fingerling acclimatization   + Stocking procedure * Post-harvest monitoring of stocked fish   + Handling fingerling mortalities * Signs of stress in newly stocked fish | * Written tests * Oral questioning * Oral presentations * Practical tests |
| 1. Feed grow out fish | * Types of fish feeds * Natural feeds   + Pond liming and fertilization * Fish feeding methods   + Hand feeding (broadcasting)   + Automatic feeders   + Demand feeders * Fish feeding behaviour * Feeding rates, frequency and timing * On-farm feed handling and storage * Maintenance of basic feeding records | * Oral questioning * Written tests * Practical tests |
| 1. Maintain fish farm | * Tools and equipment used required during farm maintenance * Farm maintenance checklists   + Daily activities   + Weekly activities   + Monthly activities * Minor repairs on the farm   + Pond breakages and leakages   + Supply and drainage channels   + Inlets and outlets   + Predator control structures * General farm cleanliness * Control of water quality in ponds | * Oral questioning * Practical tests * Written tests * Oral presentations |
| 1. Monitor signs of stress and disease | * Common signs of stress in cultured fish * Effects of water quality on fish behaviour * Causes of stress in cultured fish * Common signs of diseased fish * Fish stress control measures in ponds and tanks * Common fish parasites * Prevention of parasite infestations * Maintenance of biosecurity installations on a fish farm | * Oral questioning * Practical tests * Written tests * Oral presentations |
| 1. Control weeds, predators and intrusive animals | * Types of weeds found in ponds * Submerged plants * Emergent plants * Floating plants * Methods of weed control in ponds * Fish predators and intrusive animals   + Difference between predators and intrusive animals   + Types of predators and their behaviour   + Types and behaviour of intrusive animals * Methods of controlling predators on fish farms | * Oral questioning * Practical tests * Written tests * Oral presentations |
| 1. Harvest fish stock | * Tools, equipment and materials used during fish harvests * Determination of mature fish   + Based on age   + Based on market demand * Types of harvesting gears * Harvesting methods * Grading and sorting of harvested fish * Handling of harvested fish * Maintenance and care of fish harvesting tools and equipment * Basic record keeping and maintenance | * Oral questioning * Practical tests * Written tests * Oral presentations |
| 1. Maintain integrated animals on fish farm | * Maintenance and cleaning of housing structures * Handling and care of integrated livestock * Feeding and feed management * Disease and predator control in integrated animals * Basic record keeping and maintenance | * Oral questioning * Practical tests * Written tests * Oral presentations |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Group discussions

**Recommended Resources**

**Tools and equipment**

Slashers, Measuring tape, weighing scale, machetes, wheelbarrow, secchi disc, jembes, spades, rakes. Lime, fertilizer, tampers, **seine net, scoop net,fish graders,**

**Materials and supplies**

Gunny bags, buckets, laundry baskets, perforators, lime, fertilizer, ropes, cover nets, twines, screens, fencing materials, traps and scarecrows, perforators, writing material, cement, sand, transport containers, fish feeds,

**Personal protective equipment (PPEs)**

Safety goggles, gum boots, helmets, gloves, dust coats, first aid kits, industrial mouth piece, wading suits, life jackets,

## POST HARVEST FISH HANDLING

**UNIT CODE:** AQ/CU/AM/CR/05/3/B

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Handle harvested fish

**Duration of Unit:** 20 hours

**Unit Description**

This unit describes the competencies required to handle harvested fish. It involves ability to apply food safety measures in handling harvested fish, hygienically handle, preserve, and process harvested fish. It includes the sales of fish and fish products. It also involves disposal of wastes from fish processing.

**Summary of Learning Outcomes**

1. Apply food safety measures in handling harvested fish
2. Prepare harvested fish for preservation
3. Preserve harvested fish
4. Process harvested fish
5. Carry out sales of fish and fish products
6. Manage waste from fish processing

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply food safety measures in handling harvested fish | * Meaning of food safety * Importance of food safety * Principles of food safety * Prerequisite programmes * Meaning and importance of prerequisite programmes * Relevant programmes in post-harvest fish handling * Hazard analysis for post-harvest fish handling   + Types and sources of hazards   + Significance of hazards   + Methods of hazard control * Components of HACCP plan for post-harvest fish handling   + Critical control points   + Critical control limits   + Monitoring procedures on the control limits   + Corrective actions   + Verification and validation   + Record keeping * Standards and legislations of food safety on post-harvest fish handling | * Written tests * Oral questioning * Observation |
| 1. Prepare harvested fish for preservation | * Use of PPEs in preserving harvested fish * Safety measures to be observed * Use of fish preservation materials, supplies, tools and equipment * Fish handling procedures * Grading * Cleaning * Scaling * Gutting | * Written tests * Oral questioning * Practical tests |
| 1. Preserve harvested fish | * Fish preservation methods * Icing * Smoking * Sun-drying * Salting * Freezing | * Written tests * Oral questioning * Practical tests * Projects |
| 1. Process harvested fish | * Use of PPEs in processing harvested fish * Safety measures to be observed * Use of fish processing materials, supplies, tools and equipment * Types of processed fish products * Processing methods * Frying * Filleting * Packaging and labelling * Packaging tools and equipment * Packaging materials * Labelling information * Products storage | * Written tests * Oral questioning * Oral presentation * Practical tests * Projects |
| 1. Carry out sales of fish and fish products | * + Price determination   + Distribution channels   + Selling methods   + Sales records   + Observation of hygiene | * Oral questioning * Written tests * Observation |
| 1. Manage waste from fish processing | * Use of tools, materials and equipment in disposal of fish processing wastes * Types of fish processing wastes * Disposal methods of fish processing wastes | * Oral questioning * Practical tests * Written tests * Oral presentations |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Group discussions
* Role plays
* Field trips

**Recommended Resources**

**Tools and equipment**

Weighing balance, wheelbarrow, pallets, filleting tables, knives, waste disposal containers, ice box, smoking kiln, solar dryer, drying racks, drying mats or canvass, domestic freezers, cool boxes, meat mincer, blender, crockery, basins, buckets, hard brush, baskets, fire-fighting equipment

**Materials and supplies**

Ice, salt, frying oil, polybags, cartons, gunny bags, ice packs, sealing tape, labels

**Personal protective equipment (PPEs)**

Gum boots, head covers, gloves, dust coats, first aid kits, mouth pieces, aprons