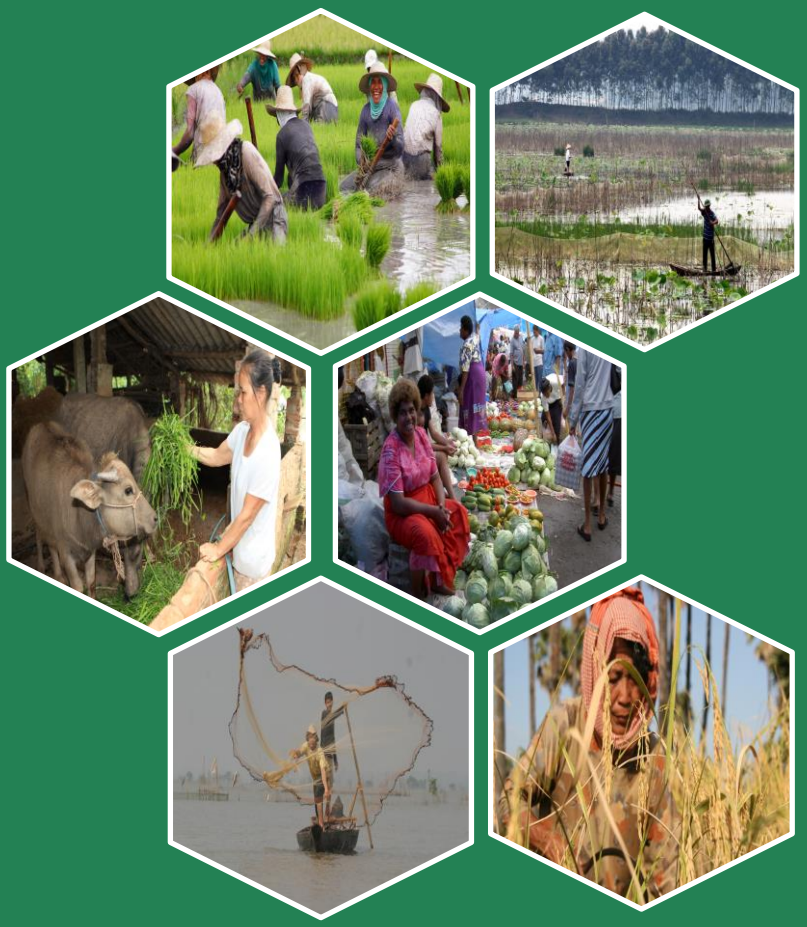
International Labour Organization

Regional Model Competency Standards:

Agriculture and aquaculture



Regional Model Competency Standards: Agriculture and aquaculture

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Preface

Many Asian countries rely on agriculture for their livelihoods. The region is a major area for intensive subsistence farming, with rice production dominant. However a variety of other crops, plantations and livestock are also farmed and mixed crop/livestock farming systems are also common. Half of the world's workers are found in agriculture. About 40 per cent of these are in South-East Asia, accounting for around 450 million people.

Asia has been a leader in aquaculture production, accounting for nearly 90 per cent of the world production (FAO, 2012). The species farmed in Asia range from seaweeds to herbivorous fishes and mollusks to carnivorous fishes, shrimps and crabs. Employment in aquaculture has grown faster than the world's population. The sector provides jobs to tens of millions and supports the livelihoods of hundreds of millions. Thus, skills development will be essential to enhance the capacities of the workforce for these sectors.

The need to improve the quality and effectiveness of training systems remains a major challenge for many countries in the Asia-Pacific region. The skills of workers are a critical source of enterprises' productivity and competitiveness, as well as of workers' employability. Much effort has been made to improve the relevance of training systems, to ensure that the skills that workers possess meet the needs of the workplace.

The establishment of the ASEAN Economic Community (AEC 2015), with the goal of creating economic integration, a single market production base and a freer flow of skilled labour in the region, has increased the importance to sending and receiving countries of being able to recognize the skills of migrant workers.

To help accelerate the improvement of training systems and the mutual recognition of skills, the ILO has developed, in consultation with employers, governments and workers, the Regional Model Competency Standards (RMCS). These have been developed in identified priority areas and are in a simplified format.

Competency standards are a set of benchmarks that define the skills, knowledge and attributes people need to perform a work role. They are developed in consultation with industry, in order to ensure they reflect the needs of the workplace. These standards are primarily used to develop and implement training, to assess the outcomes of training, and to assess the level of a person's existing skills and competencies.

The RMCS are intended to be a regional reference for developing competency standards for those countries that are in the process of creating standards, or reviewing existing national standards. The RMCS can provide the basis for developing national competency standards in countries so they can avoid developing standards from scratch. By providing a regional reference for competency standards, I also hope that the RMCS can assist ASEAN regional integration by facilitating the mutual recognition of skills of workers across borders.

Tomoko Nishimoto
Assistant Director-General and Regional Director
for Asia and the Pacific

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The Regional Model Competency Standards (RMCS) for Agriculture and Aquaculture were produced as a result of a collaborative effort between a number of dedicated individuals who contributed their time and expertise through a consultative process. They were developed following a benchmarking process, in which national competency standards from several countries were researched and similarities noted.

The ILO would in particular like to thank the Commonwealth of Australia, for invaluable information obtained from the National Competency Standards for the agriculture and seafood industries, developed by the National Industry Skills Council, AgriFood Skills Australia.

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Glossary

Attainment of Competency
Competencies may be gained in a number of ways including through:

- Formal or informal education and training
- Experiences in the workplace
- General life experience, and/or
- Any combination of the above

Competency
The ability to perform particular tasks and duties to the standard of performance expected in the workplace, applying all relevant skills, knowledge and attitudes consistently over time in the required workplace situations.

Competency Standards
Competency standards are made up of a number of units of competency each of which describes a key function or role in a particular job function or occupation.

Critical skills and essential knowledge
Brief statements that outline key skills and required knowledge for the job function covered by this unit. Knowledge identifies what a person needs to know to perform the work in an informed and effective manner. Skills describe how the knowledge is converted to a workplace outcome.

Elements of competency
These are the major functions and tasks that make up the competency.

Evidence guide
The Evidence guide information to the assessor about how the competency may be demonstrated, such as conditions and context of assessment, suitable methods of assessment and resource implications.

Herbicides
Herbicides, are pesticides used to kill unwanted plants. Selective herbicides kill specific targets, while leaving the desired crop relatively unharmed. Herbicides used to clear waste ground, industrial sites, railways are not selective and kill all plant material with which they come into contact.

Integrated pest management (IPM)
IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control (including the life cycles of pests), habitat manipulation, modification of cultural practices, and use of resistant varieties as well as the judicious use of pesticides. Pest control decisions relate to the cost benefit analysis of treatments and are made based on the type of pest and the population that is tolerable before intervention is required.

Performance criteria
The performance standard or tasks that are involved in each of the relevant job functions. Critical terms or phrases may be written in bold italics and then defined in Range statement, in the order of their appearance in the performance criteria.

Pesticides
Pesticides are substances meant for attracting, destroying, or mitigating any pest. The most common use of pesticides is herbicides for weeds, and for treating plant diseases or insects. Pesticides are more than are also used for non-agricultural purposes. The term pesticide includes such substances as insect or animal repellant, fungicides disinfectants and sanitizers.

Propagation
Plant propagation is the process of creating new plants from a variety of sources: seeds, cuttings, bulbs and other plant parts.

Range statement
Brief statements that clarify the scope and range of performance, including clarification on contexts, operations and equipment referred to in the performance criteria As applicable, the meanings of key terms used in the performance criteria are also explained in the Range statement.

Salinity
Salinity is the saltiness or dissolved salt content of a body of water or of a soil.

Turbidity
Turbidity is the cloudiness or haziness of a fluid and is a key test of water quality.

Unit descriptor
A short statement giving a more detailed description of the job function covered by the unit.

Unit of competency
An agreed statement of the skills and knowledge required for effective performance of a particular job or job function.

Unit title
A short title that summarises the main job function covered by the unit; accompanied by an alphanumeric code that follows ILO guidelines.

Introduction

National competency standards play an important and increasing role in skills development and recognition in Asia and the Pacific, as they do in many other parts of the world. They are a guide to the range of skills and knowledge required for a whole industry. Competency standards can be flexibly combined into jobs and occupations. They are the common basis for training programmes, skills assessment, and certification in many countries.

Competency standards, when recognized nationally or across a cluster of nations, can form a key component in assisting the mobility of skilled workers. As part of a quality assured system, the assessment of a person's skills against accepted benchmarks means that those skills can be applied in similar work, and potential employers can feel confident in the level of competency that a worker claims to have. Workers returning from employment in other countries can have the skills they gained working there formally recognized at home.

Labour mobility and the need for recognition

The labour market in Asia is characterized by a high level of worker migration, both within the region and to countries further afield. In 2013, Asia accounted for 31 per cent of the global international migrant stock (UN, 2013).[1] Many developing countries have come to rely heavily on remittances sent from individuals working abroad to their families at home. Remittances in the 2010s are now nearly three times the size of official development assistance, and larger than private debt and portfolio equity flows to developing countries. The importance of remittances as a source of foreign currency earnings is increasing, particularly in South Asia (World Bank, 2013).[2]

Many migrants do have skills that were acquired in their home country, but not all of their skills are necessarily formally certified. This reduces their prospects for employment and better working conditions that correspond with their skills. Upon their return home, there is little opportunity to have their newly acquired skills and work experience formally acknowledged. These are missed opportunities in capitalizing on the wealth of new learning and skills that workers bring back to their home countries. This scenario affects the individual worker's future employment prospects both within the region and outside. It also impedes the country's capacity to build a skilled and qualified workforce.

Training systems and the need for improvement

Training systems in Asia and the Pacific are often criticized for the mismatch between the skills offered and the needs of workers and employers. This means that some people are learning skills that are not needed in domestic industries, and training organizations are wasting their limited resources by providing training that is not used. This is a serious problem for any country as it holds back development and growth in productivity and employment.

Agriculture

Half of the world's workers are employed in agriculture. About 40 per cent of these are in South-East Asia, accounting for around 450 million people. Agriculture is the main source of livelihood in every country in the region except Brunei Darussalam and Singapore, where growth in industry and services has been most significant. The Asian region is a major area for intensive subsistence farming, with rice growing dominant. However a variety of other crops are also farmed, alongside plantations and

[1] United Nations, Department of Economic and Social Affairs: *Trends in international migrant stock: The 2013 Revision*. http://esa.un.org/unmigration/TIMSA2013/migrantstocks2013.htm [accessed 7 Oct. 2014].

[2] World Bank: *Migration and Development Brief 22*. Migration and Remittances Team, Development Prospects Group. April 2014 http://www.worldbank.org/prospects/migrationandremittances [accessed 7 Oct. 2014].

livestock production. Indeed, mixed crop-livestock farming systems are predominant in South-East Asian countries.

Agriculture enterprises range from small, subsistence, family plots to large properties owned by multinational companies and run by hired workers. Production methods and the use of machinery and chemicals vary considerably, depending on the size and wealth of the farm.

Women are more represented than men in the agricultural sector, and child labour and bonded labour is a widespread problem. It is very common for migrant workers to be employed in agriculture, and women and children can be particularly vulnerable to discrimination and abuse. Around 40 per cent of agricultural workers are in waged employment, while the remainder work in the informal sector.

The agriculture sector in South-East Asia is poorly regulated, and workers face a range of serious problems, including lack of job security, abuses of fundamental rights, and high occupational health and safety risks. Furthermore, as working and living conditions are interwoven, workers and their families live on the land, where they experience firsthand the effects of exposure to pesticides, contamination of water and foodstuffs, and loss of viable land due to overproduction or intensive farming.

Aquaculture

Aquaculture is particularly important in Asia, which accounts for 90 per cent of the world production (FAO, 2012). Species farmed in Asia range from seaweeds to herbivorous fish and mollusks to carnivorous fish, shrimp, and crabs.

Aquaculture enterprises range from a small fish cages owned and run by a farming or fishing family to augment their diet and income, to several hundred hectares of fish or shrimp ponds owned by large companies and run by hired workers. Marketing can be on a "farm-gate" basis, with the buyer picking up freshly harvested fish, or can involve processing, cold storage, and eventual shipment of the product overseas.

Health and safety

Agriculture is one of the three most hazardous employment sectors in the world. In several countries, the fatal accident rate in agriculture is double the average for all other industries. Out of some 335,000 fatal workplace accidents worldwide, about 170,000 occur among agricultural workers. Furthermore, agriculture is one of the worst forms of child labour, with more than half (53 per cent) of the 215 million child labourers worldwide heavily involved.[3]

Environmental hazards

Agricultural production has well documented negative environmental consequences, including soil degradation, pollution of waterways from toxic herbicides and pesticides, air pollution through toxic spray drifts, toxic residue in foods, seed contamination, deforestation, and release of greenhouse gases.

Irresponsible fishing and farming practices, and accelerated development, can destroy sensitive ecosystems and reduce biodiversity. The negative environmental effects of irresponsible fishing and farming practices have included the destruction of mangroves, extensive conversion of mangrove forests to ponds, changes in water properties, and discharge of high levels of organic matter into coastal waters.

[3] ILO, retrieved from http://www.ilo.org/global/industries-and-sectors/agriculture-plantations-other-rural-sectors/lang--en/index.htm [accessed 3 Sep. 2014].

In view of the environmental effects and the considerable occupational safety risks faced by agricultural workers, these RMCS have incorporated both environmental and safety requirements for performance in each unit of competency. These requirements are made explicit in the introduction section of these RMCS.

Purpose of the RMCS

The Regional Model Competency Standards (RMCS) were developed as a basis for identifying skills needed in the workplace, so that training and assessment resources can be developed, and individuals tested against the standards. Training resources may include a curriculum, test projects, learner guides, texts, references, teaching strategies, group activities, and an assessment system that can be used to determine ability in each unit of competency.

Different enterprises will have different enterprise methods and standards, and any training provided should reflect the different standards. Similarly, there will be different legislation and government regulations that apply in different countries and regions, and these also must be taken into account in designing training programmes.

Content

The RMCS are grouped functionally and not along the line of jobs or occupations. This enables users to tailor make their own competency standards by selecting and grouping the units of competencies from the RMCS to better fit their national and local understanding and situations.

The standards define a general framework for the critical skills, knowledge, and attitudes that equip or certify workers to undertake that specific job.

These RMCS should not be seen as complete sets of competencies. They are meant to be a starting point for discussions, and should be modified to meet the specific requirements of a particular employer, job, workplace, or country's education and training system. Additional performance elements could be added or deleted to match local requirements. Similarly, any special "performance standards" can be modified or added to match enterprise requirements or government regulations that apply in different countries and regions.

The RMCS for agriculture and aquaculture include both generic competencies (Functional Area A: Core Competencies), and vocational and technical competencies (Functional Areas B–H).

Within this set of competency standards the various elements do not specify "work safely" or "in an environmentally responsible manner" because it is assumed that these concepts apply to each competency element.

Templates for RMCS

The template follows the model used in various countries in Asia and the Pacific, as well as the other RMCS developed by the ILO. Each unit of competency describes the skills a worker applies when performing the identified task or role, as well as the underpinning skills, knowledge, and attitudes needed to perform the task effectively.

Individual units define the competency outcomes necessary for a particular area of work. It is the combination of a number of units that describes a whole job role. The combining of units also captures the need to manage different tasks simultaneously and to adapt to different workplace environments and situations.

These RMCS have been divided into eight functional areas, which comprise 46 units of competency. These are summarized in the following table.

Functional area		Code	Unit title
A	Core units	AA-A1	Communicate in the agriculture or aquaculture workplace
		AA-A2	Work safely in the agriculture or aquaculture industries
		AA-A3	Plan for agriculture or aquaculture work tasks
B	Land maintenance and preparation	AA-B1	Test water
		AA-B2	Test soil
		AA-B3	Manage soil quality
		AA-B4	Manage pests
		AA-B5	Prepare land for agriculture
		AA-B6	Spread fertilizer and soil improvers
C	Planting and harvesting	AA-C1	Propagate plants
		AA-C2	Plant crops
		AA-C3	Manage crop growing
		AA-C4	Maintain crops
		AA-C5	Harvest agricultural crops
		AA-C6	Save and store seed
D	Irrigating and drainage	AA-D1	Install irrigation
		AA-D2	Install agricultural drainage
		AA-D3	Operate gravity-fed irrigation systems
		AA-D4	Operate pressurized irrigation systems
		AA-D5	Maintain irrigation systems
		AA-D6	Check and repair irrigation and drainage systems
E	Fruit and vegetable production	AA-E1	Prepare and care for vegetable and fruit crops
		AA-E2	Plant vegetables and fruit plants
		AA-E3	Plant fruit trees and shrubs
		AA-E4	Harvest vegetable crops
		AA-E5	Harvest fruit crops
F	Rice growing and processing	AA-F1	Prepare, plant and maintain a rice paddy
		AA-F2	Harvest rice

		AA-F3	Dry and thresh rice
		AA-F4	Hull, whiten and polish rice
		AA-F5	Prepare, store and raise rice seed
G	Poultry production	AA-G1	Artificially inseminate poultry
		AA-G2	Brood poultry
		AA-G3	Incubate eggs
		AA-G4	Identify and sex poultry
		AA-G5	Collect and pack eggs
		AA-G6	Trim poultry beaks
		AA-G7	Monitor free-range poultry production
		AA-G8	Maintain poultry health
H	Aquaculture tanks and systems	AA-H1	Maintain aquaculture tanks and systems
		AA-H2	Collect broodstock
		AA-H3	Artificially inseminate poultry
		AA-H4	Handle aquaculture stock
		AA-H5	Feed aquaculture stock
		AA-H6	Control aquaculture pests and disease
		AA-H7	Harvest aquaculture stock
		AA-H8	Prepare aquaculture stock for live transport

Functional area A – Core competencies

AA-A1 Communicate in the agriculture or aquaculture workplace

Unit details	
Functional aea A	**Core unit**
Unit title	**Communicate in the agriculture or aquaculture workplace**
Unit code	**AA-A1**

Description

This unit describes the outcomes required to communicate effectively through verbal and written means to ensure work practices that are safe and meet specifications.

Elements of competency	**Performance criteria**
1. Follow messages and instructions	1.1 Required information is obtained by listening and is interpreted correctly.
	1.2 **Verbal** instructions are followed correctly.
	1.3 Verbal information is conveyed to others accurately.
	1.4 **Non-verbal** hand signals and gestures are interpreted correctly and clarified.
	1.5 Clarification is sought from the supervisor when instructions or procedures are not understood.
2. Follow written instructions	2.1 Written job and safety instructions are read and interpreted correctly.
	2.2 Written instructions are conveyed to others as required.
	2.3 Work signs and safety requirements are correctly interpreted/clarified and applied.
	2.4 Technical instructions relating to job process, criteria and equipment operations are accessed, interpreted and applied.
3. Complete work related documents	3.1 Workplace data is recorded manually or electronically using standard workplace forms and documents.
	3.2 Required workplace documents are completed in accordance with workplace procedures for quality, time and detail.
	3.3 Errors in recording information are identified and fixed.
4. Communicate with others	4.1 Workplace meetings are attended punctually.
	4.2 Meeting inputs are consistent with meeting purpose and workplace protocols.
	4.3 Personal interaction is courteous and enquiries are made clearly and concisely.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- complete relevant work related documents;
- follow routine spoken messages and written notices;
- obtain and provide information in response to workplace requirements; and
- participate in workplace meetings and discussions.

Critical skills and essential knowledge

The ability to:

- demonstrate interpersonal skills to relate to people from a range of backgrounds and with varying abilities;
- demonstrate teamwork skills to participate in workplace meetings and discussions;
- gather and provide information in response to workplace requirements;
- use literacy skills to complete relevant work-related documents and follow simple written notices; and
- use oral communication skills to listen, question, clarify, follow simple spoken messages and seek advice from supervisor.

Knowledge of:

- Communication technology relevant to the workplace and the candidate's work role
- Different modes of communication (e.g. written and non-verbal)
- Effective communication in a work team
- Effective communication techniques, including the role of body language
- Workplace communication procedures and systems
- Workplace documentation requirements

Range statement

Verbal or interpersonal communication may include:

- One to one communication
- Small group e.g. work team
- Telephone
- Two-way radios

Non-verbal communication may include:

- Email
- Facsimile
- Hand signals
- Internet
- Signage
- Written instructions

Competency may be assessed through a combination of:

- Demonstration
- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-A2 Work safely in the agriculture or aquaculture industries

Unit details	
Functional area A	**Core unit**
Unit title	**Work safely in the agriculture or aquaculture industries**
Unit code	**AA-A2**

Description

This unit describes the outcomes required to plan and carry out safe work practices in an agriculture or aquaculture workplace, to ensure personal safety and the safety of others.

Elements of competency	**Performance criteria**
1. Follow safe work practices	1.1 Follow all safe work practices, duty of care requirements and safe work instructions.
	1.2 Identify, assess and report hazards in the work area to designated personnel.
	1.3 Identify and obey work site **safety signs and symbols**.
	1.4 Clear and maintain the work area to prevent accidents and protect self and others.
	1.5 Wear correctly fitted and suitable **personal protective equipment** and clothing for work tasks, and store appropriately after use.
2. Follow and apply measures for controlling workplace risks	2.1 Identify, handle and use hazardous materials according to the workplace procedures and manufacturer's safety instructions.
	2.2 Apply measures for controlling **risks** and hazards effectively and immediately in accordance with **workplace procedures**.
3. Follow emergency procedures	3.1 Follow emergency response and evacuation procedures, and carry these out effectively when required.
	3.2 Identify designated personnel for communication purposes in the event of an emergency.
	3.3 Follow safe work procedures for dealing with accidents, various types of fire and other emergencies, including the use of fire-control equipment.
	3.4 Carry out emergency first-aid treatment of minor injuries and assist first aid people as required, including listing any treatment administered.
	3.5 Contribute to safety, hazard, accident or incident reports according to the workplace procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- apply risk control measures to hazards and risks immediately and effectively;

- follow emergency response, accident and evacuation procedures;
- identify and handle hazardous materials as instructed; and
- understand and correctly follow safety signs.

Critical skills and essential knowledge

The ability to:

- apply problem-solving skills to use available resources and determine risk control procedures;
- apply risk control measures;
- demonstrate understanding of duty of care requirements;
- follow emergency response and evacuation procedures;
- identify and control and/or report potential workplace risks; and
- use oral communication skills to convey safety messages and risks to others and seek advice from supervisor.

Knowledge of:

- Basic first aid procedures for treatment of minor injuries
- Designated workplace emergency and first aid personnel
- Meaning of safety and symbols in the workplace
- Safety requirements
- Use of Personal Protective Equipment (PPE)

Range statement

Safety signs and symbols may include:

- Emergency information signs
- Fire signs (location of fire alarms and firefighting equipment)
- Hazard identification and safety tags on equipment
- Vehicle warning signs and symbols

Personal Protective Equipment (PPE) may include:

- Buoyancy vest or personal floatation device (PFD)
- Gloves, mitts or gauntlets, and protective hand and arm covering
- Hard hat or protective head covering
- Hearing protection (e.g. ear plugs and ear muffs)
- Non-slip and waterproof boots (gumboots) or other safety footwear
- Personal locator beacon or Emergency Position Indicating Radio Beacon (EPIRB)
- Protective outdoor clothing for tropical conditions
- Safety harness
- Sun protection (e.g. sun hat, sunscreen and sunglasses)
- Uniforms, overalls or protective clothing (e.g. mesh and waterproof aprons)
- Waterproof clothing (e.g. wet weather gear and waders)

Workplace **risks** may include**:**

- Animal and insect pests and diseases
- Broken or damaged equipment
- Chemicals and toxic substances
- Electricity and water
- Flammable materials and fire hazards
- Lifting practices
- Moving vehicles and machinery
- Sharp objects and cutting tools
- Spillages
- Unguarded equipment

- Waste and debris especially on floors
- Working at heights

Workplace policies and procedures relating to safety may include:

- Compliance with manufacturer's safety instructions
- Emergency, fire and accident procedures
- Hazard policies and procedures
- Personal safety procedures including use of personal protective clothing and equipment
- Safety instructions for use of equipment, vehicles and machinery
- Work instructions

Competency may be assessed through a combination of:

- Demonstration
- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-A3 Plan for agriculture or aquaculture work tasks

Unit details	
Functional area A	**Core unit**
Unit title	**Plan for agriculture or aquaculture work tasks**
Unit code	**AA-A3**

Description

This unit describes the outcomes required to plan and organize work tasks in the agriculture and/or aquaculture work environment.

Elements of competency	**Performance criteria**
1. Identify task requirements	1.1 Task requirements are determined and confirmed with supervisor.
2. Plan and prioritize	2.1 Work steps are sequenced and prioritized correctly.
	2.2 Work activity is planned and organized with other involved personnel.
3. Document and review	3.1 Documents related to job planning and progress are completed and provided to supervisor in accordance with workplace requirements.
	3.2 Work plan is reviewed regularly to check effectiveness and identify improvements.
	3.3 Suggestions for improvement are made for future planning where appropriate.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- cooperate with others in planning, conducting and reviewing activities;
- identify tasks and steps required to achieve a work outcome; and
- sequence and prioritise tasks.

Critical skills and essential knowledge

The ability to:

- apply safety considerations in planning;
- use communication skills, including questioning, listening, asking for clarification and seeking advice from supervisor;
- break down work requirements into tasks and steps;
- follow safety policies and procedures and written instructions;
- prioritise and sequence tasks appropriately; and
- use problem-solving skills to use available resources, prioritise tasks and change plans where required.

Knowledge of:

- Workplace planning procedures

Range statement

Competency may be assessed through a combination of:

- Demonstration
- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional area B – Land maintenance and preparation

AA-B1 Test water

Unit details	
Functional area B	**Land maintenance and preparation**
Unit title	**Test water**
Unit code	**AA-B1**

Description

This unit of competency describes the outcomes required to carry out water sampling and test for a range of chemical and physical characteristics as a foundation for further operations.

Elements of competency	**Performance criteria**
1. Prepare to carry out sampling and testing	1.1 A **Sampling plan** that identifies required water samples, the **sampling locations** and required environment is developed and confirmed with supervisor.
	1.2 Appropriate **testing equipment** is selected and checked for serviceability and accuracy.
	1.3 Repairs of field-based testing equipment are carried out and correlated for accuracy if required.
	1.4 Personal protective equipment required for sampling and testing is selected and used.
2. Conduct water quality sampling	2.1 Water samples are collected in accordance with the sampling plan and workplace procedures.
	2.2 Integrity of samples is maintained during sampling and sample containers are labeled according to workplace requirements.
	2.3 Sample information, and observations are recorded in required record books/sheets.
3. Conduct basic water testing	3.1 Water quality **tests** are conducted on collected samples, according to workplace procedures, ensuring that sample integrity is maintained.
	3.2 Evidence of **water quality hazards** is determined and recorded and samples requiring external analysis are identified.
	3.3 Pathology samples are prepared and packaged for submission to laboratories in accordance laboratory standards.
	3.1 Test results and **observations** are **recorded** on data sheets.
	3.2 Communicate results of testing and any potential hazards to supervisor.
4. Maintain testing equipment	4.1 Clean and sanitize all equipment and clothing and store in accordance with workplace procedures.

4.2 Repair any damaged or faulty equipment on site or send to manufacturer or specialist.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- collect and prepare water samples and perform water flow and quality tests according to specified standards;
- determine and report accurate and relevant results from testing;
- identify potential hazards in water sampling;
- plan and organize sampling and testing;
- understand and apply procedures for water sampling and testing; and
- use appropriate sampling and testing equipment.

Critical skills and essential knowledge

The ability to:

- conduct basic water quality tests;
- dispose of waste and spent samples correctly;
- follow plans and instructions;
- plan work activities;
- prepare, collect, label and preserve water samples;
- produce reports and logs; and
- use and calibrate testing equipment.

Knowledge of:

- Procedures and techniques for water sampling
- Procedures for disposal of waste and excess water samples
- Range and purpose of basic water quality testing
- Range of likely operating conditions, hazards and environments that can affect testing
- Relevant policies, procedures and standards including laboratory standards for preparing samples
- Test procedures

Range statement

Sampling plan may include

- Timelines
- Communication with other team members and individuals
- Sampling locations:
- Variety of samples to be collected and tested
- Testing equipment to be used

Sampling locations may include:

- Raw water supply
- Surface water
- Groundwater
- Water distribution and treatment systems

Testing equipment may include:

- Bailer
- Dredges
- Electronic machines
- Fox whistle
- Grabs
- Micropipettes

- Nets
- Plankton nets, probes
- Refractometer
- Soil-analysis kits, specialized machinery
- Water-sample bottles

Tests may include:

- Alkalinity, ammonia
- Biological oxygen demand
- Carbon dioxide, clay content
- Dissolved oxygen
- Hardness
- Mineral content
- Nitrate
- pH level
- Presence of contaminants, presence of dissolved or suspended solids
- Salinity
- Temperature, turbidity

Water quality hazards may include:

- Aquatic life (including macro invertebrates and macrophytes) indicating presence of contamination
- Bacteria (E. coli and faecal coliforms)
- Chlorophyll
- Heavy metals
- Herbicides
- Nitrogenous products (TKN, TAN, NO2-, NO3-)
- Pesticides,
- Phosphorus (total and/or thophosphate)
- Redox

Observations may include:

- Adverse effects from severe weather conditions
- Changes in native land-based and/or aquatic life around the site
- Information on relevant ambient and antecedent environmental conditions
- Sediment and debris levels
- Toxic microalgae
- Wastes and contaminants

Records may include sample records or field detail sheets, including information such as:

- Atypical results
- Data gathered at time of collection
- Details of person collecting sample
- Equipment identification
- Instructions to transporters
- Preservation
- Pre-treatment
- Sample point
- Time and logging of sample receipt and testing
- Time sample was taken
- Visual observations
- Volume of sample

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-B2 Test soil

Unit details	
Functional area B	**Land maintenance and preparation**
Unit title	**Test soil**
Unit code	**AA-B2**

Description

This unit describes the outcomes required to conduct soil sampling and test for a range of characteristics as a basis for further operations, such as nutrition programmes and irrigation scheduling.

Elements of competency	**Performance criteria**
1. Prepare for soil testing	1.1 Soils to be surveyed are identified and confirmed with supervisor.
	1.2 Areas and soils to be sampled are determined, based on site plans and in consultation with the supervisor.
	1.3 Correct density and depth for a representative sampling of an area is determined.
	1.4 A sampling plan outlining soils and areas to be sampled, density and depth to be chosen is developed.
	1.5 Appropriate tools, **equipment** and machinery, including personal protective equipment, are selected in accordance with the site conditions and testing requirements.
2. Conduct soil sampling	2.1 Holes are excavated at the identified sampling sites according to workplace procedures, safety requirements and with consideration of the local environment.
	2.2 Sampling results are recorded in an established format, classifying soil types according to standards for soil classification.
3. Test soil for planting	3.1 The **physical** and **chemical characteristics** of the soil are determined, according to requirements.
	3.2 The physical and chemical suitability of the sampled soil is determined for a specified plant.
	3.3 Appropriateness is determined of applying soil improvement techniques to increase original soil's water efficiency and nutrient utilization.
	3.4 Any required samples for off-site testing collected and prepared, packaged, accurately labeled and dispatched according to testing agency requirements.
	3.5 Records of soil-testing activities are completed according to workplace procedures.
4 Equipment maintenance	4.1 All equipment is cleaned and sanitized and stored in accordance with the workplace procedures.

4.2 Damaged or damaged or faulty equipment is repaired or sent to manufacturer.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- assess benefits and viability of applying soil improvement techniques;
- determine the physical and chemical suitability of the sampled soil for a specified plant; and
- identify correct density and depth for a representative sampling.

Critical skills and essential knowledge

The ability to:

- determine suitability of sampled soil for specified planting; and
- determine testing areas and methods.

Knowledge of:

- Characteristics of a range of soils and their application to plants
- Chemical characteristics of soil
- Physical characteristics of soil
- Soil improvement techniques and agents
- Standards for soil classification

Range statement

Equipment may include:

- Charts and tables of soil characteristics and plant soil parameters
- Electrical conductivity (EC) metre
- Hand or powered auger
- Hand-held salinity
- PH test kit or electronic pH testing device
- Plastic overlays
- Sample bags
- Tape measure

Physical characteristics may include:

- Colour
- Compaction
- Depth
- Depth of root zone
- Depth of water table
- Structure
- Texture

Chemical characteristics may include**:**

- Air-filled porosity
- Carbonate content
- Nutrient content (N, K, P)
- PH level
- Readily available water
- Salinity

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-B3 Manage soil quality

Unit details	
Functional area B	**Land maintenance and preparation**
Unit title	**Manage soil quality**
Unit code	**AA-B3**

Description

This unit describes the outcomes required to collect soil and/or media samples, perform basic soil tests and interpret the results.

Elements of competency	**Performance criteria**
1. Identify soil characteristics and improvement activities needed	1.1 Information about local soil characteristics is obtained and analyzed for relevance to the particular workplace operation. 1.2 Results of **soil quality** tests are used to identify and recommend soil properties capable of being improved. 1.3 Improvement measures such as soil improving agents and/or work practices are introduced 1.4 Personal Protective Equipment relevant to the task is selected and used appropriately.
2. Conduct, monitor and record soil improvement activities	2.1 **Soil improvement** activities are conducted according to the production/management plan and **safe work practices**. 2.2 The performance of soil improvement activities is tested and monitored, and the production/management plan, is modified accordingly and recorded for later use.
3. Maintain documentation and equipment	3.1 Equipment and clothing, is cleaned, sanitized and stored in accordance with the workplace procedures. 3.2 Damaged or faulty equipment is repaired or reported to supervisor. 3.3 Records of all activities are completed to required work standards.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and Critical skills and essential knowledge and knowledge requirements. The candidate must be able to:

- apply soil improving agents and techniques to meet the needs of required plants;
- use soil management techniques to monitor, modify and conserve soil; and
- use water results to correctly determine soil properties.

Critical skills and essential knowledge

The ability to:

- apply soil conservation strategies and sustainable production techniques;
- conduct and interpret basic soil tests;
- maintain testing records; and
- read, interpret and follow instructions.

Knowledge of:

- Nutritional requirements of plants relevant to the workplace
- Safety requirements
- Soil characteristics
- Soil conservation methodologies
- Soil improvement agents and their uses and effects

Range statement

Soil qualities for testing:

- Air-filled porosity
- Color
- Compaction
- Depth
- Major
- Nutrient availability
- PH level
- Readily available water
- Salinity
- Structure
- Texture

Soil improving agents may include:

- Flocculating agents
- PH-modifying agents such as lime
- Structure additives
- Structure-modifying agents such as gypsum and artificial
- Texture modifications
- Wetting and water-retention agents

Work practices to improve soil may include:

- Compaction alleviation
- Modifications to soil drainage or moisture-holding capacity

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-B4 Manage pests

Unit details	
Functional area B	**Land maintenance and preparation**
Unit title	**Manage pests**
Unit code	**AA-B4**

Description

This unit describes the outcomes required to manage pests and diseases in an agricultural environment, taking into consideration Integrated Pest Management (IPM) options in planning and monitoring.

Elements of competency	**Performance criteria**
1. Assess pest and disease infestation	1.1 Presence of pests or diseases identified through monitoring and type of infestation determined.
	1.2 Scope and size of the infestation is assessed.
	1.3 Information about the pest, its biology, and environmental factors is analyzed to determine whether tolerance is appropriate or management is required.
	1.4 A pest and disease management action plan is developed, with monthly, weekly or daily work plans.
2. Prepare for pest management measures	2.1 Tools, equipment and machinery required are selected and checked for serviceability.
	2.2 Safety hazards are identified, risks assessed and risk controls are implemented.
	2.3 Personal protective equipment is selected, used and maintained according to safety standards.
3. Conduct pest management activities	3.1 Monitoring and measurement schedules are implemented to comply with the pest and disease management plan.
	3.2 Preventative **cultural methods** are employed as part of an integrated pest and disease management plan.
	3.3 **Scheduled pest/weed or disease** control activities are determined and implemented.
	3.4 All areas requiring pest and disease management are visually checked for coverage.
	3.5 Checks are made to ensure any chemicals applied do not contaminate growing areas, water supplies or adjoining property.
4. Monitor pest and disease control methods	4.1 **Pest and disease population controls** are monitored to identify side effects to other plants, animals or external environment.
	4.2 Effectiveness of control methods are assessed and adjustments made to the pest management plan where necessary.

5.	Maintain documentation and equipment	5.1 Equipment and clothing, is cleaned, sanitised and stored in accordance with the workplace procedures. 5.2 Damaged or faulty equipment is repaired or reported to supervisor. 5.3 Records of all disease and pest-management activities are completed to required work standards.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- plan, apply and monitor a range of pest and disease control methods;
- identify a range of pests diseases and beneficial organisms; and
- select pest and disease controls and timing of operations.

Critical skills and essential knowledge

The ability to:

- apply Integrated Pest Management practices;
- calculate the quantities and application rates of control materials; and
- recognize a range of pests, diseases and beneficial organisms relevant to the workplace.

Knowledge of:

- Chemical, biological and cultural control methods and treatments available
- Critical control points in pests' life cycle, behaviour patterns and their interaction with the environment
- Current pest and disease treatments and their safety considerations
- Economic or environmental thresholds for a range of plant pests, diseases and disorders
- Pests and disease recognition

Range statement

Cultural methods may include:

- Biological-control agents
- Planting pest-free rootstock
- Removal of the food supply using weed-control techniques
- Rotating between different crops
- Selecting pest-resistant varieties

Scheduled pest/weed or disease control activities may include:

- Alignment of milestones with the critical control points in the pests' life cycle and behaviour patterns
- Alignment of milestones with the local land-management and production activity cycles
- Consideration of other local farms or residents

Pest and disease population controls may include

- Biological controls
- Exclusion fencing
- Fumigation
- Harvesting
- Mustering
- Poisoning
- Relocation
- Sedation
- Shooting

- Tagging
- Trapping

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-B5 Prepare land for agriculture

Unit details	
Functional area B	**Land maintenance and preparation**
Unit title	**Prepare land for agriculture**
Unit code	**AA-B5**

Description

This unit describes the outcomes required to prepare land for cultivation.

Elements of competency	**Performance criteria**
1. Prepare for cultivation of a range of **crops**	1.1 Interpret the land preparation requirements from the planting plan and confirm with the supervisor.
	1.2 Determine the method and order of cultivation from the planting plan.
	1.3 Select, check and prepare required **vehicle, equipment, and attachments** and replace any faulty parts.
2. Cultivate soil	2.1 Previous **crops** or land clearance debris is removed, incorporated or burnt according to the workplace procedures.
	2.2 Cultivation plan is followed for each area, with vehicles and equipment operated safely.
	2.3 Quality of cultivation is checked on an ongoing basis.
	2.4 **Weed and pest-control** measures are applied as required.
3. Maintain documentation and equipment	3.1 Equipment is cleaned and stored in accordance with workplace procedures.
	3.2 Damaged or faulty equipment is repaired on site reported to supervisor.
	3.3 Records of all land maintenance and preparation activities are completed to required work standards.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- cultivate land using appropriate equipment effectively, safely and efficiently; and
- interpret land preparation requirements from the planting plan.

Critical skills and essential knowledge

The ability to:

- complete pre-and post-operational checks on tools, vehicles and equipment ;
- interpret **relevant documentation** ;
- operate, adjust and calibrate cultivation equipment safely;
- Operation and maintenance of planting equipment; and
- perform routine safety, service and maintenance procedures on tools, cultivator and equipment.

Knowledge of:

- Methods of cultivating a range of soil types
- Range of pre-planting treatments, their purpose and method of application
- Workplace safety guidelines, including manual handling and exposure to hazardous substances

Range statement

Crops may include:

- Cereals
- Legumes
- Oilseeds
- Pasture seeds
- Pulses
- Rice (dry-land growing)
- Sugar cane

Vehicle, equipment and attachments may include:

- Buster
- Crop/stick puller
- Cultivator
- Disc
- Fertilizer spreader
- Four-wheel-drive vehicle
- Lister
- Mounted or trailing plough
- Mulcher
- Rakes
- Ripper
- Scarifier
- Spraying equipment
- Tandem or offset discs
- Tractor
- Truck

Weed- and pest-control measures may include:

- Application of herbicides
- Biological-control agents
- Burning
- Grazing
- Slashing

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-B6 Spread fertiliser and soil improvers

Unit details	
Functional area B	**Land maintenance and preparation**
Unit title	**Spread fertilizer and soil improvers**
Unit code	**AA-B6**

Description

This unit describes the outcomes required to spread fertilizer and soil improvers according to specifications and clean and store vehicles and equipment.

Elements of competency	**Performance criteria**
1. Prepare for soil improvement	1.1 Soil type and condition is visually assessed or advice is sought from the supervisor.
	1.2 Location and boundaries of the area to be treated are identified and recorded for reference.
	1.3 Features that may present a hazard to the operation are identified and appropriate action is taken.
	1.4 Local weather and climate conditions are identified and taken into account when planning.
2. Perform pre-fertilizer checks	2.1 Rate of spreading is determined and fertilizer or **soil improvement products** are obtained.
	2.2 Clean and prepare spreading **vehicles, machinery and equipment** according to workplace procedures and manufacturers' instructions to ensure they are serviceable and are correctly set up and calibrated.
3. Spread fertilizer	3.1 **Personal protective equipment** is selected and used.
	3.2 Spreading of fertilizer or soil improvement complies with guidelines on buffer zones, to minimise run-off into waterways and drains.
	3.3 Spreaders are checked to ensure calibrations achieve standard coefficients of variation for proposed product and spread width.
	3.4 Vehicles are used in line with safety standards and specifications for use.
	3.5 Weather conditions are monitored during the spreading and operations adjusted accordingly.
4. Perform follow up and clean-up activities	4.1 Equipment and clothing, is cleaned, sanitized and stored in accordance with the workplace procedures.
	4.2 Vehicles machinery and equipment used are cleaned, maintained and stored according to workplace specifications.
	4.3 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.
	4.4 Records of activities are completed accurately and promptly, and according o required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- maintain and operate spreading equipment to maintain uniformity of application; and
- maintain and operate spreading equipment to meet health and safety requirements.

Critical skills and essential knowledge

The ability to:

- monitor and record activities performed; and
- operate equipment according to manufacturer recommendations.

Knowledge of:

- Spreading characteristics of different fertilizer and soil improvement products

Range statement

Soil improvement products to be spread may include:

- Chemical and organic fertilizers
- Composts
- Dolomite
- Lime

Vehicles, machinery and equipment for spreading may include:

- Product bins
- Spreading mechanisms
- Tractor - mounted or trailed
- Truck - mounted or trailed

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional Area C – Planting and harvesting

AA-C1 Propagate plants

Unit details	
Functional area C	**Planting and harvesting**
Unit title	**Propagate plants**
Unit code	**AA-C1**

Description

This unit describes the outcomes required to propagate plants by both sexual and asexual methods.

Elements of competency	**Performance criteria**
1. Prepare for propagation	1.1 The most effective propagation method for the selected plant is determined.
	1.2 **Tools and equipment** suitable for the selected **propagation method** are selected.
	1.3 **Propagation material** is collected using the appropriate method for the species.
	1.4 Propagation material is maintained and stored to ensure maximum viability**.**
2. Propagate plants	2.1 **Propagating pre-treatments** are applied appropriate to the plant and propagation method.
	2.2 Propagation techniques are carried out and **propagating media** prepared according to plant requirements.
	2.3 Propagation material is handled in a way that minimises damage and maximises viability.
	2.4 Water and nutrients are applied to suit the **media specifications**, plant requirements and propagation techniques employed.
	2.5 Labels are applied according to workplace guidelines.
	2.6 Plant health is monitored and remedial action is taken according to work guidelines.
3. Complete propagation activities	3.1 Work site is cleaned and waste is safely disposed of, or recycled, in accordance with workplace guidelines.
	3.2 **Propagation records** are entered accurately, according to workplace guidelines.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- apply a range of propagation techniques; and
- maintain and monitor propagated plants.

Critical skills and essential knowledge

The ability to:

- carry out a variety of propagation techniques;
- collect propagation material;
- read, interpret and follow instructions and safety material; and
- select and apply appropriate pre and post treatments.

Knowledge of:

- Basic plant nutrition
- Characteristics of a range of parent plants and propagation materials
- Propagation methods required for a range of plant species.

Range statement

Tools and equipment may include:

- Autoclave
- Boxes
- Knives, scalpel and other cutting instruments
- Linear measure
- Plastic containers and trays
- Secateurs
- Shovel
- Trolley
- Vermiculite
- Water spray container
- Wheelbarrow

Propagation methods may include:

- Cuttings
- Division or splitting
- Growing on tissue-cultured plants
- Layering
- Seeds
- Spores

Propagation material may include:

- Cuttings
- Plantlets
- Rhizomes
- Rootlings
- Seeds
- Separations/divisions
- Spores
- Tissue cultures

Propagating pre- treatments may include:

- Breaking seed coat
- Cleaning
- Division
- Fungicides
- Grading
- Heat or chemical disinfestation
- Hormones
- Hot-water treatment of cuttings
- Hydration

- Rehydration
- Sterilization
- Stratification

Propagating media may include:
- Agar
- Gravel
- Growool
- Perlite
- Pine bark
- Potting mix
- Rockwool
- Sand
- Sawdust
- Scoria
- Vermiculite water (hydroponics)

Media specifications may include:
- Humidity levels
- Setting temperature controls
- Wind machines

Propagation records may include**:**
- Batch number
- Number of plants propagated
- Source material used
- Treatments applied and at what time
- Variety

Competency may be assessed through a combination of:
- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-C2 Plant crops

Unit details	
Functional area C	**Planting and harvesting**
Unit title	**Plant crops**
Unit code	**AA-C2**

Description

This unit describes the outcomes required to plant crops in accordance with a planting programme.

Elements of competency	**Performance criteria**
1. Prepare equipment and materials	1.1 Planting site, **planting methods** and plant species are selected, according to the planting plan and the supervisor's instructions.
	1.2 **Machinery and equipment** are selected and prepared according to manufacturers' specifications and potential safety hazards reported to the supervisor.
	1.3 Equipment is securely attached and calibrated for operation to manufacturer specifications.
	1.4 Soil and weather conditions are monitored for optimal seeding conditions.
	1.5 Seeding, fertilizer, and pest and weed control requirements are confirmed against the work plan and prepared to manufacturer specifications using safe handling procedures
2. Pre-planting care	2.1 Area to be planted is established and prepared and soil treated as required to enhance identified plants' survival and seeding.
	2.2 Plants are inspected prior to planting and those with major defects are culled, and those with minor defects are trimmed or treated to maintain health and vigour.
	2.3 Waste and pollutants are removed from the site.
3. Planting crops	3.1 The area is planted in accordance with the planting program and environmental considerations.
	3.2 Planting is carried out in a sequential, timely and effective manner.
	3.3 The plant-establishment programme is followed correctly in spacing and positioning of plants to comply with their growing requirements.
	3.4 The layout of services and planting depths are checked against the site plan, plant positions marked according to the plant-establishment plan and any discrepancies reported to the supervisor.
	3.5 Water and any **substances for protecting plants** are applied as required to protect plants and enhance growth.
	3.6 Incorrectly planted stock are culled or rectified.

	3.7 **Post planting care** is applied to new plants according to the needs of the species and cultivar.
4. Perform follow up and clean-up activities	4.1 Equipment is cleaned, sanitized and stored in accordance with the workplace procedures.
	4.2 Vehicles and machinery, tools equipment used are cleaned, maintained and stored according to workplace specifications.
	4.3 Damaged or faulty equipment is repaired on site or supervisor advised.
	4.4 Records of activities are completed accurately and promptly, and according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- apply preparation and treatment techniques to aid plant health;
- correctly calibrate and use machinery;
- identify damaged or defective plants; and
- plant an area in accordance with planting programme, including correct spacing of plants.

Critical skills and essential knowledge

The ability to:

- assess and calculate the application of fertilizer/pesticide requirements and application rates;
- calibrate equipment and calculate volumes, consumption and servicing requirements;
- calibrate, operate machinery and attach/detach equipment;
- identify pests and weeds harmful to crop establishment;
- recognize and report machinery damage, faults or malfunctions and perform minor repairs; and
- sow seed/plant seedlings and apply fertilizer at the required placement and rate

Knowledge of:

- Crop types, preparation of seeds and plants
- Effects of weather conditions (normal and adverse) on seeding and fertilizing applications
- Fertilizer types, rates of application and crop nutrient requirements
- Operating principles and operating methods for machinery and equipment
- Pre-operational and safety checks, servicing and maintenance procedures for seeding machinery and equipment
- Procedures for cleaning, securing and storing machinery, equipment and materials
- Workplace procedures with regard to planting operations, and recording and reporting routines.

Range statement

Planting methods may include:

- Hand or machine-assisted planting of seedlings
- Planting of divisions
- Transplanting
- Tube planting

Machinery and equipment (such as trailed, three-point linkage and motorized) is required for:

- Excavation
- Irrigation and drainage systems
- Planting

- Post-planting care

Substances for protecting plants may include:

- Additives including lime, gypsum
- Soil improvers
- Chemicals for weed and pest control
- Fertilizers
- Organic materials

Post planting care may include:

- Controlling pests and diseases
- Fertilizing
- Monitoring of plant health
- Mulching
- Protecting
- Staking
- Trellising
- Watering
- Weeding

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-C3 Manage crop growing

Unit details	
Functional area C	**Planting and harvesting**
Unit title	**Manage crop growing**
Unit code	**AA-C3**

Description

This unit describes the outcomes required to manage crop growing.

Note: this unit is aimed at a supervisory level of work, as it encompasses budgeting, planning and supervision.

Elements of competency	**Performance criteria**
1. Determine requirements and prepare	1.1 Requirements for optimal growth and production of chosen crops are determined.
	1.2 Selected environment is assessed for capacity to provide optimal growing conditions.
	1.3 Procedures to implement environmental controls or adjust environmental conditions to maximize crop potential are determined.
	1.4 Structures, machinery and **equipment** and resources for maintaining a controlled environment are identified, costed and their availability confirmed.
	1.5 A budget is calculated and recorded to support the environment production plan and is submitted to management for approval as required.
	1.6 A growing schedule is developed and monitored.
2. Assess agricultural crop condition, growth and requirements	2.1 Growing crops are monitored to assess their needs, observations are recorded and water, fertilizer and soil improvers added as determined in the growing plan or by circumstances.
	2.2 Pests and diseases are identified, monitored and reported and controls implemented as threshold levels outlined in the growing plan are reached.
	2.3 Soil water content is monitored and supplemented or addressed as needed for crop health.
3. Manage risks in crop growing	3.1 Specialist sprays and soil improvers are applied according to label directions and industry standards for growth stages.
	3.2 Machinery and equipment for crop growing is regularly checked for safe operation and is used in accordance with safety and manufacturers guidelines.
	3.3 Monitoring data is recorded, analyzed and applied to the management of crop growing for ongoing quality improvement.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- assess a chosen environment for capacity to provide optimal growing conditions;
- develop a growing plan, based on knowledge of crop requirements for growth, production and environment and required resources;
- develop key planning documents including budget, growing schedule, environmental control and data schedule ;
- monitor and address various aspects of crop health including soil quality, water needs and pests and disease infestations; and
- supervise staff and contractors in crop management.

Critical skills and essential knowledge

The ability to:

- develop a budget and schedule resources adequately and appropriately;
- prepare a growing plan;
- record information collected and select and apply procedures for a range of tasks; and
- supervise others in the operation of machinery to manufacturers specifications

Knowledge of:

- General machine maintenance procedures
- Hygiene requirements for agricultural crops and equipment that comes into contact with the crop
- Organization recording and reporting procedures
- Symptoms of crop lacking health and vigour and signs of pest and disease infestation, moisture stress and nutrient deficiencies
- Types and uses of herbicides, insecticides and other pesticides and alternative pest control methods (non-chemical)

Range statement

Equipment needed to control growing conditions may include:

- Air, plant tissue and water analysis
- Pumps
- Fans
- Generators
- Growth media
- Heaters
- Humidifiers

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-C4 Maintain crops

Unit details	
Functional area C	**Planting and harvesting**
Unit title	**Maintain crops**
Unit code	**AA-C4**

Description

This unit describes the outcomes required to monitor and maintain crop health and maturity.

Elements of competency	**Performance criteria**
1. Monitor crop growth and health	1.1 Crops are monitored to assess their needs, and observations are recorded and reported.
	1.2 **Pests**, **diseases** and **weeds** are identified, monitored and reported at nominated threshold levels.
	1.3 **Soil and water requirements** are assessed and plans for watering, irrigation or drainage are identified.
	1.4 Nutrient requirements of the crops are assessed, and any deficiencies identified for appropriate treatment.
2. Maintain crops	2.1 Crop growth stages and key milestones are assessed, recorded and reported.
	2.2 Water is applied according to need and the work requirements.
	2.3 Pest, disease and weed control methods are scheduled for the optimum time.
	2.4 Specialist sprays are applied according to specifications for growth stages, with methods selected to avoid building resistance to chemicals.
	2.5 Chipping or spot spraying is carried out as required.
	2.6 Tools, equipment and machinery are used according to specifications.
3. Monitor crop condition, growth and requirements	3.1 Crop maturity is monitored and any need for further applications is reported to supervisor.
	3.2 Crop health is continually monitored and deviation from expected growth and vigour is reported.
	3.3 Observations of crop ripening are reported for the timing of harvest.
4. Maintain records	4.1 The cropping programme is monitored for efficiency and effectiveness, and **required records** kept for future crop management.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- assess crops for evidence of pests, weeds or disease and take appropriate action;
- determine nutrient requirements of specified crops and address deficiencies;
- maintain records of crop stages and key interventions; and
- monitor crop growing programme and stages of crop growth.

Critical skills and essential knowledge

The ability to:

- determine and apply requirements for optimal crop growth;
- implement and monitor a crop maintenance programme; and
- implement sustainable land use strategies in planning.

Knowledge of:

- Crop growth requirements
- Detrimental factors for growth and strategies to address
- Sustainable land management

Range statement

Pests may include:

- Invertebrates such as:
  - Caterpillars
  - Locusts
  - Mites
  - Nematodes
  - Thrips
- Vertebrates such as:
  - Birds
  - Macropods
  - Rabbits
  - Rats and mice

Diseases may include:

- Ascochyta
- Cereal cyst nematodes
- Chocolate spot
- Fusarium
- Mildew
- Phytophthora
- Pythium
- Rhizoctonia
- Rusts
- Seferotina
- Septaria
- Soil-borne pathogens

Weeds may include:

- Annual
- Broad leaf
- Grasses
- Narrow leaf
- Perennial

Soil and water requirements are assessed on factors including

- Forecasted weather conditions.
- Soil analysis data
- The crop's needs

Required records include records of

- Costs
- Crop growth stages
- Key interventions
- Outcomes
- Weather patterns

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions.

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-C5 Harvest agricultural crops

Unit details	
Functional area C	**Planting and harvesting**
Unit title	**Harvest agricultural crops**
Unit code	**AA-C5**

Description

This unit describes the outcomes required to prepare harvesting machinery and crop-treatment equipment, sequence harvesting activities and harvest crops safely and efficiently while maximizing the yield.

Elements of competency	**Performance criteria**
1. Prepare for harvest	1.1 Requirements, method and order of harvesting are confirmed.
	1.2 Safety hazards are identified and suitable controls implemented.
	1.3 Harvesting hygiene standards appropriate to the crop are identified.
	1.4 **Harvesting machinery** and equipment is adjusted for harvesting and parts replaced as required.
	1.5 Machinery and other equipment is checked for pests and other contaminants.
2. Perform harvest	2.1 The harvest plan and sequence is followed for each area of crops.
	2.2 Windrowing/swathing is completed to the standard required and crop is sampled for moisture content.
	2.3 Harvesting machinery and equipment is operated according to specifications.
	2.4 Hygiene of all surfaces that come into contact with the crop is maintained to maximize crop quality.
	2.5 Insecticides are applied as required.
	2.6 The harvest is stacked and stored in accordance with work requirements.
3. Perform follow up and clean-up activities	3.1 Harvesting equipment and attachments are cleaned, maintained and stored in accordance with specifications.
	3.2 Harvesting records are completed, in accordance with workplace requirements.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- follow and interpret a harvesting plan;
- identify safety hazards, and implement suitable controls;
- maintain standards of hygiene to avoid compromising crop or paddock quality;
- sample the crop for moisture content; and
- use harvesting machinery and equipment safely and according to specifications, with minimal damage to crop.

Critical skills and essential knowledge

The ability to:

- apply agricultural chemicals under supervision;
- complete basic calculations and measure volumes; and
- operate machinery to specifications.

Knowledge of:

- Suitable crop moisture content
- Operation and use of machinery and harvest equipment
- Harvesting and storage requirements of variety of crops

Range statement

Harvesting machinery may include:

- Communication equipment
- Conveyors
- Crop-treatment equipment
- Field and chaser bins for towing vehicles
- Grain augers
- Tarpaulins
- Tractors
- Trucks

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-C6 Save and store seed

Unit details	
Functional area C	**Planting and harvesting**
Unit title	**Save and store seed**
Unit code	**AA-C6**

Description

This unit describes the outcomes required to maintain identified quantities of seed in storage to ensure maximum quality and yield when used.

Elements of competency	**Performance criteria**
1. Select seed from agricultural crops	1.1 The quantity of **seed** required for the following season's crop is calculated.
	1.2 A portion of the crop to be used as seed is selected based on calculated requirements, seed type and the crop's health, vigour, and grain size.
	1.3 All work is conducted safely, using the appropriate personal protective equipment.
2. Evaluate and store seed	2.1 Saved seed is graded to the required size.
	2.2 Fungicidal and insecticidal dressings are applied to the seed where appropriate.
	2.3 Samples are taken, prepared, documented, and where appropriate forwarded for testing of **seed properties**.
3. Store seed	3.1 Seed storage facilities are hygienically prepared.
	3.2 Seed is transferred to storage facilities according to the workplace hygiene procedures.
	3.3 Seed is stored under conditions that maintain its quality, health and germination capacity.
	3.4 Checks of stored seed storage are carried out periodically, to assess quality and viability.
	3.5 Where required, samples are taken, prepared and forwarded for testing.
4. Perform follow up and clean-up activities	4.1 Waste is removed.
	4.2 Machinery, tools and equipment are cleaned, maintained and stored according to workplace specifications.
	4.3 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.
	4.4 Records of activities, seed collection, storage records and data and observations are completed according to required work procedures.

Evidence guide
To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- calculate the quantity of seed required for the following season;
- grade and test seed and interpret the results; and
- maintain grain in storage to ensure maximum quality and yield when used.

Critical skills and essential knowledge

The ability to:

- apply pre and post-harvest treatments for seed;
- calculate volumes, capacities, areas, ratios for seed, storages, and chemicals;
- identify pests in stored grain and initiate control measures;
- identify varieties of seed;
- identify weed seeds and contaminants;
- maintain records relating to information about the seed; and
- select appropriate seed tests

Knowledge of:

- Inoculation treatments and seed dressings used within the workplace
- Records and documentation required for tracking and handling of seed
- Seed treatment and cleaning measures
- Storage techniques and requirements for seed and grain

Range statement

Seed may include:

- Cereals
- Grains
- Legumes
- Oilseeds
- Pasture seeds
- Pulses

Seed properties may include:

- Disease identification
- Germination
- Purity
- Seed weight
- Vigour

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional area D – Irrigation and drainage

AA-D1 Install irrigation

Unit details	
Functional area D	**Irrigating and drainage**
Unit title	**Install irrigation**
Unit code	**AA-D1**

Description

This unit describes the outcomes required to install and commission irrigation systems.

Elements of competency	**Performance criteria**
1. Prepare for installation	1.1 **Tools and equipment, machinery** and **irrigation parts** are selected in accordance with **irrigation system** plans and workplace procedures and checked for correct operation.
	1.2 The site and construction methods are identified from the irrigation system plans and workplace procedures.
	1.3 Irrigation parts and equipment are checked to ensure they meet the system's specifications.
	1.4 Safe working practices are maintained throughout the installation process.
	1.5 **Water supply** is checked to ensure that it is compatible with the system specifications.
2. Prepare site	2.1 Irrigation lines are measured and marked out, consistent with the plan.
	2.2 Trenches are constructed at specified depth, without damaging services, facilities, features and established plants.
3. Install system	3.1 Components are assembled and connected according to the irrigation plan.
	3.2 Fittings and valves are attached and adjusted as required in the installation plan, and all joints secured.
	3.3 Installation is configured and completed, matching the specifications outlined in the installation plan.
4. Operate the system	4.1 The start-up sequence is performed in accordance with the operations manual.
	4.2 The system is flushed as required.
	4.3 The testing and monitoring equipment is calibrated to the manufacturer's specifications.
	4.4 The site is restored and waste material disposed.
	4.5 Tools, equipment and machinery are cleaned, maintained and stored according to the workplace procedures.

4.6 Work outcomes are reported as required by workplace procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- commission irrigation systems;
- complete installation work;
- install irrigation components;
- organize resources for installation work; and
- set out and prepare site.

Critical skills and essential knowledge

The ability to:

- commission an irrigation system;
- install irrigation components;
- organise resources for installation work; and
- set out and prepare site

Knowledge of:

- Behaviour of water on different terrains and soil types
- Calculations for installing irrigation systems
- Characteristics and operation of joints, valves and sprinkler components
- Components of an irrigation system
- Methods and techniques of irrigation
- Operation of pumps and water flow rates
- Soil characteristics
- Testing techniques for soil water retention
- Water quality and water filtration techniques

Range statement

Tools and equipment may include:

- Automatic level, laser level, dumpy level, cowley level
- Boning rods
- Hoses and hose fittings
- Pegs
- Rakes, rollers
- Shovels, spades
- Surveying and leveling equipment
- Wheelbarrow

Machinery may include:

- Backhoes
- Bobcats
- Ditch witches
- Three-point linkage equipment
- Tractors

Irrigation parts may include:

- Computer and/or other scheduling devices
- Injector
- Motors
- Pressure gauge
- Probe tubes meter
- Pump fittings

- Pumps and pump fittings
- Sprays
- System controllers
- Tensiometer

Irrigation systems may include:

- Above-ground
- Below-ground
- Capillary irrigation systems
- Dripper
- Low-pressure
- Mains-pressure
- Spray
- Underground

Water supplies may be:

- Mains supplies
- Surface storage such as:
    - Bores
    - Channels
    - Dams
    - Tanks
    - Windmills

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-D2 Install agricultural drainage

Unit details	
Functional area D	**Irrigating and drainage**
Unit title	**Install agricultural drainage**
Unit code	**AA-D2**

Description

This unit describes the outcomes required to set out and install surface and/or subsurface drainage systems according to drainage system plans.

Elements of competency	**Performance criteria**
1. Organize and check resources for installation	1.1 The site and construction methods are identified from plans and specifications.
	1.2 **Materials**, tools and equipment, machinery and drainage parts are selected as defined in the **drainage system** design and workplace requirements.
	1.3 **Drainage parts** and equipment are checked to ensure they meet specifications.
	1.4 Maintenance and safety checks are conducted on tools, equipment and **machinery** according to workplace procedures.
	1.5 The layout of services is identified, and depths checked against the drainage system plan.
2. Prepare site	2.1 The site is **surveyed**, measured and marked out and soil characteristics confirmed consistent with the planned drainage system.
	2.2 Excavations are conducted without damaging services, facilities, features and established plants.
3. Install system	3.1 The drainage system is installed according to specifications and .tested for configuration, flow rates and capacity.
	3.2 Earthworks are finished to specifications.
4. Perform clean up	4.1 The site is restored and waste disposed of in accordance with workplace procedures.
	4.2 Tools, equipment, vehicles and machinery are cleaned, maintained and stored according to workplace procedures and faults repaired or reported.
	4.3 Records of activities are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- prepare and set out site; and
- install drainage components and commission drainage systems.

Critical skills and essential knowledge

The ability to:

- organize resources for drainage work;
- read and follow workplace procedures, specifications and instructions;
- set out and prepare site for drainage installation; and
- install and commission drainage systems.

Knowledge of:

- Behavior of water on differing terrains and soil types
- Calculations for installing drainage systems
- Components of a drainage system
- Methods and techniques of drainage
- Operation of pumps and water flow rates
- Testing techniques for soil water retention
- Water quality and water filtration techniques

Range statement

Drainage **materials** may include:

- Backfill materials
- Construction materials for drain surfaces and slopes
- Drainage system components
- Glues
- Plastic welding systems

Drainage systems may include:

- Culverts
- Dune and swale systems
- Mole drains
- Pit and trap systems
- Reed beds
- Sand slit
- Subsurface traps
- Surface drains
- Water-recycling pumps and baffles

Drainage parts may include:

- Computer and/or other scheduling devices
- Delivery equipment
- Fitting tools
- Injector
- Motors
- Pressure gauge
- Probe tubes meter
- Pump fittings
- Pumps
- Recycling equipment

- Spray equipment
- Sprays
- System controllers
- Tensiometer

Machinery may include:

- Backhoes
- Bobcats
- Ditch witches
- Three-point linkage equipment
- Tractors

Surveying and leveling equipment may include:

- Automatic level, laser level, dumpy level, cowley level
- Boning rods
- Hand tools (rakes, shovels, spades, rollers, wheelbarrow, hoses and hose fittings)
- Pegs
- Staff

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-D3 Operate gravity-fed irrigation systems

Unit details	
Functional area D	**Irrigating and drainage**
Unit title	**Operate gravity fed irrigation systems**
Unit code	**AA-D3**

Description

This unit describes the outcomes required to operate a gravity-fed (flood) irrigation system specified conditions and inspect and shut down the system in response to irrigation indicators.

Elements of competency	**Performance criteria**
1. Prepare for operation of **gravity fed irrigation system**	1.1 Checks of water, power, fuel and lubricants are undertaken to ensure that all are available and the control system is operational.
	1.2 Pumps are primed, if required, and gates and controls are open or closed in accordance with workplace procedures.
	1.3 Pipes, system equipment and outlets are positioned and set up in accordance with workplace standards.
2. Start up and inspect system	2.1 Siphons and other delivery mechanisms are primed, start-up sequence is implemented and pressure built up slowly, in accordance with operations manual and water levels.
	2.2 Pressure at the headworks and control valves is within design specifications, indicating efficient filter operation, and water is run-off through the outlets and distributed evenly to the targeted areas with minimal wastage.
	2.3 All malfunctions, leaks, damage to water courses and blockages are corrected or repaired immediately and reported in accordance with workplace procedures.
	2.4 Head water levels are monitored and maintained.
	2.5 Any pumps used are monitored during operation.
	2.6 Rubbish and weeds are cleared from the outlets and pump is back-flushed.
3. Shut down system based upon irrigation indicators	3.1 Area is irrigated in accordance with workplace procedures, and time lag between shut down and end of watering is observed to minimize run-off and deep percolation.
	3.2 System components are shut down in sequence in accordance with manufacturer's and workplace procedures.
	3.3 Tail water control systems are implemented in accordance with the manufacturer’s and workplace procedures.
4. Perform clean up	4.1 The site is restored and waste disposed of in accordance with workplace procedures.

4.2 Tools, equipment, vehicles and machinery are cleaned, maintained and stored according to workplace procedures and faults repaired or reported.

4.3 **Records** of activities and outcomes are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- carry out running repairs on irrigation delivery and drainage systems;
- check pressure at the headworks and control valves;
- operate and inspect the system ;
- read and follow operations manual and irrigation schedules; and
- shut down the system in response to irrigation indicators.

Critical skills and essential knowledge

The ability to:

- carry out running repairs on irrigation delivery and drainage systems;
- check pressure at the headworks and control valves;
- set up pipes, system equipment and outlets;
- start up the system and carry out shut down procedures; and
- use siphons.

Knowledge of:

- General irrigation methods for gravity fed irrigation systems
- Inspection procedures
- Main components of gravity fed irrigation systems
- Pump types used in gravity fed irrigation systems and their operation
- Shutdown sequence
- Soil/plant/water relationships
- Water requirements of plants/crops consistent with sound environmental management

Range statement

Gravity fed irrigation systems may include**:**

- Basin irrigation
- Border check
- Contour irrigation
- Furrow irrigation
- Hillside flooding

Records of work outcomes may include records of:

- Blockages
- Leaks
- Malfunctions
- Other faults requiring repair
- Time of shutdown
- Water used

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-D4 Operate pressurized irrigation systems

Unit details	
Functional area D	**Irrigating and drainage**
Unit title	**Operate pressurized irrigation systems**
Unit code	**AA-D4**

Description

This unit describes the outcomes required operate a pressurized irrigation system, conduct required checks and shut down in response to irrigation indicators.

Elements of competency	**Performance criteria**
1. Perform pre-start checks for pressurized irrigation system	1.1 **Pre-start checks** of water, power, fuel and lubricants are undertaken to ensure that all are available and the control system is operational. .
	1.2 Pumps are primed, if required, and gates and controls are open or closed in accordance with workplace procedures.
2. Start up and inspect system	2.1 After the **pressurized irrigation system** is started, water flow, water quality and pressures are inspected at the delivery points.
	2.2 Checks are made to the lines for leaks and blocks and to the drainage flow.
	2.3 All malfunctions, leaks and blockages are repaired immediately.
	2.4 Filter efficiency is checked to ensure the pressure at the headworks and control valves is within design specifications.
	2.5 Water is distributed evenly to the targeted areas and with minimal wastage and runoff.
	2.6 Water is applied for sufficient time to ensure required soil moisture levels are met, with allowance made for weather conditions.
3. Shut down system, clean up and document	3.1 Systems are shut down in sequence, and tailwater control systems for drainage are implemented, in accordance with specifications.
	3.2 Tools, equipment and machinery are maintained and stored, according to workplace procedures.
	3.3 **Work outcomes** are recorded according to workplace specifications.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- carry out pre-start checks;
- carry out running repairs on irrigation delivery and drainage systems;
- check pressure at the headworks and control valves;
- measure and interpret flow rates and pressures;
- operate and inspect the system; and
- shut down the system in response to irrigation indicators.

Critical skills and essential knowledge

The ability to:

- calibrate pressure and flow testing equipment;
- carry out pre-start checks and prime pumps;
- conduct operational checks;
- identify hazards and implement safe work procedures;
- measure and interpret flow rates and pressures;
- perform shut down procedures;
- perform start up and shutdown sequences; and
- read and follow operations manual and irrigation schedules.

Knowledge of:

- General irrigation methods for pressurised systems
- Main components of pressurised irrigation systems
- Pump types used in pressurised irrigation systems and their operation
- Soil/plant/water relationships
- Water requirements of plants/crops

Range statement

Pre-start checks on a pressurized irrigation system may include:

- Bike shift/easy shift types
- Capillary and spray irrigation systems/ travelling irrigators
  - Hard hose boom type
  - Soft hose
- Centre pivot
- Hand-shift permanent (installed)
- Linear move
- Microirrigation
  - Below or above ground with sprays
  - Drip emitter trickle
  - Low pressure
  - Mains pressure
  - Mini-sprinklers
  - T-tape
- Powered side roll

Pressurised irrigation system may include:

- A manual operation
- Fully automated computer-control

Work outcomes records may include information on:

- Blockages
- Leaks
- Malfunctions
- Time of shutdown
- Water used

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-D5 Maintain irrigation systems

Unit details	
Functional area D	**Irrigating and drainage**
Unit title	**Maintain irrigation systems**
Unit code	**AA-D5**

Description

This unit describes the outcomes required to implement a maintenance programme for an irrigation systems including inspecting, testing and conducting minor repairs of equipment.

Elements of competency	**Performance criteria**
1. Follow an irrigation maintenance programme	1.1 The scope of maintenance works is determined according to the irrigation maintenance programme.
	1.2 The frequency of maintenance works is calculated and implemented according to the irrigation maintenance programme.
	1.3 Maintenance work and resources, equipment and materials needed are planned.
2. Inspect and repair irrigation system	2.1 An inspection checklist is developed from the **irrigation** maintenance programme and followed.
	2.2 System is inspected regularly in line with the checklist.
	2.3 Repairs are identified and remedied to restore system to full effectiveness.
	2.4 Surroundings are tidied and materials and equipment cleared from the site on completion of maintenance works.
	2.5 Damage and blockage caused by pests and animals is corrected and recorded by damage type, location and the section of the system affected.
3. Record and report maintenance activities	3.1 Tools, equipment and machinery are cleaned maintained and stored according to workplace procedures.
	3.2 Records of maintenance and other activities are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- inspect irrigation systems;
- record and report maintenance activities;
- test irrigation equipment; and
- undertake minor repairs of equipment.

Critical skills and essential knowledge

The ability to:

- identify hazards and implement safe work procedures;
- inspect and test irrigation systems and equipment;

- undertake minor repairs of equipment; and
- interpret and follow an irrigation maintenance plan.

Knowledge of:

- Common operational and maintenance problems
- Irrigation system components

Range statement

Irrigation systems may include:

- Gravity-fed systems
- Pressurised irrigation systems such as micro-irrigation and spray irrigation systems

ey may range from manual operation and monitoring to fully automated with computer control and monitoring.

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-D6 Check and repair irrigation drainage systems

Unit details	
Functional area D	**Irrigating and drainage**
Unit title	**Check and repair irrigation drainage systems**
Unit code	**AA-D6**

Description

This unit describes the outcomes required to perform shutdown sequence and make repairs to irrigation drainage systems.

Elements of competency	**Performance criteria**
1. Prepare to carry out **irrigation drainage system** maintenance	1.1 The site is inspected to and drainage assessed.
	1.2 If repair is necessary, plans and drawings or instructions are obtained to determine work requirements.
	1.3 Appropriate drainage and inflow diversion arrangements are made without damage to environment.
2. Determine access to drainage lines	2.1 Access points are located from plan and instructions and digging is conducted to allow access to blockages.
	2.2 Equipment and excavation methods are selected in accordance with work requirements.
	2.3 Digging is carried out without unnecessary damage to buildings, site, environment or existing fixtures/fittings.
3. Carry out repairs	3.1 Faulty components are identified, shut down and isolated in accord with specifications and technical manuals.
	3.2 Components and associated fittings are repaired or replaced according to manufacturer specifications and organizational requirements.
4. Clear blockages	4.1 Blockages are cleared.
	4.2 Drainage lines are tested to confirm blockages have been cleared from pipe system.
	4.3 Drainage lines are repaired/resealed to permit normal use.
	4.4 Work area is cleaned and aligned and waste disposed of according work requirements.
5. Perform follow up activities	5.1 Vehicles and machinery, tools and equipment are cleaned, maintained and stored according to workplace specifications.
	5.2 Faulty equipment is repaired on site if possible or reported according to work procedures.
	5.3 Records of activities are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- clear blockages or replace blocked sections
- isolate appliances/fixtures/fittings and related assemblies;
- level and align site;
- repair or remove blockages;
- return components to service; and
- use manual and mechanical drain clearing equipment.

Critical skills and essential knowledge

Ability to:

- carry out operational tests;
- maintain and repair irrigation drainage systems;
- replace components; and
- shut down and isolate components.

Knowledge of:

- Components used in irrigation drainage systems
- Identification, characteristics and operation of replaceable components of irrigation systems
- Isolation procedures
- Levelling and alignment processes
- Types and operational parameters of irrigation drains

Range statement

Irrigation drainage system may include:

- Both surface and sub-surface drainage installed to handle water which is excess to plant requirements in an irrigated area

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional area E – Fruit and vegetable production

AA-E1 Prepare and care for vegetable and fruit crops

Unit details	
Functional area E	**Fruit and vegetable production**
Unit title	**Prepare and care for vegetable and fruit crops**
Unit code	**AA-E1**

Description

This unit describes the outcomes required to install suitable crop-support components; tend to growing media and care for growing plant stock; ensure irrigation system components suit the crop and local conditions and provide basic maintenance for the growing crop.

Elements of competency	**Performance criteria**
1. Prepare for planting	1.1 Tools, equipment and machinery are selected and used that are appropriate to the task.
	1.2 Planting and maintenance requirements of the particular plant are identified.
	1.3 Soil or growing media is prepared as required for the particular plants.
2. Plant crops	2.1 Pre-planting treatments are applied according to plant needs.
	2.2 Plant supports are placed where needed for the particular crop and tension required.
	2.3 Supports are secure, stable, straight and correctly spaced for the anticipated crop growth height and width.
	2.4 Plant stock treatments are carried out neatly, cleanly and in a fashion that causes no disturbance to the plants.
3. Care for crops	3.1 Crop support components are adjusted or repaired as required during plant growth.
	3.2 Fertilizer is prepared and spread evenly and at rates specified by the supervisor.
	3.3 Weed removal is carried out and weeds disposed of according to workplace procedures.
	3.4 Soil cultivation is undertaken manually or by mechanized equipment, in accordance with the requirements of the crop and soil conditions.
	3.5 Work is undertaken in a manner that causes minimal disturbance and damage to crops.
	3.6 Irrigation components are assembled, connected and tested according to the supervisors and manufacturers specifications.

4. Perform follow up and clean-up activities	4.1 Equipment and clothing, is cleaned, sanitized and stored in accordance with the workplace procedures. 4.2 Vehicles and machinery, tools equipment used are cleaned, maintained and stored according to workplace specifications. 4.3 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed. 4.4 Records of activities are completed accurately and promptly, and according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- apply pre-planting soil and plant treatments;
- carry out planting;
- prepare soil or growing media for planting; and
- water in plants and apply other treatments to seedlings if required.

Critical skills and essential knowledge

The ability to:

- accurately record required data;
- estimate spacing and planting patterns;
- select planting material; and
- use and maintain planting equipment.

Knowledge of:

- Basic plant physiology
- Basic preparation of soil and growing media
- Growing requirements of plants
- Importance of field hygiene and quality control in regard to crop planting
- Nutritional, water and other requirements of the crop
- Principles of pest, weed and disease control
- Range of pre-planting soil and plant treatments and their importance
- Soil structure and health
- The importance of correct timing and procedures for crop planting

Range statement

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-E2 Plant vegetables

Unit details	
Functional area E	**Fruit and vegetable production**
Unit title	**Plant vegetables**
Unit code	**AA-E2**

Description

This unit describes the outcomes required to prepare and planting vegetables and fruit plants.

Elements of competency	**Performance criteria**
1. Prepare for planting	1.1 Soil or hydroponic media is moistened according to the plant requirements and mulch is applied.
	1.2 Soil improvers and fertilizers are applied as required to sustain growth and protect plant.
	1.3 Plant or seed material selected is sound and of defined size and suitable vigour for use in the planting process.
	1.4 Plants are kept cool and moist to avoid the roots drying, in accordance with the workplace practice.
	1.5 Plants are prepared by trimming the roots and tops, washing, dipping or dusting.
2. Plant **vegetables**	2.1 Planting holes are dug to the specified dimensions, depth and angle.
	2.2 Checks are made to ensure that the plant placement, spacing, depth, orientation and planting techniques are in line with the prescribed planting method.
3. Post planting care	3.1 Post-planting treatments are undertaken.
	3.2 Checks are made to ensure the soil covering is level to the required depth and compaction.
	3.3 Water and fertilizers are applied at specified rates.
	3.4 Plants are heeled as required, and existing fruit removed to aid plant establishment, ensuring minimal plant damage.
	3.5 Crop support components are installed where required.
4. Perform follow up and clean-up activities	4.1 Vehicles and machinery, **tools** equipment used are cleaned, maintained and stored according to workplace specifications.
	4.2 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.
	4.3 Records of activities are completed accurately and promptly, and according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- maintain seedlings and plants prior to planting;
- perform post planting care;
- plant fruit and vegetables in a manner that will maximize growth and sustainability;
- prepare plants for planting;
- prepare soil or culture according to the needs of the plant or seed; and
- select, maintain and safely use of tool, equipment and machinery.

Critical skills and essential knowledge and Essential Knowledge

The ability to:

- apply agricultural chemicals under supervision;
- apply knowledge of post planting care to reduce plant shock and encourage growth and production;
- identify hazards and employ appropriate strategies to minimize risk;
- prepare plant holes in accordance with requirements for spacing, depth and angle; and
- prepare soil or growing culture for planting to encourage maximum return

Knowledge of:

- Depths and compaction of soil covering requirements for various plants
- Operate machinery to manufacturers specifications and low risk operating procedures
- Plant and soil treatments and their application
- Post planting care of a variety of vegetable and fruit plants

Range statement

Vegetable crops may include:

- Beans, bitter melon, broccoli
- Cabbages, carrots, cauliflower
- Eggplant
- Leeks, lotus root
- Onions
- Potatoes
- Radish
- Soy chum, spinach, squash
- Taro

Tools may include:

- Secateurs
- Spade
- Water jet

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-E3 Plant fruit trees and shrubs

Unit details	
Functional area E	**Fruit and vegetable production**
Unit title	**Plant fruit trees and shrubs**
Unit code	**AA-E3**

Description

This unit describes the outcomes required to prepare a planting site; estimate planting numbers and growing space required; prepare and plant trees and shrubs and provide aftercare.

Elements of competency	**Performance criteria**
1. Prepare for planting	1.1 The planting site is marked out according to the planting plan and/or supervisor's instructions.
	1.2 Competing plants are controlled as required.
	1.3 The soil is prepared and modified according to the cultural requirements of the trees to be planted.
	1.4 **Tools and equipment** are prepared and used according to specifications.
2. Plant fruit trees and scrubs	2.1 Planting holes are dugs to a size sufficient to ensure the roots can grow outwards and downwards according to the needs of the species and size of the plant's root system.
	2.2 Sides of planting holes are gouged to remove the glazing of the side-walls and allow for root penetration into surrounding soil.
	2.3 Depth of planting holes sufficient to ensure that planting is no deeper than the junction of the roots and the stem.
	2.4 **Trees and shrubs** are watered prior to planting, ensuring the entire root ball is damp.
	2.5 Plants are removed from containers without damage.
	2.6 Roots are treated for binding or breakage, according to the needs of the species and standard horticulture practice, prior to placement in the hole.
3. After planting care	3.1 Plant hole is backfilled with soil that is free from large lumps and consolidated lightly, with a shallow basin formed for water retention.
	3.2 Plants are watered with sufficient volume to eliminate air pockets.
	3.3 Mulch material is applied evenly to the depth specified in the workplace guidelines.
	3.4 Trees and shrubs are **secured** by the appropriate method for the plant and conditions.
	3.5 Formative pruning and removal of damaged or dead materials is performed.
	3.6 Canopy reduction, thinning and lifting is undertaken as required.

	3.7 Fertilizer is applied according to the supervisor's instructions and manufacturers' guidelines.
	3.8 Necessary **aftercare** is applied.
4. Perform follow up and clean-up activities	4.1 Waste is removed and disposed of.
	4.2 Tools and equipment used are cleaned, maintained and stored according to workplace specifications.
	4.3 Records of activities, data and observations are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- apply pre-planting soil and plant treatments;
- carry out planting;
- prepare soil or growing media for planting; and
- water in plants and apply other treatments to seedlings if required.

Critical skills and essential knowledge

The ability to:

- apply agricultural chemicals under supervision;
- estimate spacing and planting patterns;
- measure quantities of plant materials and treatments;
- select planting material; and
- use and maintain planting equipment.

Knowledge of:

- Basic plant physiology
- Basic preparation of soil and growing media
- Importance of field hygiene in regard to crop planting
- Nutritional, water and other requirements of the crop
- Principles of pest, weed and disease control
- Range of pre-planting soil and plant treatments and their importance
- Soil structure and health
- The importance of correct timing and procedures for planting

Range statement

Tools and equipment may include:

- Auger
- Rake
- Secateurs
- Shovel
- Spade
- Spray equipment

Trees and shrubs may include:

- Bare-rooted
- Container-grown
- Plants that do not require mechanized lifting devices for planting
- Tube-grown

Plant **securing** may be done by**:**

- Anchoring or guying

- Bracing
- Installing tree guards and protective materials
- Staking
- Tying

Aftercare may include:

- Fertilizing
- Mulching
- Ongoing protection through staking and tying
- Pruning
- Watering
- Weed and disease control

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-E4 Harvest vegetable crops

Unit details	
Functional area E	**Fruit and vegetable production**
Unit title	**Harvest vegetable crops**
Unit code	**AA-E4**

Description

This unit describes the outcomes required to plan and prepare for harvesting; harvest crops correctly, select and grade produce at picking where required and stack produce to minimize damage.

Elements of competency	**Performance criteria**
1. Plan and prepare for the harvest	1.1 **Crop** is monitored to determine maturity and readiness for harvesting and reported to the supervisor.
	1.2 Harvesting method and order is determined and confirmed with the supervisor.
	1.3 Hygiene standards for the crop and storage requirements are identified.
	1.4 Machinery and equipment is checked according to manufacturer specifications and work procedures and assessed for reliability and safety.
	1.5 Repairs and adjustments are made to machinery and equipment made and any safety issues reported to the supervisor.
	1.6 Harvesting and crop-treatment machinery and equipment are cleaned to ensure they are free of pests and contaminants to maintain crop and paddock hygiene standards.
2. Harvest vegetable crops	2.1 **Harvesting machinery** and equipment is handled in a safe manner, according to the manufacturers' specifications and at speeds to suit crop conditions.
	2.2 Harvesting machinery is continually checked and adjusted where necessary.
	2.3 Harvesting procedures minimize plant damage.
	2.4 The crop is handled carefully and hygiene standards maintained to maximize quality, according to work procedures.
	2.5 The crop is checked for any contamination by soil and diseases that may cause deterioration during storage.
3. Handling, sorting and storage	3.1 Basic sorting and **grading** of the crop is carried out.
	3.2 Produce is stacked into containers in a manner that minimizes damage to produce.
	3.3 Containers of cropped produce are moved to storage areas and stacked in a way that minimizes damage to the crop.
	3.4 Rotten, diseased or damaged produce is disposed of in an environmentally aware manner.

4. Perform follow up and clean-up activities	4.1 Vehicles and machinery, tools and equipment used are cleaned, maintained and stored according to workplace specifications. 4.2 Records of activities are completed accurately and promptly, and according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- estimate the readiness of produce for picking;
- harvest the vegetable crop using the correct technique;
- select and grade produce at picking where required;
- stack produce in containers without causing damage or losses; and
- transport produce from the field according to workplace requirements.

Critical skills and essential knowledge

The ability to:

- select and grade produce;
- stack produce without damage or loss;
- recognize of crop maturity of a range of crops; and
- use the correct crop harvesting technique efficiently and effectively.

Knowledge of:

- Grading characteristics of each crop
- The effect of adverse climatic conditions (e.g., rain, hail, extreme wind with dust, or very high ultraviolet radiation), which may downgrade the quality of affected crop, prevent or impede harvest operations or severely influence the time taken to complete the harvest programme
- The importance of maintaining quality of produce including cooling requirements and quick transport from field to processing areas

Range statement

Vegetable **crops** may include:

- Beans, bitter melon, broccoli
- Cabbages, Carrots, cauliflower
- Eggplant
- Leeks, lotus root
- Onions
- Potatoes
- Radish
- Soy chum, spinach, squash
- Taro

Harvesting machinery and equipment may include:

- Conveyors
- Field and chaser bins
- Tarpaulins
- Towing vehicle
- Tractor
- Truc.

Grading factors may include:

- Blemishes
- Bud count

- Colour
- Length
- Maturity
- Quality
- Variety

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-E5 Harvest fruit crops

Unit details	
Functional area E	**Fruit and vegetable production**
Unit title	**Harvest fruit crops**
Unit code	**AA-E5**

Description

This unit describes the outcomes required to assess a fruit crop for picking readiness; pick the crop by manual means, using machinery to assist; check, grade and transport the crop.

Elements of competency	**Performance criteria**
1. Plan and prepare for the harvest	1.1 Fruit crop is monitored to determine readiness for harvesting and supervisor advised.
	1.2 Equipment is cleaned, to ensure it is free of pests and other contaminants.
2. Harvest fruit	2.1 Fruit is selected for picking that conforms to the workplace standards for maturity, quality and health.
	2.2 Manual picking practices and equipment are used in a manner to minimize plant damage.
	2.3 **Equipment** and any **machinery** is used in accordance with specifications.
	2.4 Dropped material is collected and rotten, damaged or immature fruit removed to maintain crop and field hygiene.
	2.5 Fruit is picked and packed into transport **containers** in a manner that avoids any damage to it.
	2.6 Pest-control measures are applied to the picked area as required.
3. Store fruit crops	3.1 Fruit is **graded** and sorted according to workplace requirements.
	3.2 Containers fruit are moved and unloaded for storage without damage.
	3.3 An even temperature of the picked fruit is maintained at levels set by the supervisor.
4. Perform follow up activities	4.1 Diseased, damaged or rotten fruit are reported in accordance with the workplace procedures.
	4.2 Harvesting tools, equipment and machinery are cleaned and maintained and stored properly to minimize damage and to maximize hygiene.
	4.3 Harvesting records are completed in accordance with workplace requirements.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- estimate the readiness of produce for picking;
- harvest the fruit crop using the correct technique;
- stack produce in containers without causing damage or losses; and
- transport produce from the field according to workplace requirements.

Critical skills and essential knowledge

The ability to:

- operate machinery to specifications;
- recognize fruit maturity of a range of fruit crops;
- select and grade produce;
- stack produce without damage or loss; and
- use the correct crop harvesting technique efficiently.

Knowledge of:

- Grading characteristics of each fruit
- The effect of **adverse climatic conditions** (e.g., rain, hail, extreme wind with dust, or very high ultraviolet radiation), which may downgrade the quality of affected fruit, prevent or impede harvest operations or severely influence the time taken to complete the harvest programme
- The importance of maintaining quality of produce including cooling requirements and quick transport from field to processing areas

Range statement

Equipment may include:

- Bags
- Containers
- Gloves
- Knives
- Ladder
- Snips

Machinery to assist picking may include:

- Forklifts
- Power ladders
- Tractors
- Trailers

Containers may include:

- Boxes
- Bulk bins
- Trays

Grading factors may include:

- Blemishes
- Colour
- Maturity
- Quality
- Size
- Variety

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional area F – Rice growing and processing

AA-F1 Prepare, plant and maintain a rice paddy

Unit details	
Functional area F	**Rice growing and processing**
Unit title	**Prepare, plant and maintain a rice paddy**
Unit code	**AA-F1**

Description

This unit describes the outcomes required to select and prepare tools and equipment for cultivating the rice paddy; apply any pre-planting treatments and prepare the land by ploughing and flooding to the required depth for optimum rice growing.

Elements of competency	**Performance criteria**
1. Plan and prepare	1.1 Paddy preparation requirements are determined.
	1.2 Check the irrigation and drainage systems, and ensure that the bunds dividing the fields are in good order.
	1.3 Equipment and towing vehicle where used for land cultivation, is selected, checked and prepared.
	1.4 Worn or broken parts are repaired to ensure reliability during cultivation.
	1.5 Safety hazards are identified, risks assessed and risk controls are implemented.
2. Plant paddy	2.1 Ploughing is completed for each paddy, using the equipment in a safe, effective and efficient manner and at speeds to suit the conditions.
	2.2 Paddy is using irrigation systems and checked to ensure the bunds maintain the correct water level.
	2.3 Rice plants are planted 20–30 centimetres apart, across each paddy.
	2.4 Paddy is drained, using drainage systems, to remove weeds as required, and re-flooded.
	2.5 **Weed and pest control** measures are applied safely.
3. Perform follow up and clean-up activities	3.1 Vehicles and machinery, **tools and equipment** used are cleaned, maintained and stored according to workplace specifications.
	3.2 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.
	3.3 Records of activities are completed accurately and promptly, and according to required work standards and procedures.
4. Plan and prepare	4.1 Paddy preparation requirements are determined.

4.2 Check the irrigation and drainage systems, and ensure that the bunds dividing the fields are in good order.

4.3 Equipment and towing vehicle where used for land cultivation, is selected, checked and prepared.

4.4 Worn or broken parts are repaired to ensure reliability during cultivation.

4.5 Safety hazards are identified, risks assessed and risk controls are implemented.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- use irrigation and drainage systems to flood and drain paddies;
- use planting techniques for rice plants; and
- use ploughing techniques suitable to rice production.

Critical skills and essential knowledge

The ability to:

- identify pests and weeds;
- operate machinery to manufacturers specifications and low risk operating procedures;
- use irrigation and draining systems in order to flood and drain paddies;
- use pesticides, herbicides and biological controls safely; and
- use ploughing tools and equipment.

Knowledge of:

- Operation of irrigation and drainage systems
- Various weeds and pests and related use of herbicides and biological agents to control or eliminate these

Range statement

Tools and equipment may include:

- Harrows
- Hoes (changkol)
- Ribbed rollers
- Vehicles

Weeds and pest controls may include:

- Biological agents to control pests may include:
  - Army worms
  - Mice
  - Rats
  - Rice stem borers
  - Water snails
- Herbicides to control:
  - Kernel spots
  - Leaf smut
  - Leaf spot
  - Seedling blight
  - Stem rot
  - Straight head

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-F2 Harvest rice

Unit details	
Functional area F	**Rice growing and processing**
Unit title	**Harvest rice**
Unit code	**AA-F2**

Description

This unit describes the outcomes required to sequence harvesting activities and harvest crops efficiently.

Elements of competency	**Performance criteria**
1. Prepare for harvest	1.1 Requirements for the method and order of rice harvesting are prepared and confirmed with supervisor.
	1.2 Crop is sampled for readiness, ensuring relevant colour change and drooping panicle.
	1.3 Harvesting hygiene standards are determined to minimize loss from pests and disease.
	1.4 **Harvesting equipment** is cleaned to ensure pests and other contaminants do not compromise crop hygiene standards.
	1.5 Equipment is checked and adjusted for harvesting conditions and worn or damaged parts replaced to ensure reliability during the harvest activity.
	1.6 Containers, leftover fluids, waste and debris from maintenance and servicing are removed and safely disposed.
2. Harvest rice	2.1 Paddy is drained in preparation for harvesting.
	2.2 Mechanized harvesting machines are used in dry fields, in accordance with the manufacturer's specifications.
	2.3 Rice is cut into long or short straws by hand with a rice cutter/scythe or with powered equipment.
3. Perform post harvesting activities	3.1 Harvested rice is bundled into sheaves and transferred to drying and processing area according to workplace procedures.
	3.2 Short harvested straw is left in the paddy to dry for later collection and use in animal feed.
	3.3 Hygiene of all surfaces that come into contact with the crop is maintained in order to maximize crop quality.
	3.4 Insecticides are applied to the paddy after harvesting, as required and in accordance with manufactures specifications and workplace safety guidelines.
4. Perform follow up and clean-up activities	4.1 Vehicles and machinery, tools and equipment used are cleaned, maintained and stored according to workplace specifications.
	4.2 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.

4.3 Records of activities are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- harvest and bundle rice using appropriate equipment for the task;
- identify readiness of rice for harvesting; and
- maintain high standards of hygiene for all surfaces to come into contact with the crop.

Critical skills and essential knowledge

The ability to:

- apply agricultural chemicals under supervision;
- determine readiness of crop for harvesting;
- harvest and bundle rice;
- identify hazards and employ appropriate strategies to minimize risk; and
- operate machinery to specifications.

Knowledge of:

- Drainage systems for draining fields

Range statement

Rice-harvesting equipment may include:

- Hand cutters
- Mechanized harvesters (dry-field rice crops where planted)

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-F3 Dry and thresh rice

Unit details	
Functional area F	**Rice growing and processing**
Unit title	**Dry and thresh rice**
Unit code	**AA-F3**

Description

This unit describes the outcomes required to dry and thresh rice.

Elements of competency	**Performance criteria**
1. Dry rice plants	1.1 Rice sheaves are collected from the harvest and moved to **drying** area.
	1.2 Rice plants are dried according to the standard workplace procedure, to reduce the moisture content to 14 per cent.
	1.3 Dried paddy (rice plants), including straw and panicles, are transported to threshing area.
2. Thresh and bag rice	2.1 Rice is threshed, correctly using available equipment to separate the panicles from the straw.
	2.2 **Threshed rice** is checked for cleanliness, and winnowed to remove small straw particles.
	2.3 Rice is bagged for transport to the next process, using safe manual handling procedures.
	2.4 Bagged rice is weighed, counted and data recorded.
	2.5 Straw remainder is collected and containerized for use as feedstock or as a growing medium.
3. Perform follow up activities	3.1 Machinery, tools and equipment used are cleaned, maintained and stored according to workplace specifications.
	3.2 On site or workplace procedures for repair are followed.
	3.3 Records of activities are completed accurately and promptly, and according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- dry rice plants to required moisture content;
- maintain high standards of hygiene for all surfaces to come into contact with the crop;
- thresh rice plants; and
- winnow rice to remove straw.

Critical skills and essential knowledge

The ability to:

- operate machinery to specifications;
- perform drying processes;
- perform threshing processes; and
- perform winnowing processes

Knowledge of:

- Drying procedures to achieve optimum moisture content

Range statement

Methods of **drying** rice plants may include:

- Manually/mechanically (such as with a drying drum)
- Naturally (air and sun)

Means of **threshing rice** may include:

- By a mechanized threshing drum that rotates the rice
- By hand (flailing treading or in a mortar)
- By machine (such as with a hand- or pedal-powered drum)

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-F4 Hull, whiten and polish rice

Unit details	
Functional area F	**Rice growing and processing**
Unit title	**Hull, whiten and polish rice**
Unit code	**AA-F4**

Description

This unit describes the outcomes required to hull, whiten and polish rice by manual or mechanical means and prepare for transport.

Elements of competency	**Performance criteria**
1. Prepare for rice, hulling whitening and polishing	1.1 Required equipment or machinery is determined, inspected and prepared for use.
	1.2 Dried and threshed rice is selected for **milling** or hulling as determined by supervisor.
2. Perform milling and hulling	2.1 Rice is milled using workplace procedures and hulled to remove bran and bring to brown rice stage.
	2.2 Brown rice is bagged for transport or transfer to the whitening area.
	2.3 Hulls are collected for later burning to use as animal feed, fuel or fertilizers.
	2.4 Brown rice is milled to remove the outer layer (pericarp) and the germ of the kernel to produce white rice.
	2.5 Damaged or heat-affected rice and milling waste is removed.
	2.6 Removed bran is collected for use in the production of oil or for pickling.
3. Perform sorting and polishing	3.1 Rice is **sorted and graded** and bagged for transfer to the next processing stage.
	3.2 **Rice characteristics**, as well as cooking and processing characteristics are determined.
	3.3 Rice is polished or glazed using talc and glucose mixture, as per the production specifications.
	3.4 Containerized rice is weighed or counted and production numbers recorded.
4. Perform follow up and clean-up activities	4.1 Machinery, tools and equipment used are cleaned, maintained and stored according to workplace specifications.
	4.2 Records of production numbers, weigh totals and other relevant activities, are recorded according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- mill and hull rice;
- perform rice polishing;
- sort and grade rice; and
- use safe handling and operating techniques.

Critical skills and essential knowledge

The ability to:

- grade and sort rice;
- perform milling and hulling processes; and
- perform whitening and polishing processes

Knowledge of:

- Rice characteristics
- Rice grading categories

Range statement

Milling may be conducted by:

- Hand-operated (mortar and pestle)
- Mechanized equipment, such as a huller (rotary or swing)

Sorting and grading categories may include:

- Long-grain rough rice
- Medium-grain rough rice
- Mixed rough rice
- Short grain rough rice
- Whitened rice

Rice characteristics may include:

- Appearance
- Cleanliness
- Colour
- Uniformity

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-F5 Prepare, store and raise rice seed

Unit details	
Functional area F	**Rice growing and processing**
Unit title	**Prepare, store and raise rice seed**
Unit code	**AA-F5**

Description

This unit describes the outcomes required to select and prepare rice seed for planting or store for future use.

Elements of competency	**Performance criteria**
1. Produce seed	1.1 Area of paddy required to produce the desired amount of seed is selected, based on calculated requirements and the health, vigour and grain size of the growing rice.
	1.2 Measures are taken to improve seed and plant health, vigour and uniformity within the selected area when growing.
2. Collect seed	2.1 Quantity of seed for the following season's crop is calculated, based on projected needs and area available for future growing.
	2.2 Following rice harvest, the calculated seed requirement is kept aside from that to be used for production.
	2.3 Seed to be kept is graded to the required size for even-sized grain, and samples taken to **test for quality**, so that best possible stock is kept for future growing.
	2.4 Fungicidal and insecticidal dressings applied where appropriate to seed stock.
3. Store seed	3.1 Seed storage facilities are hygienically prepared.
	3.2 Seed is transferred to the storage area, for storage under conditions that maintain its quality and germination capacity.
	3.3 Periodic checks are conducted of seed storage for quality factors and viability.
4. Complete seed storage	4.1 Seeds are moved to seedling-growing area or nursery to grow to pre-planting size.
	4.2 Records of seed collection and storage are completed in accordance with workplace requirements.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and Critical skills and essential knowledge. The candidate must be able to:

- accurately calculate future seed requirements taking into account considerations including future needs, land availability, seed vigour and strain;
- implement measures to improve and maintain rice seed in storage;
- maintain rice seed in storage; and
- test and grade rice seed.

Critical skills and essential knowledge

The ability to:

- use pesticides, herbicides, fungicides and biological controls safely.

Knowledge of:

- Calculation formulas for quantifying future needs
- Hygienic preparation of storage facilities
- Rice crop needs for maximum growth and yield, vigour and uniformity
- Sampling and testing techniques
- Storage techniques for rice seed to maintain maximum quality and germination capacity

Range statement

Tests for quality include tests for:

- Disease resistance
- Germination
- Purity
- Vigour
- Weight

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional area G – Poultry production

AA-G1 Artificially inseminate poultry

Unit details	
Functional area G	**Poultry production**
Unit title	**Artificially inseminate poultry**
Unit code	**AA-G1**

Description

This unit describes the outcomes required to conduct the artificial insemination of poultry.

Elements of competency	**Performance criteria**
1. Prepare for artificial insemination	1.1 Timing is scheduled to ensure the availability of resources and personnel.
	1.2 Correct semen supplies are accessed from reliable sources and stored in conditions specified by the workplace.
	1.3 **Insemination equipment**, including poultry restraints, is selected, prepared and checked to ensure serviceability and cleanliness.
	1.4 **Poultry** is selected and segregated and checked for symptoms of **infection and disease** (zoonoses) and any disease hazards reported.
2. Conduct artificial insemination	2.1 Recipient birds are correctly identified.
	2.2 All straws are checked for correct sire identification.
	2.3 Poultry is restrained for insemination using safe and humane techniques to minimize stress.
3. Perform maintenance and documentation	3.1 Waste is disposed of according to workplace hygiene standards.
	3.2 Work area and equipment is cleaned to workplace standards and returned to operating order.
	3.3 Birds are returned to designate area accordance with workplace requirements.
	3.4 Records of insemination are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- maintain strict hygiene;
- handle poultry humanely and safely throughout procedures;
- prepare relevant materials and equipment; and
- record details of artificial insemination.

Critical skills and essential knowledge

The ability to:

- keenly observe birds and insemination processes;
- safely and humanely handle poultry; and
- sterilize equipment and prepare hygienic work site prior to insemination procedures

Knowledge of:

- Methods to safely dispose of waste
- Optimal storage conditions for semen straws
- Procedures for artificial insemination
- Safe poultry handling
- Signs and symptoms of common infectious diseases that affect birds
- Sterilisation procedures

Range statement

Insemination equipment may include:

- Bird restraints
- Gloves
- Insemination straws
- Pipettes

Poultry may include**:**

- Chickens
- Ducks
- Other commercially produced birds
- Turkeys

Infectious diseases may include:

- Coxiella burnetii infection, also known as Q fever
- Zoonoses.

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G2 Brood poultry

Unit details	
Functional area G	**Poultry production**
Unit title	**Brood poultry**
Unit code	**AA-G2**

Description
This unit of competency describes the outcomes required to ensure optimum conditions for brooding poultry, including environmental, feed and training aspects of care.

Elements of competency	**Performance criteria**
1. Prepare for brooding	1.1 Tools and equipment needed for the work are selected, checked and serviced as needed.
	1.2 Bird temperatures are monitored and recorded accurately, following the workplace procedures.
	1.3 Brooding systems and procedures are checked to protect from gases and dusts.
2. Conduct brooding operations	2.1 Day-old chickens are placed in the brooding shed according to the workplace instructions, and handled with care to avoid damage and stress.
	2.2 Shed temperatures are adjusted in accordance with bird behaviour and the supervisor's directions.
	2.3 Changes in birds' activity are observed and reported.
	2.4 Dead or culled young birds are removed and hygienically disposed of according and mortalities recorded.
	2.5 Brood information is provided to transport and hatchery personnel, including any vaccine reactions.
	2.6 Brooding area is extended as young birds grow, to provide an optimal stocking density and avoid crowding.
	2.7 Blackout training of young birds/hatchlings is conducted regularly according to workplace procedures.
	2.8 Birds are monitored and **detrimental conditions** remedied.
3. Perform clean-up activities	3.1 All debris and waste material from the brooding area is removed.
	3.2 Equipment is cleaned and stored properly in accordance with manufacturer's specifications and workplace procedures.
	3.3 Records of activities are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- handle hatchlings and brooding chickens and ensure suitable access to feed and water;
- maintain optimal ventilation, temperature and humidity of the shed environment;
- use immunization techniques and diet to optimize the immune system; and
- recognize and address symptoms of illness, disease, pest infestation or failure to thrive.

Critical skills and essential knowledge

The ability to:

- follow instructions and procedures;
- handle brooding chickens and hatchlings with strict accordance to the codes of welfare;
- monitor and record temperature, times, humidity and bird numbers;
- perform routine hygiene maintenance activities ; and
- recognize feed types.

Knowledge of:

- Effects of litter quality and depth on chicken activity and productivity
- How live respiratory vaccines impact on bird behavior and how to manage this
- Relationship between bird behavior and brooding temperature
- Sound management practices and processes to minimize noise, odors and debris from the livestock operations
- The impact that feed, water and floor space has on flock performance
- The need to maximize hygiene practices and awareness
- Workplace livestock production and management plans

Range statement

Detrimental conditions may include:

- Chilling
- Draughts
- Drops in gas pressure.
- Lack of feed or water
- Lack of floor space
- Overheating
- Short supplies of medication stock
- Unclean or inadequate litter and environment

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G3 Incubate eggs

Unit details	
Functional area G	**Poultry production**
Unit title	**Incubate eggs**
Unit code	**AA-G3**

Description
This unit of competency describes the outcomes required to prepare for, monitor and control the process of incubating eggs.

Elements of competency	**Performance criteria**
1. Receive eggs	1.1 Setter is sealed and fumigated according to manufacturer instructions, and shed is aired prior to further activity.
	1.2 Eggs are unloaded at the hatchery and checked for **quality**.
2. Store eggs	2.1 Eggs are stored as instructed regarding position, temperature, humidity and period of storage.
	2.2 Eggs are transferred to setter trolleys without damage or disturbance and in the sequence required by the workplace.
	2.3 Eggs are attached to the turning machine to ensure that maximum viability is maintained.
3. Operate and monitor setter	3.1 Setter is operated, repaired and maintained according to the workplace procedures.
	3.2 Temperature probes are calibrated with known standards, and checks and adjustments are made to temperature, humidity and airflow to ensure proper operation.
	3.3 Egg stock is managed to minimize egg age on setting, with setter readings taken and recorded accurately.
4. Transfer eggs to hatcher	4.1 Eggs are transferred to hatching trays in the sequence specified by the workplace procedures.
	4.2 Temperature, humidity and airflow are checked to ensure specified equipment operation and adjustment.
	4.3 Hatcher is sealed and fumigated according to manufacturer instructions and shed aired prior to staff re-entry.
5. Monitor hatcher	5.1 Manual readings are accurately taken and recorded.
	5.2 Adjustments are made to temperature, humidity and airflow as required.
	5.3 Strict pasteurization and hygiene methods are applied where eggs are to be pulped.

6. Clean up	6.1 Waste material is removed from the incubation area and disposed of according to work procedures. 6.2 All equipment used is cleaned, maintained and stored in accordance with workplace procedures. 6.3 **Hatchery records** are updated in accordance with the workplace requirements.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- fumigate setter and hatcher safely;
- monitor and operate setter and hatcher and carry out contingency measures if necessary;
- obtain a high hatch percentage;
- provide a standardised environment (temperature, humidity and airflow) to incubate eggs; and
- store and handle fertile eggs.

Critical skills and essential knowledge

The ability to:

- calibrate temperature and humidity probes;
- complete manual monitoring sheets;
- conduct fumigation and dangers of fumigants;
- investigate causes of problems and address where possible e.g. replace fan motors;
- monitor setters and hatchers for constant performance; and
- perform routine hygiene maintenance activities as required by the workplace.

Knowledge of:

- Airflow of machines in hatchery
- Importance of maintaining hygiene
- Practices and processes to minimise noise, odours and debris from the livestock operation
- Servicing requirements

Range statement

Egg **quality** indicators may include:

- Age
- Cracks
- Defects
- Shape
- Shell quality
- Size
- Stains
- Type

Hatchery records may include:

- Dates
- Flow-rate gauges readings
- Humidity readings
- Temperature readings
- Times and periods of operation and maintenance

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G4 Identify and sex poultry

Unit details	
Functional area G	**Poultry production**
Unit title	**Identify and sex poultry**
Unit code	**AA-G4**

Description

This unit of competency describes the outcomes required to determine the sex of poultry.

Elements of competency	**Performance criteria**
1. Prepare to sex poultry	1.1 Work area is sanitized and prepared for work to ensure safe and hygienic conditions for the sexing activities.
	1.2 Tools and equipment suitable to the work are selected.
2 Identify and sex poultry	2.1 Criteria for identification is obtained from the production and supervisor's instructions.
	2.2 Sex is identified and the bird marked, separated and placed according to workplace work procedures.
3 Perform clean up	3.1 The site is restored and waste disposed of in accordance with workplace procedures.
	3.2 Tools and equipment are cleaned, maintained and stored according to workplace procedures and faults repaired or reported.
	3.3 **Records** of activities and outcomes are completed according to required work procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- handle chickens humanely; and
- sex chickens using recognized techniques.

Critical skills and essential knowledge

The ability to:

- Complete sexing at a rate acceptable to the industry and the workplace
- Identify the key features used to sex chickens using a variety of techniques
- Operate marking equipment

Knowledge of:

- Bird reproductive anatomy
- Hygienic maintenance and use of machinery
- Sound management practices and processes to minimize noise, odours and debris from the poultry operation
- The key indicators of gender in a range of birds
- The need to maximize hygiene practices

Range statement

Poultry may include**:**

- Chickens
- Ducks
- Geese
- Guinea fowl
- Pheasants
- Quail
- Turkeys

Records to be kept may include:

- Chemicals and other substances used, including quantities and methods
- Culling records
- Dates
- Hatched chicks per flock
- Instances diseases, illnesses, pests
- Periods of operation and maintenance
- Readings from temperature and flow-rate gauges
- Times

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G5 Collect and pack eggs

Unit details	
Functional area G	**Poultry production**
Unit title	**Collect and pack eggs**
Unit code	**AA-G5**

Description

This unit of competency describes the outcomes required to collect, grade, pack and store poultry eggs for a commercial egg producing enterprise.

Elements of competency	**Performance criteria**
1. Collect and grade eggs	1.1 Eggs are collected by either hand or mechanical means, and placed in egg trays, with the pointed end down.
	1.2 Eggs are candled using appropriate equipment in a light proof area.
	1.3 Eggs are graded into appropriate weight and quality grades according to industry standards.
	1.4 Eggs are graded into appropriate weight and quality grades, according to industry standards.
	1.5 Cage-marked, cracked or weak-shelled eggs are removed.
	1.6 Eggs are washed using appropriate equipment and oil when required, according to workplace practice.
2. Store eggs	2.1 Eggs are placed in cartons or trays and packed and labeled according to work procedures.
	2.2 Cool room and equipment is cleaned and sanitized and checked for efficient operation.
	2.3 Eggs are transferred to storage in cool room and positioned in order of age, grade or dispatch.
3. Perform follow up activities	3.1 Waste is removed and disposed of according to workplace procedures.
	3.2 Equipment is sanitized cleaned and stored in accordance with workplace procedures.
	3.3 Egg-production records are entered accordance with the workplace requirements.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- assess and grade eggs for storage or packing;
- check eggs are fit for human consumption and meet shelf life requirements;
- clean and sanitize the equipment used for handling the eggs;
- collect and handle eggs in a hygienic fashion; and
- pack and store eggs according to workplace procedures.

Critical skills and essential knowledge

The ability to:

- clean up worksite and safely dispose of waste;
- grade eggs according to identified standards;
- identify defective eggs; and
- operate an egg wash machine or wash manually.

Knowledge of:

- Egg cleaning and hygiene procedures for egg handling areas and machines
- Safe handling and appropriate storage of eggs
- Sanitizers and activity, and measurement
- Standards for grading eggs
- Workplace procedures for shell egg production, grading, and packing

Range statement

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G6 Trim poultry beaks

Unit details	
Functional area G	**Poultry production**
Unit title	**Trim poultry beaks**
Unit code	**AA-G6**

Description

This unit of competency describes the outcomes required to accurately trim poultry beaks at various ages with minimal stress on birds.

Elements of competency	**Performance criteria**
1. Prepare for beak trimming	1.1 Confirm **beak-trimming equipment** requirements.
	1.2 Set up beak-trimming equipment, according to the age and behavior of the birds to be trimmed.
2. Perform beak trimming	2.1 Birds are handled according to relevant work practice.
	2.2 Beak shape, length and hardness are assessed regularly.
	2.3 Beaks are trimmed according to work procedures to required standard and length with accuracy.
	2.4 Birds with bleeding beaks are re-cauterized.
	2.5 Bird welfare is assessed regularly.
	2.6 Checks are made to ensure animal health and welfare requirements are being observed and followed.
3. Perform follow up and clean-up activities	3.1 Waste is removed and disposed of according to the workplace procedures.
	3.2 All equipment is cleaned and stored and workplace procedures.
	3.3 Records are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- cut beak to correct length and cauterise bleeding if necessary;
- ensure biosecurity requirements are used;
- minimise stress on the birds by careful handling;
- monitor de-beaked birds;
- record details; and
- set up equipment correctly so that accurate trims are achieved.

Critical skills and essential knowledge

The ability to:

- carry out trimming of beaks;
- complete beak trimming procedures; and
- prepare to beak trim birds.

Knowledge of:

- Biosecurity procedures for poultry production
- Bird handling and restraint techniques
- Techniques to treat bleeding and injured birds including euthanizing methods
- Tools and equipment used in trimming
- Trimming methods and procedures
- Workplace standard operating procedures

Range statement

Beak trimming equipment may include:

- Baskets
- Beak-trimming machine
- Boxes
- Electrical cords
- Electrical safety switch
- Nets
- Service tools
- Surrounds

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G7 Monitor free-range poultry production

Unit details	
Functional area G	**Poultry production**
Unit title	**Monitor free-range poultry production**
Unit code	**AA-G7**

Description

This unit of competency describes the outcomes required to plan and schedule operations for free-range poultry production.

Elements of competency	**Performance criteria**
1. Provide an optimal environment for poultry	1.1 Biosecurity protocols and quarantine procedures are maintained at all times to prevent the entry of disease.
	1.2 Equipment and housing is installed in accordance with established workplace procedures.
	1.3 Number of birds per unit of space for grazing/pasture is in line with industry codes of practice.
	1.4 **Poultry** are provided daily access to outside environment for set periods of time.
	1.5 Birds are provided non-commercial feed sources, such as grass and forage, in accordance with their requirements.
2. Assess and monitor bird health and welfare	2.1 Regular checks are taken to ensure animal health and welfare.
	2.2 Birds are protected from predators.
	2.3 Symptoms of sickness, disease, parasite infestations, or physical abnormalities are recognized and reported.
	2.4 **Marketable products** are monitored for insecticide and soil residues and any infections of human health significance.
3. Perform follow up activities	3.1 Bird-production indicators, health status, specifications and targets are measured, based on the production plan.
	3.2 Waste is removed and disposed of in accordance with workplace policies.
	3.3 Tools and equipment used are cleaned, hygienically maintained and stored according to workplace specifications.
	3.4 Records are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- minimize the risk of infection through the effective use of hygiene and quarantine procedures;

- monitor bird housing conditions for temperature and humidity; and
- recognise symptoms of ill health, common diseases, parasite infestations, or physical abnormalities and remove non-viable poultry.

Critical skills and essential knowledge

The ability to:

- accurately assess bird numbers;
- maintain biosecurity protocols and quarantine procedures;
- observe the welfare of poultry and take action in accordance with workplace procedures; and
- tag poultry of varying ages.

Knowledge of:

- Sound management practices and processes to minimise noise, odours and debris from the poultry operations
- Symptoms of ill-health in poultry
- Workplace poultry production and management plans

Range statement

Poultry may include:

- Chickens
- Ducks
- Geese
- Guinea fowl
- Pheasants
- Quail
- Turkeys

Marketable products may include:

- Down and manure as marketable by products
- Eggs
- Feathers
- Meat

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-G8 Maintain poultry health

Unit details	
Functional area G	**Poultry production**
Unit title	**Maintain poultry health**
Unit code	**AA-G8**

Description

This unit of competency describes the outcomes required to maintain poultry health and welfare.

Elements of competency	**Performance criteria**
1. Conduct routine inspections	1.1 Conduct floor walks regularly to check **poultry** visually, including the checking of stock housed above the floor level, picking up and handling stock for closer investigation, as required.
	1.2 Bird housing is monitored to ensure protection from predators and weather.
	1.3 Temperature and humidity control equipment is correctly maintained.
2. Recognize ill health in poultry	2.1 Symptoms of ill health, common diseases, parasite infestations or physical abnormalities are recognized and reported.
3. Apply vaccines and disease prevention	3.1 Vaccines, veterinary chemicals or other therapeutic medicines are labeled and stored in controlled or refrigerated conditions.
	3.2 **Agents** for routine **prevention or treatment of disease or parasite** infestation are measured and applied according to the workplace procedure and manufacturers' instructions.
	3.3 Swabs are taken from production and storage surfaces and work areas on a regular basis, labeled and prepared for testing as required by the workplace.
4. Remove non-viable poultry	4.1 Birds to be culled are identified using workplace quality criteria.
	4.2 Birds are culled humanely, removed and disposed of according to work procedures.
5. Document and clean up	5.1 Equipment and tools are cleaned and sanitized and stored in accordance with workplace procedures.
	5.2 **Records** of activities are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- administer vaccines and medications and maintain records;
- collect samples for analysis;
- minimise the risk of infection through hygiene and quarantine procedures;
- monitor bird housing conditions for temperature and humidity; and
- recognize symptoms of ill health, common diseases, parasite infestations, or physical abnormalities and remove non-viable poultry.

Critical skills and essential knowledge

The ability to:

- detect possibility of disease through parameters such as behaviour, length of time required to eat food;
- maintain biosecurity protocols and quarantine procedures;
- recognise clinical symptoms (normal vs. abnormal); and
- tag poultry of varying ages.

Knowledge of:

- Sound management practices and processes to minimise noise, odours and debris from the poultry operations
- Symptoms of ill-health in poultry
- The range of diseases affecting the class and age of poultry
- Vaccination programmes, vaccines and mode of action in use in the organisation
- Withholding periods for use of antibiotics
- Workplace poultry production and management plans
- Zoonotic diseases and mode of transmission

Range statement

Poultry may include**:**

- Chickens
- Ducks
- Geese
- Guinea fowl
- Pheasants
- Quail
- Turkeys

Agents for prevention or treatment of disease or parasites may include:

- Antibiotics
- Medicated feed and water
- Nutrient drenches and injections
- Sprays
- Therapeutic drugs
- Vaccines

Records to be kept may include records of:

- Chemicals, agents and other substances used, including quantities and methods
- Culling records
- Dates
- Hatched chicks per flock
- Instances diseases, illnesses, pests
- Periods of operation and maintenance
- Readings from temperature and flow-rate gauges
- Times

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

Functional area H – Aquaculture tanks and systems

AA-H1 Maintain aquaculture tanks and systems

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Maintain aquaculture tanks and systems**
Unit code	**AA-H1**

Description

This unit of competency describes the outcomes required maintain closed and semi-enclosed aquaculture systems (not open water).

Elements of competency	**Performance criteria**
1. Repair and maintain equipment	1.1 Different types of **aquiculture systems** and their maintenance requirements are correctly identified.
	1.2 Serviceability of the **system components** relevant to the workplace is checked and any faults identified and reported to the supervisor.
	1.3 **Tools and equipment** required for repair are selected, checked for fault, and repair or maintenance is effectively carried out.
	1.4 Supplies of **repair materials** are maintained, and low supplies reported to the supervisor.
2. Shut down and repair water supply	2.1 Water supply/disposal system is shut down or controlled and the input/output is supplied from an alternative system before maintenance or repairs are carried out.
	2.2 Identified faults in system components are repaired and worn or damaged parts are replaced or repaired.
	2.3 **Mechanical equipment** is checked and serviced, in accordance with the manufacturers' guidelines.
	2.4 Any impediments are removed from the water supply or disposal system.
3. Return water supply to operation	3.1 Water supply/disposal system is returned to operation in working order according to manufacturer's specifications.
	3.2 Critical flow rates are measured and recorded.
	3.3 Water supply and disposal system is checked to ensure standard operation according to specifications and workplace procedures.
4. Perform follow up and clean-up activities	4.1 Waste is disposed of according in accordance with workplace policies.
	4.2 Tools and equipment are cleaned, inspected, maintained or repaired and returned to storage in accordance with the workplace procedures.

4.3 Records are completed accurately and according to the workplace procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- apply understanding of the correct operations of water disposal and waste systems;
- identify and repair faults in system;
- measure critical flow rates; and
- shut down or control input/output of water to tank or system.

Critical skills and essential knowledge

The ability to:

- control input/output of water for supply of alternative system;
- identify and repair faults in system;
- measure and interpret critical flow rates;
- read, interpret and follow instructions, procedures and safety material; and
- shut down water supply/disposal systems.

Knowledge of:

- Correct operations of water disposal and waste systems

Range statement

Aquiculture systems may include:

- Canals or trenches (earthen-, concrete- or plastic-lined)
- Channels
- Intake-structure support screens
- Roaded banks
- Spill ways/outlets and siphons

System components may include:

- Bores
- Depth gauges
- Filters, float switches, flow meters,
- Header tank, hoses
- Mechanical, chemical or biological treatment structures and flow-control devices (taps, valves, float valves, monks, dykes, weirs, gates)
- Non-return mechanisms
- Outlet screens
- Pipes (metal, PVC, rubber, concrete or polyethylene/polypropylene)
- Pressure gauges, pressure or sewage-rating sumps, pumps
- Reducing-diameter pipes
- Sediment dams, settlement tank, sieves, solenoids, sprays, storage dams or reservoirs
- Windmills

Basic **tools and equipment:**

- Cleaning rags
- Grease gun
- Hack saw
- Heat guns
- Plumber's tape
- Screwdrivers
- Spanners or socket sets

- Spare parts
- Stilson wrench
- Threads

Repair materials may include:

- Fibreglass
- Fibreglass webbing
- Gels
- Glue
- Gravel
- Hardeners
- Pipe lengths
- Pipe saddles or clamps
- Primer
- Protection strips
- Reducers
- Sand
- Silicone or similar sealant
- Unions

Mechanical equipment may include:

- Aerator
- Centrifugal drive
- Filtration plant (including mechanical, chemical and biological)
- Magnetic drive
- Pressure or submersible pumps, which may be powered by:
    - Battery
    - Cable
    - Diesel
    - Electricity (single or three-phase)
    - Hydraulics
    - Petrol
    - Solar
    - Wind

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-H2 Collect broodstock

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Collect broodstock**
Unit code	**AA-H2**

Description

This unit of competency describes the outcomes required to collect and prepare broodstock for hatchery production.

Elements of competency	**Performance criteria**
1. Prepare for collection	1.1 Required collection **equipment** is obtained and checked for serviceability according to manufacturer guidelines.
	1.2 Broodstock unit is prepared to ensure clean, disinfected and functional conditions for hatchery production, according to workplace guidelines.
2. Collect and transport stock	2.1 Broodstock is collected and graded according to **quality and quantity requirements** as identified in workplace requirements.
	2.2 Broodstock is handled and transported to the farm in a manner which minimises stress or damage.
	2.3 Broodstock is transferred into culture or holding structures.
	2.4 **Treatments** are applied to spawning tanks containing selected broodstock, in accordance with the workplace procedures.
3. Monitor spawning tanks	3.1 Spawning tanks are monitored regularly for signs of imminent spawning.
	3.2 The environment is monitored and controlled for successful spawning, in accordance with the needs of the species and workplace procedures.
	3.3 Spawn are collected, washed and counted and assessed for quality of eggs and sperm.
	3.4 Eggs are fertilized, if appropriate.
	3.5 **Post-spawning husbandry practices** are applied, as required.
	3.6 Fertilized and hatched eggs are cared for according to biological requirements.
	3.7 **Progeny** are regularly monitored to ensure that individual needs are met by appropriate post-hatch-rearing procedures.
	3.8 Stock is graded, sorted and transported to new culture according to workplace procedures.
4. Complete post-collection/post spawning activities	4.1 Clean-up activities are undertaken in accordance with workplace procedures.
	4.2 Tools and equipment used are cleaned, maintained and stored according to workplace specifications.

4.3 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.

4.4 Records of activities are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- collect, transport and hold broodstock and seedstock according to collection requirements;
- follow supervisor's instructions; and
- minimise stress and damage to stock.

Critical skills and essential knowledge

The ability to:

- providing oral reports to supervisor on operation irregularities; and
- recognise normal and abnormal stock behaviour.

Knowledge of:

- Behaviour of stock in relation to the collection of broodstock and seedstock from the wild
- Causes of stress and damage in stock and methods to overcome these
- Collection, transport and holding equipment operating methods, maintenance and repairs
- Effects of water and weather conditions on stock
- Maintaining and repairing collection, transport and holding equipment
- Operating collection, transport and holding equipment
- Work procedures for collecting broodstock and seedstock

Range statement

Equipment may include:

- Anaesthetics, syringes, darts, guns and restraints
- Bait, burley and attractants
- Bins
- Bivalve seed collectors:
  - Christmas tree rope
  - Mesh bags
  - Racks, sticks, tubes and slats
- Buckets
- Diving equipment (e.g. breath holding or compressed air)
- Harvesting equipment:
  - Crowd nets and fish pumps or brails
  - Dilly nets, drop nets, scoop nets, trawl/prawn nets, cast nets, gill nets, traps (e.g. bait and opera house traps), wing nets and snares
  - Dredges
  - Electrofishers
  - Flow traps
  - Hand lines and fishing lines
  - Hides or substrate (used with dip nets)
  - Traditional fishing equipment
- Holding and transport equipment
- Oxygen supply
- Tanks
- Transport water and treatment equipment

- Troughs

Quality requirements may include:
- Colour and appendages
- Disease history
- Health and activity status
- Life-cycle stage
- Physical appearance
- Previous reproductive performance
- Sex
- Size
- Spawning condition
- Wild caught or cultured stock

Quantity requirements may include:
- Density
- Number
- Volume
- Weight

Treatments may be applied to:
- Advance maturation
- Condition the broodstock
- Induce spawning

Post-spawning husbandry practices may include:
- Changing water
- Counting density
- Culling of dead or non-viable individuals
- Feeding
- Grading or sorting
- Maintaining culture environment within accepted parameters
- Sampling
- Taking visual observations,
- Transferring to a clean or larger culture structure
- Treating by medication or prophylaxis
- Weighing and measuring

Progeny may include:
- Aquatic plants or micro-algal cells
- Buds
- Crustacean post-larvae or juveniles
- Finfish eyed eggs
- Fingerlings
- Fry
- Hatchlings or juveniles
- Mollusc larvae
- Polyp colonies
- Seed
- Seedlings
- Smolts or juveniles
- Spat or juveniles
- Sporophytes

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-H4 Handle aquaculture stock

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Handle aquaculture stock**
Unit code	**AA-H3**

Description

This unit of competency describes the outcomes required to safely handle, clean, move and grade aquaculture stock.

Elements of competency	**Performance criteria**
1. Prepare for handling stock .	1.1 Instructions are obtained from the supervisor on the handling schedule of **stock**, and any clarification needed is sought.
	1.2 Planning for handling, relevant to the type and species of stock, is undertaken to determine timing of handling, **quantities** to be handled, **pre-handling** activities and destination of handled stock.
	1.3 **Equipment** and materials are selected and checked for serviceability according to the manufacturers' instructions.
	1.4 Basic repairs and calibrations are made to equipment as required and in accordance with to manufacturer instructions.
	1.5 **Water quality** and weather conditions that could adversely impact on stock wellbeing or handling are noted and problem issues reported to the supervisor.
	1.6 Culture or holding structures or systems, or other, equipment identified for stocking are prepared to meet the water quality and rearing conditions required by the incoming stock.
	1.7 A route is selected for stock to be moved that is appropriate for ease of access, safety of workers and minimal risk of stress and damage to stock.
2. Handle stock	2.1 Stock is identified, retrieved and isolated and behaviour anticipated and controlled and appropriate safety measures taken for dangerous stock.
	2.2 Stock is handled as instructed by the supervisor and in a manner that minimizes stock stress and damage.
	2.3 **Cleaning** is carried out for molluscs by hand, causing minimum damage to stock.
	2.4 **Stock** are returned original culture structure or introduced to a new culture structure or holding culture or other equipment, after acclimatising them if appropriate.
	2.5 Stock is observed for abnormal activities or post-**handling** mortalities and reported to the supervisor.
3. Complete activities	3.1 Work area is cleaned up and tools and equipment are cleaned, inspected, maintained or repaired, and returned to storage according to the workplace procedures.

3.2 All required records, including handling data and observations are completed accurately and according to the workplace procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- handle stock with minimum risk of stress and injury to stock, according to instructions; and
- recognise a range of stock types and groupings.

Critical skills and essential knowledge

The ability to:

- correct handling for dangerous species;
- count, weigh and measure stock and containers;
- maintain and repairing basic handling equipment; and
- recognize normal and abnormal stock behaviour.

Knowledge of:

- Basic stock behaviour and biological requirements as they relate to stock handling activities
- Effects of handling on stock
- Effects of water and weather conditions on stock
- Handling equipment maintenance and basic repairs
- Handling techniques
- Life cycles of species as they relate to stock handling activities
- Operation and maintenance of equipment
- Stock type and groupings.

Range statement

Aquaculture **stock** may include**:**

- Adults
- Aquatic plants
- Broodstock
- Crustaceans
- Finfish (including ornamentals)
- Fingerlings
- Fry
- Grow-out animals and plants
- Hatchery/nursery-produced animals and plants
- Hatchlings
- Juveniles
- Larvae
- Microalgae
- Miscellaneous aquatic invertebrates (such as sponges, wild-caught animals and plants)
- Molluscs
- Seed
- Seedling
- Smolt
- Spat
- Sporophytes
- Yearlings

Quantities may include:

- Number
- Volume
- Weight

Pre-handling activities may include:

- Anaesthesia
- Purging

Equipment may include:

- Aerators and other water-treating equipment
- Boxes or bags, buckets or pails
- Cages, cleaning equipment, counters, culture structures/work
- Fish pump
- Graders
- Measuring equipment
- Nets
- Scales, scoops, swim way
- Tanks, traps

Water quality may include:

- Dissolved oxygen
- Hardness
- pH level
- Salinity
- Temperature

Hand **cleaning** may include:

- Chipping and scrubbing using hoses, sprays
- Gloves, chisels, brushes, knives
- Water

Stock handling purposes may include:

- Acclimating them as appropriate to the temperature, pH level, hardness and salinity, if appropriate
- Assessing the number, volume or weight
- Counting by hand or hand-operated or electronic machines (videos, sensors)
- Weighing and measuring

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-H5 Feed aquaculture stock

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Feed aquaculture stock**
Unit code	**AA-H5**

Description

This unit of competency describes the outcomes required to prepare natural, formulated or live feed to feed a range of common aquaculture stock.

Elements of competency	**Performance criteria**
1. Prepare for feeding	1.1 The **feeding schedule** is obtained and confirmed with the supervisor.
	1.2 Required feeding equipment is obtained and checked for serviceability according to manufacturer instructions.
	1.3 Basic repairs and calibrations are made to equipment, according to the manufacturers' instructions.
	1.4 Required quality and quantity of feed is collected and loaded into feed hopper or container.
	1.5 Data or record sheets/books are collected for use.
2. Feed stock	2.1 **Culture or holding structure** due to receive feed is identified and confirmed.
	2.2 For set feed, **feed** is distributed in accordance with feeding schedule, and feed trays checked to determine the next feeding level.
	2.3 For satiation feed, stock response is noted and feeding continued until feed response is observed to slow down.
	2.4 Stock behaviour is observed and recorded and any abnormal activity reported to the supervisor.
	2.5 Unused food is checked and returned to storage containers.
3. Perform follow up and clean-up activities	3.1 Work area is cleaned up and tools and **equipment** are cleaned, inspected, maintained or repaired, and returned to storage according to the workplace procedures.
	3.2 All required records are completed according to the workplace procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- feed stock by hand or using mechanical devices;
- interpret and follow feeding schedule; and
- make and record observations about stock behaviour during feeding.

Critical skills and essential knowledge

The ability to:

- maintain and repair basic feeding equipment;
- operate basic feeding equipment; and
- recognise normal and abnormal stock behaviour and environmental conditions.

Knowledge of:

- Basic stock feeding behaviour
- Effects of feeding on stock
- Effects of water and atmospheric conditions on stock feeding behaviour
- Estimate percentage of feed consumed, calculate time between feedings and count number of feeds taken
- Feeding equipment, maintenance and basic repairs
- Feeding techniques
- Handling equipment calibration and operating methods
- Meanings of ratios, metric units and the concept of percentages
- Operation and maintenance of automatic or mechanised equipment
- Storage of feed to maintain quality and minimise pest infestation, including rotation of feed bags, climate control and pest-proofing.

Range statement

Feeding schedule may include:

- Any specific requirements, such as:
- Culture stock and culture or holding structure to be fed
- Feed types and location of stores
- Feeding method and equipment requirements
- Feeding trays
- Frequency (e.g. times per day/per hour)
- **Nutriments** and natural sources of nutriments and food
- Observations to be made
- Period over which feeding is to be carried out
- Quantities (e.g. weight and volume)
- Special care or feeding techniques
- Time at which feeding is to be carried out

Culture or holding structures may include:

- Cages, pontoons, enclosures and pens
- Dams, ponds and pools
- Display tanks, glass aquariums
- Grow out facilities, hatcheries and nurseries
- Grow-out facilities
- Harvesting swimways, canals or channels
- Hatcheries and nurseries
- Live holding tanks, bins, cages and pens
- Longlines, posts, racks and rails, rafts, trays, fences, baskets
- Open, flow-through, closed and semi-closed systems

Feed may include:

- Broths or emulsions
- Flakes
- Live (algae, brine shrimp, copepods, insects and other invertebrates, nematodes, polychaetes, rotifers, zooplankton)
- Moist, semi-moist or dry
- Natural or formulated (e.g. artificial or man-made)
- Pellets, powders, crumbles or granules
- Plants (aquatic, micro-algae, seaweed)

Equipment may include:

- Belt
- Buckets or bags and scoops
- Clock
- Demand
- Mechanized (belt, blower, clock, demand, smart, spinner)
- Mechanized blowers
- Smart hoppers
- Spinner
- Trays

Nutriments may include:

- Enrichment formulae
- Feeds (e.g. micro-algae, pellets, powders and emulsions)
- Green water
- Nutrients, fertilisers or other chemicals.

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-H6 Control aquaculture pests and disease

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Control aquaculture pests and disease**
Unit code	**AA-H6**

Description

This unit of competency describes the outcomes required to construct, check and maintain predator- and pest-control structures and equipment.

Elements of competency	**Performance criteria**
1. Prepare for pest control	1.1 Behaviour and intensity of **pests**, predators and **disease** including any abnormal behaviour in stock, is noted and reported to the supervisor.
	1.2 Appropriate personal protective clothing and is equipment selected, maintained and used in accordance with the safety requirements and workplace procedures.
	1.3 Assistance with erecting or installing **control structures and equipment** is given.
	1.4 Regular inspections on control structures and equipment are carried out and major problems reported to supervisor.
	1.5 **Basic repairs** and **maintenance** are carried out, according to safety requirements and workplace procedures.
2. Pest control measures are taken	2.1 Predator wildlife is relocated safely.
	2.2 Vegetation or other materials that can harbour or shelter pests and predators is cleared and removed.
	2.3 Stock is monitored and any unusual stock **behaviour** to the supervisor.
	2.4 Assist with the preparation of disease **treatments** as directed and according to workplace procedures and safety requirements for handling chemicals and disposing of **waste**.
	2.5 Observations are made on stock following treatment and reported to supervisor.
	2.6 Work practices employed minimize stock stress or damage.
3. Perform follow up and clean-up activities	3.1 Tools and equipment used are cleaned, maintained and stored according to workplace specifications.
	3.2 Damaged or faulty equipment is repaired on site or workplace procedures for repair are followed.
	3.3 Records of activities and data are completed according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- assist with the construction or erection, and maintenance of predator and pest control structures and equipment;
- assist with the **control and treatment** of disease;
- recognise and report actual and potential disease problems; and
- recognise and report actual and potential predator and pest problems.

Critical skills and essential knowledge

The ability to:

- operate, repair and maintain disease control structures and treatment equipment;
- recognise normal and gross abnormal stock behaviour; and
- undertake disease treatment.

Knowledge of:

- Disease control structures and treatment equipment options
- Gross signs/symptoms of common diseases of cultured or held stock
- Hygiene risks associated with diseases (zoonoses)
- Normal behaviour of stock
- **Potential effects** on cultured or held stock
- Predator and pest control information
- Safe use of chemicals

Range statement

Pests may include:

- Airborne
- Amphibians, teleosts, reptiles, birds, elasmobranch and mammals
- Competitors for food, space, shelter and oxygen
- Fouling organisms
- Human (e.g. poachers)
- Plants (weeds), seaweed and micro-algae
- Starfish, crustaceans, molluscs, insects and other invertebrates
- Terrestrial or water based

Diseases may be caused by:

- Bacteria, fungi, worms, vibrios, crustacean or parasitic molluscs
- Environmental issues, such as poor water quality or contaminants (e.g. chemicals)
- Nutritional issues (e.g. feed contaminants, quality and quantity)
- Toxicants (chemicals) or toxins of biological origin (toxic algae)

Control structures and equipment may include:

- Acoustic deterrents (gas gun, electronic, firecrackers)
- Biological controls (cleaner fish, predator species)
- Cages
- Exclusion nets
- Netting and fences
- Overflow barriers
- Poisons and chemicals (pesticides, herbicides or anti-foulants)
- Screens on inlets and outlets
- Shelters and habitat

- Traps
- Visual deterrents (scarecrows, floodlights)

Basic repairs or **maintenance** may include:

- Mending screens, nets and fencing
- Replacing broken or unserviceable traps, shelters, habitats, scarecrows and lights

Behaviour traits may include:

- Day or night time activity
- Entry and exit into culture or holding structures
- Feeding or attack methods
- Infection pathways
- Location and hunting methods
- Seasonal activity
- Size of prey targeted
- Size or age of stock affected
- Solitary or groups

Wastes may include:

- Biohazard wastes (e.g. moribund animals, hormones and chemicals)
- From predator and pest control structures
- Nutrient-rich water and sediments
- Uneaten food and settled solids

Control and treatment may include:

- Appropriate nutritional programme and additional vitamins
- Biological control (e.g. cleaner fish)
- Chemical barriers (e.g. foot baths)
- Deprivation or purging
- Disinfection of equipment
- Freshwater, saltwater or chemical baths
- Filtration, ozonation or water treatment
- Medication in food
- Probiotics and other chemicals (e.g. pesticides, herbicides and algaecides)
- Prophylactic treatments of probiotics
- Provide cover, hides, shelters and habitat
- Reduce stress
- Replace susceptible species/variety with resistant species/variety
- Vaccination or inoculation:
    - Medicated feeds
    - Syringes, drippers and other application equipment
- Water quality optimisation

Potential effects may include:

- Increased avoidance activity
- Increased stress
- Loss/escape of stock
- Mortalities
- Reduced breeding
- Reduced feeding
- Reduced growth rates
- Transfer of disease or pathogens

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-H7 Harvest aquaculture stock

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Harvest aquaculture stock**
Unit code	**AA-H7**

Description

This unit of competency covers the process required to harvest, sort, grade and transport aquaculture stock.

Elements of competency	**Performance criteria**
1. Prepare to **harvest stock**	1.1 Requirements of the **harvest schedule** and quantities to be harvested are confirmed with supervisor.
	1.2 Required harvesting equipment is obtained, checked for serviceability in accordance with workplace procedures.
	1.3 **Equipment** is moved to site, move equipment to site; positioned in relation to **culture or holding structures or systems**, and made ready for use.
	1.4 Prepare transport and **holding equipment**, and **post-harvest facilities.**
2. Carry out harvest	2.1 Stock are identified, retrieved and isolated, and appropriate safety measures taken for identified **dangerous stock**.
	2.2 Behaviour of stock is observed and non-standard activity reported to the supervisor.
	2.3 Water and weather conditions that could adversely impact the harvest or well-being of stock are noted, and changes reported to the supervisor.
	2.4 Stock are removed from water and placed in holding containers or transport equipment.
	2.5 Grading and counting of stock is conducted based on the **quality parameters** of the harvest schedule or supervisor's instructions.
	2.6 Handling practices used minimize damage or stress to stock.
3. Complete **post-harvest** activities	3.1 Work area is cleaned and tools and equipment cleaned, inspected, maintained and returned to storage.
	3.2 Records of harvesting data, observations or information are completed accurately and promptly, and according to required work standards and procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- harvest stock according to harvest schedule, supervisor's instructions and with minimal risk of stock stress or damage.

Critical skills and essential knowledge

The ability to:

- operate basic harvesting equipment;
- harvest stock with minimal damage or stress to fish; and
- recognize normal and abnormal stock behavior.

Knowledge of:

- Behaviour of stock as it relates to harvest
- Effects of water and weather conditions on stock
- Maintaining and repairing basic harvesting equipment
- Normal and abnormal stock behaviour
- Operation and maintenance of harvest equipment
- Stock handling methods
- Work procedures for handling stock.

Range statement

Aquaculture stock may include:

- Finfish, crustaceans, molluscs, miscellaneous aquatic invertebrates, microalgae, seaweeds and aquatic plants as well as adults, larvae, juveniles, seeds, spat, broodstock and hatchlings

Harvest may include

- Drain harvests (stock may be picked up from the pond/tank or collected from the effluent)
- Fish pumps
- Full or partial
- Netting or lining (e.g. handlines or rods)
- Sieves or bags
- Trap harvesting

Harvest stock methods may include:

- By drain harvests (stock picked up from the pond or collected from the effluent)
- Fish pumps, sieves or bags
- Netting or lining (hand lines or rods)
- Trap harvesting

Harvest schedule may include:

- Cultured stock to be harvested
- Destination of harvested stock
- Equipment required for harvest operations
- Period over which harvest is to be carried out
- Quantities and specific quality parameters of stock
- Time at which harvest is to be carried out
- Work team members to be involved

Equipment may include:

- A dilly net, drop net, scoop net, trawl/prawn net, cast net, crowd net, gill net, wing net, traps (bait traps), flow traps, hand line, fishing line, fish pumps or brails

- Substrate and hides

Culture or holding structures or systems may include:

- Blowers, aerators, paddlewheels and aspirators
- Cages, pontoons, enclosures and pens, including associated moorings, anchors, floats and markers
- Dams, ponds and pools
- Display tanks, aquaria and aquascapes
- Greenhouses, hothouses and igloos
- Grow out facilities, hatcheries and nurseries
- Harvesting swimways, canals or channels
- Live holding tanks, bins, cages and pens
- Longlines, posts, racks and rails, rafts, fences, socks, trays, sticks, baskets, modules, barrels, bags and panels
- Open, flow-through, closed and semi-closed systems
- Pest, predator and disease control structures
- Purging or depurating systems
- Tanks, raceways and recirculating systems
- Water supply and disposal or effluent systems, including pumps, pipes, canals, channels, settlement ponds and storage dams

Holding equipment may include:

- Buckets, bins, troughs, tanks, trays, baskets, bags, bait and attractants

Post-harvest facilities may include**:**

- Cooking
- Holding, depurating or purging
- Packing
- Processing, including shucking molluscs, gill-gutting and bleeding, scaling or cleaning and icing or temperature manipulation
- Sedation, including ice, carbon dioxide or anaesthetics
- Slaughtering
- Sorting or grading

Dangerous stock may include:

- Stock with spikes, spines and teeth or poisonous molluscs

Quality parameters may include:

- Body condition (including fat content and meat yield)
- Maturation condition
- Physical appearance
- Sex
- Shape and colour
- Size
- Type and extent of external damage
- Weight

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

AA-H Prepare aquaculture stock for live transport

Unit details	
Functional area H	**Aquaculture tanks and systems**
Unit title	**Prepare aquaculture stock for live transport**
Unit code	**AA-H8**

Description

This unit of competency describes the outcomes required to select and treat and prepare aquaculture stock for live transport.

Elements of competency	**Performance criteria**
1. Prepare for livestock **transport**	1.1 Workplace is cleaned before commencement.
	1.2 Packing containers and other **equipment** for are gathered and checked for serviceability.
	1.3 Packaging materials and water, if needed, are prepared and containers appropriately lined.
	1.4 Appropriate quality and quantity of transport water or substrate is added.
2. Check and prepare stock for transport	2.1 **Stock** is checked against **order specifications** and weighed or counted and data recorded.
	2.2 Stock is inspected for signs of damage, disease, illness or parasites with set aside and supervisor notified.
	2.3 Stock is moved to the **preparation container** in a way that minimizes stress.
	2.4 **Transport** treatments are applied to stock in preparation container.
	2.5 Stock behaviour is observed and any abnormalities notified to supervisor.
	2.6 Air is expelled and oxygen added to the required level.
	2.7 Cooling or heating or anaesthetics and water conditioner are applied as required.
3. Dispatch live stock	3.1 **Water quality** and **environmental conditions** and stock condition are monitored adjusted as needed to keep stock alive in transit.
	3.2 Packing containers are sealed according to regulations and workplace procedures.
	3.3 Containers are clearly and correctly labeled on the outside.
	3.4 Containers are taken to loading bay for dispatch and checks made to ensure all back-up equipment and adequate spares on the transporter.

4. Perform follow up and clean-up activities	4.1 Work area is cleaned up and tools and equipment are cleaned, inspected, maintained or repaired, and returned to storage according to the workplace procedures. 4.2 All required records and data and observations are completed legibly, accurately and promptly, according to the workplace procedures.

Evidence guide

To demonstrate competency in this unit the candidate must meet performance criteria and skills and knowledge requirements. The candidate must be able to:

- prepare, treat and pack live stock for transport in a manner that takes into account order specifications and species' requirements whilst in transport; and
- recognise dying seafood.

Critical skills and essential knowledge

The ability to:

- assess seafood quality; and
- identify species

Knowledge of:

- Handling of live stock
- Local and export regulations with respect to packing live stock
- Species' requirements for travel including:
  - Air or dissolved oxygen
  - Humidity
  - Light
  - Moisture
  - Substrate
  - Temperature
  - Water (some species may be transported dry)

Range statement

Preparation for **transport** may include:

- Addition of anaesthetics, water conditioners, probiotics, Vitamin C or antibiotics
- Lowering of ambient or water temperature
- Prophylactic treatment for removal of parasites
- Purging (holding in clean water whilst digestive tracts are emptied)
- Quarantine

Transport treatments may include:

- Anaesthetics, water conditioners or antibiotics as required
- And/or a heating device (such as a bag of warm water or a heated thermo-freeze pack and water)
- Cooling device, which can be a thermo-freeze pack, ice bottle, oxygen supply or air stone (oxygen cylinders, tablet and generator, transport water or a substrate such as plastic mesh, coconut fibre, sawdust, paper cuttings or cotton wool)
- Prophylactic treatment for removal of parasites, quarantine and lowering of water temperature
- Purging (holding in clean water while digestive tracts are emptied)

Equipment may include:

- Activated carbon or zeolites additives for transport water
- Addition of water conditioners or antibiotics to transport water

- Bubble wrap and cling wrap
- Cardboard box and outer coverings
- Cardboard boxes
- Container divisions that separate stock
- Container divisions that separate stock
- Cooling device, such as thermofreeze pack or ice bottle
- Fish bin
- Fish transporter, including backup equipment
- Foam boxes
- Foam lining
- Heating device, such as bag of warm water or heated thermofreeze pack
- Insulation cover
- Jute or woven shellfish bag
- Liners and ties
- Oxygen supply, such as oxygen cylinder, air stone, tablet and generator
- Plastic bags
- Plastic bags and liners
- Polystyrene foam box
- Spare parts and equipment
- Substrate, such as plastic mesh, coconut fibre, sawdust, wood, wool, paper cuttings or cotton wool
- Tanker
- Tanker
- Ties, labels, rings and tape
- Transport water
- Waxed cardboard box

Stock may include:

- For live transport without water or supplementary oxygen:
  - Freshwater crayfish
  - Oysters mussels and other bivalves
  - Prawns
  - Rock lobsters
- Types for live transport in water:
  - Aquatic plants (cuttings or whole plants)
  - Broodstock
  - Fertilised eggs (usually fin fish)
  - Freshwater, brackish water and marine fin fish and other aquatic animals
  - Juveniles, including fry, fingerlings, smolt, seed, spat and hatchlings
  - Larvae fin fish, molluscs, crustaceans and other invertebrates
  - Micro-algae or live feeds
  - Ornamental and aquarium animals
  - Aquatic plants or seaweeds/macro-algae
  - Sub-adults and adults that are close to market size

Order specifications may include: appendage length, such as fins, legs, tails and claws-fin factor:

- Body shape
- Colour
- Conditions factor
- Numbers
- Packing and labelling instructions
- Quality
- Sex

- Size
- Species

Preparation container may include:

- Bin or bucket
- Flow through
- Glass aquaria
- Net, cage or pen
- Race way
- Recirculating
- Static tank

Water quality factors may include:

- Alkalinity
- Ammonia
- Carbon dioxide
- Dissolved oxygen
- Hardness
- Nitrate
- Nitrite
- PH
- Salinity
- Temperature
- Turbidity

Environmental conditions may include:

- Humidity
- Light
- Temperature

Competency may be assessed through a combination of:

- Practical exercises
- Written or oral short answer questions

Competency is to be assessed in the workplace or in simulated workplace environment.

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Regional Model Competency Standards: Agriculture and aquaculture

Agriculture and aquaculture provide jobs to tens of millions of people and support the livelihoods of hundreds of millions more. The skills development and recognition of workers in the two sectors are important.

To help accelerate the improvement of training systems and the mutual recognition of skills, the ILO has developed, in consultation with employers, governments and workers, Regional Model Competency Standards (RMCS). These have been developed in identified priority areas and are in a simplified format. The RMCS are intended to be a regional reference for developing competency standards for those countries that are in the process of creating standards, or reviewing existing national standards.

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