NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0077686  
-Session- 1987-88  
-Superclass- WM  
-Title- CHEESE  

-DESCRIPTION-

Type and Purpose  
A specialist module which enables the student to acquire an understanding of the manufacture and quality control of cheese.

Preferred Entry Level  
61164 Quality Assurance Procedures  
69069 Biological Chemistry  
79080 Microbiology 1  
79081 Microbiology 2A  
79082 Microbiology 2B  
69200 Techniques in Food Microbiology

Learning Outcomes  
The student should:

1. know the basic stages in the production of Cheddar cheese and the influence of the various stages on cheese quality and yield;

2. know the classification of cheese and the main differences between the manufacture of Cheddar cheese and the main international cheese types;

3. know the design features and principles of operation of the equipment which is used in mechanised Cheddar cheesemaking and related process control;

4. know the effect of the ingredients and cheesemaking materials on the quality and yield of cheese;

5. know the characteristics of starter cultures and the factors which affect starter activity;

6. know the methods of production and equipment used in the preparation of starter cultures;
7. manufacture one cheese.
Safety and hygiene regulations and safe working practices and procedures should be observed at all times.

Corresponding to Learning Outcomes 1-7:

1. Manufacture of Cheddar cheese in relation to the following: Milk storage and pasteurisation; influence of storage and heat treatment on cheese quality and yield. Curd production; starter and coagulant action. Treatment of curds and whey; scalding, acid production, stirring; influence on quality and yield. Whey removal and cheddaring; influence of acid production on quality. Milling, salting and moulding or block forming; reasons for the operations and influence on quality. Packaging; materials and methods; influence on quality and yield. Ripening; purpose, factors which achieve cheese maturation, control of ripening processes, influence on quality.

2. Classification of main international cheese types: Cheddar, Cheshire, Swiss, Dutch, mould ripened, Cottage Feta, Mozzarella, soft and processed varieties. Main differences as observed by the consumer. Comparison of ingredients, and manufacturing methods for Cheddar cheese with those for Cheshire, Swiss, Dutch, mould-ripened, Cottage, soft and processed varieties. Salient features of production of these types of cheese. Influence of ingredients and manufacturing on characteristics of the selected cheese types. National and international importance of the different types.

3. Development of cheesemaking equipment. Mechanisation of Cheddar cheesemaking. Advantages of mechanisation. Design and operational principles of cheese vats, whey removal and cheddaring equipment, milling and salting appliances; pressing or mould forming equipment; packaging equipment; materials handling of finished product. Considerations in selection of cheesemaking equipment for various production levels.

Process control criteria for Cheddar cheese. Role of production and laboratory personnel in process control. Automation of process control.

5. Definition of starters for cheesemaking. Functions in cheesemaking. Classification of lactic acid bacteria used in cheesemaking. Criteria used in the selection of bacterial and microbial cultures for Cheddar, Cheshire, Cottage, Camembert and Caledonian Blue Cheese. Starter activity; acid production; test methods. Factors affecting starter activity; natural antimicrobial systems in milk; added antimicrobial substances, including residual antibiotics, in milk; incorrect propagation methods; influence of cheesemaking techniques. Control measures to avoid slow acid production. Investigation of occurrences of slow acid production.


7. Operation of pilot scale and minor production equipment for the production of Cheddar and other varieties - Cheshire, Cottage, Camembert, Caledonian Blue - to given specifications. Selection of detergents and sanitisers for cheesemaking equipment. Manual and CIP, cleaning and sanitation of equipment used in cheesemaking operations. Assessment of hygiene status of plant and equipment. Laboratory control tests related to cheese composition and quality grading of cheese.

Suggested Learning and Teaching Approaches

Related to the Learning Outcomes:

1-6 it is envisaged that the essential information would be acquired by the student in several ways: demonstrations, lectures, hand-outs, group discussions, industrial visits, slides, videos and films.
7. Working in a small group, the student should manufacture at least one of the stated varieties, undertake cleaning and sanitation of the appliances and equipment used. Working individually the student should undertake the following quality assurance procedures: swabs of the interior of milk pipelines, plugcocks and vat and other contact surfaces and related microbiological examination to determine hygiene status of surfaces with which cheese or its ingredients come into contact. Chemical tests: milk composition, moisture, fat and salt contents of cheese before packaging or during ripening, pH and titratable acidity during manufacturing process or on finished product. Phosphatase test on head-processed milk.

Microbiological tests: total viable count, coliforms and yeasts in cheesemilk and as appropriate on cheese sampled before packaging or during ripening. Miscellaneous tests: thermometer accuracy, temperatures during cheese manufacture.

Assessment Acceptable performance in the module will be satisfactory achievement of the performance criteria specified for each Learning Outcome.

Where cutting scores are stated these are intended to be guidance. The precise cutting score for a test will depend on the difficulty of the test and will have to be decided by the Tutor aided by the Assessor.

The following abbreviations are used below:

<table>
<thead>
<tr>
<th>Abbr.</th>
<th>Description</th>
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<tbody>
<tr>
<td>LO</td>
<td>Learning Outcome</td>
</tr>
<tr>
<td>IA</td>
<td>Instrument of Assessment</td>
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<tr>
<td>PC</td>
<td>Performance Criteria</td>
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<tr>
<td>LO1</td>
<td>Written exercise.</td>
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<tr>
<td>PC</td>
<td>The student should produce a detailed flow diagram of the manufacture of Cheddar Cheese. The flow diagram should indicate where the stages have significant effects on cheese quality and yield. Cutting score 70%.</td>
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<tr>
<td>LO2</td>
<td>Written exercise.</td>
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<td>PC</td>
<td>The student should:</td>
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<tr>
<td>(a)</td>
<td>prepare a classification sheet for 3 varieties of cheese based on firmness of the cheese, internal and external appearance and texture characteristics and nature and extend of ripening;</td>
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</table>
(b) indicate the main manufacturing differences between Cheddar Cheese and Cheshire, Swiss, Dutch, mould ripened, Cottage Feta, Mozzarella, Soft and processed varieties in a tabular form. The table should include ingredients, microbial cultures required to produce specific characteristics, special process requirements, ripening process.

Cutting score 70%.

LO3 IA Written report of approximately 500 words.

PC The student should describe one commercial system of mechanised Cheddar cheese making and indicate the important features of at least one other commercial equipment. The report should cover equipment, including design features and principles of operation, used for all stages from curd production to ripening and include developments on automatic process control.

Cutting score 70%.

LO4 IA Written report.

PC The student should prepare a chart to summarise the main effects of ingredients on the quality and yield of cheese. The chart should include the effect of milk type, heat treatment and quality, starter type and quality, coagulant type, amount of annatto, amount of salt, packaging material.

LO5 IA Written exercise.

PC The student should:

(a) state the characteristics and functions of the micro-organisms used in the manufacture of Cheddar, Cheshire, Camembert and Caledonian Blue cheese.

(b) prepare an operation chart indicating how the quality assurance team would endeavour to ensure satisfactory culture activity bearing in mind the factors which effect the chosen micro-organisms.

LO6 IA Graphics exercise.

PC The student should:

(a) prepare a diagram to illustrate the forms of starter available to the cheesemaker and the operations required in the cheese factory before use. The diagram should include an illustration of procedure for the transfer of starters.
(b) prepare a diagram of a bulk starter vessel indicating features which provide protection of the culture during its presentation.

LO7 IA (a) Observation of practical work recorded on a checklist and completed progress record. The practical work will involve the manufacture of one cheese as a member of a team.

PC The student should:

(i) manufacture a minimum of 200 litres of one type of cheese to a commercial specification.

(ii) detail all manufacturing details, test results, quantity and yield data on the progress record.

(iii) undertake appropriate cleaning and sanitation of appliances and equipment;

(iv) use equipment and appliances safely and hygienically and comply with technical aspects of cheesemaking process and laboratory method.

IA (b) Oral questions.

PC The student should be able to identify major variations from normal process conditions and predict the possible effects of these variations on cheese quality and yield.