



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **FDFST4004A Perform microbiological procedures in the food industry**

**Release: 2**

## **FDFST4004A Perform microbiological procedures in the food industry**

### **Modification History**

April 2012: Minor typographical corrections.

### **Unit Descriptor**

This unit provides an introduction to food microbiology. It covers the skills and knowledge required to perform on-site microbiological laboratory techniques and to interpret the results.

### **Application of the Unit**

This unit applies to laboratory and senior technical staff, and production managers, who are required to monitor the microbiology of food and food processing operations. This unit does not require the performance of microbiological procedures in a NATA certified facility. However it does require the ability to perform on site tests required in a food processing enterprise, to interpret the results of testing as part of monitoring production processes, and to identify the need for certified laboratory testing.

### **Licensing/Regulatory Information**

Not applicable.

### **Pre-Requisites**

Not applicable.

### **Employability Skills Information**

This unit contains employability skills.

### **Elements and Performance Criteria Pre-Content**

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

| ELEMENT   | PERFORMANCE CRITERIA  |
|---|---|
| 1. Prepare for safe microbiological work using aseptic techniques                         | 1.1 Work area and equipment are selected for the safe handling of materials that may contain micro-organisms<br>1.2 Protective apparel is worn<br>1.3 Relevant emergency equipment is selected, for timely response to microbiological accidents<br>1.4 Correct disinfection procedures are applied to work areas before, and after use<br>1.5 Standard precautions, when handling biological materials, are applied<br>1.6 Relevant emergency equipment is selected, for timely response to microbiological accidents<br>1.7 Correct disinfection procedures are applied to work areas before, and after use |
| 2. Process microbiological samples and undertake microscopy                               | 2.1 Thin smears of samples for subsequent staining are prepared and stained<br>2.2 Liquid films of specimens, for direct observation, are prepared<br>2.3 Relevant samples are concentrated to facilitate microscopy<br>2.4 Stereo and compound microscopes are set up correctly, and causes of variations in image quality are identified<br>2.5 Microscopes are cleaned and stored according to procedures<br>2.6 Dry, wet and stained microbiological specimens are correctly examined   |
| 3. Apply aseptic techniques correctly to cultivate and isolate micro-organisms            | 3.1 Broths, slopes, and plates of typical media are prepared<br>3.2 Aseptic transfers of micro-organisms to prepared liquid and solid media are performed<br>3.3 Bacteria are streaked onto agar plates to isolate single colonies using aseptic technique<br>3.4 Temperature conditions and gaseous environments are selected which are suitable for the growth of a range of common micro-organisms   |
| 4. Estimate the number of micro-organisms in food and water samples                       | 4.1 Samples are prepared for testing<br>4.2 Serial dilutions are accurately and aseptically carried out<br>4.3 Bacterial growth in the sample is estimated and recorded<br>4.4 The bacterial load of the sample is calculated and the results reported  |
| 5. Perform and interpret tests to assist in the identification of common bacterial genera | 5.1 Tests are performed on pure cultures to assist in the identification of major bacterial groups<br>5.2 Pure cultures selected from common bacterial genera are prepared<br>5.3 Stained specimens are selected and prepared to demonstrate features and cellular characteristics of major bacterial groups  |
| 6. Apply quality  | 6.1 The controls used to monitor accuracy and precision of results in   |

| <b>ELEMENT</b>   | <b>PERFORMANCE CRITERIA</b>  |
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| assurance procedures commonly used in a food testing laboratory                  | a microbiological laboratory are applied<br>6.2 All tests are performed in accordance with enterprise quality procedures<br>6.3 All test data is recorded and reported in accordance with enterprise quality procedures  |
| 7. Interpret the results of laboratory testing and relate to the production plan | 7.1 Laboratory test results are accessed<br>7.2 Laboratory tests are compared to allowable variances and critical limits in production<br>7.3 Adjustments are made to recipes or operating procedures to ensure critical limits are complied with<br>7.4 The need for further certified testing is established |

## Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

### Required skills include:

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#### Ability to:

- identify types of animal, plant and microbial cells and their components and functions
- safely perform tasks for the isolation, identification and cultivation of microorganisms
- set up and use microscope slides and a microscope
- avoid contamination of self, other people, the work area, equipment or the samples under test
- avoid contamination of media or reagents during manipulations involving transfer of cultures
- identify artefact or image aberration attributable to misalignment or obstruction of light paths or condensers used in bright field, dark ground, or with other steps in microscopic examinations
- recognise the use of the Gram reaction in the identification of common types of bacteria
- accurately describe forms of bacterial colonies on common media used in bacteriological investigations in the food industry
- correctly and safely perform tests to assist in the identification of bacteria
- identify and correctly use methods for the control of growth of micro-organisms
- report all incidents or accidents
- disinfect any spillage and safely dispose of all contaminated materials
- decontaminate the work area upon completion of work
- ensure that quality assurance procedures, commonly used in a food testing laboratories, are used.

### Required knowledge includes:

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#### Knowledge of:

- physiological characteristics of animal, plant and microbial cells
- microbiological terminology
- use of protective clothing and biological safety cabinets
- disinfection and sterilisation as applied to practical aspects of microbiology
- microbial diversity and growth
- micro-organisms of significance in the production and spoilage of foods
- chemical and physical methods available for controlling microbial growth
- methods for sterilisation or control of a given micro-organism
- the Gram reaction in the identification of common types of bacteria
- advantages and disadvantages of the identified methods are established
- rationale for sample dilution when preparing materials for enumerating organisms and other pure culture work
- relevant health, safety and environment requirements.
- chemical and physical methods available for controlling microbial growth

- quality assurance procedures commonly used in a food testing laboratories.

## Evidence Guide

| <b>EVIDENCE GUIDE</b>  |  |
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| The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package. |  |
| Overview of assessment   | A person who demonstrates competency in this unit must be able to perform microbiological laboratory techniques that are relevant to food processing, with the use of appropriate equipment.   |
| Critical aspects for assessment and evidence required to demonstrate competency in this unit   | Critical aspects of assessment must include evidence of the ability to perform on site tests required in a food processing enterprise, to interpret the results of testing as part of monitoring production processes, and to identify the need for certified laboratory testing.  |
| Context of and specific resources for assessment   | <p>Assessment of performance requirements in this unit should be undertaken within the context of food technology. Competency is demonstrated by performance of all stated criteria, including the critical aspects and knowledge and skills elaborated in the Evidence Guide, and within the scope as defined by the Range Statements applicable to the workplace environment.</p> <p>Assessment must occur in a real or simulated workplace where the assessee has access to:</p> <ul style="list-style-type: none"> <li>• suitable laboratory equipment and a sufficient range of samples to allow microbiological procedures to be demonstrated</li> <li>• procedures and templates used to report relevant product/process information and recorded results.</li> </ul> |
| Method of assessment   | <p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> <li>• observation of candidate conducting a range of tests and procedures</li> <li>• written and/or oral questioning to assess knowledge of microbiology related to food processing</li> <li>• report including interpreting test results and making recommendations for production</li> <li>• completing workplace documentation</li> <li>• third party reports from experienced practitioner</li> <li>• field reports.</li> </ul>  |
| Guidance information for assessment  | Evidence should be gathered over a period of time in a   |

**EVIDENCE GUIDE**

range of actual or simulated environments.

**Range Statement****RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

**Policies and procedures**

- Codes of practice, regulations, Material Safety Data Sheets (MSDSs)
- AS/NZS 2243.3 - Safety in laboratories, Part 3: Microbiology
- Enterprise specific: Standard Operating Procedures(SOPs):
  - safety requirements for equipment, materials or products
  - cleaning, hygiene, personal hygiene requirements
  - incident and accident/injury reports
- Australian and international standards, including: Food Standards Code 2002 Australia New Zealand and amendments:
  - AS 2830 Good laboratory practice
  - AS/NZS 2243 Safety in Laboratories
  - AS/766 Food microbiology
  - Enterprise Standard Operating Procedures(SOPs)
  - Acts of Parliament

**Occupational health and safety requirements**

- Codes of practice
- Material Safety Data Sheet
- Enterprise specific.

**Regulations**

- Australian and international standards including:
  - professional association regulations
  - industry guidelines and codes of practice
  - industry regulations
  - Food Standards Code
  - ISO Standards



**RANGE STATEMENT**

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|  | <ul style="list-style-type: none"><li>• codex alimentarius</li><li>• Federal and state food regulations</li><li>• International, Australian and State EPA protocols and regulations regarding waste.</li></ul> |
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**Unit Sector(s)**

Technical.