



Higher National Unit specification

General information for centres

Unit title: Food Manufacture: Technology of Milk and Dairy Products

Unit code: F8M6 35

Unit purpose: This Unit is designed to enable candidates to perform and evaluate manufacturing methods and processes used in the manufacture of milk and dairy products. The evaluation covers specific manufacturing operations as well as the factors which influence manufacturing methods in this sector and the relationship between manufacturing operations and other aspects of the food supply chain such as packaging. Candidates will also develop practical skills in milk and dairy technology.

On completion of the Unit the candidate should be able to:

- 1 Assess the factors which influence manufacturing operations in the milk and dairy sector
- 2 Evaluate methods and processes used in the manufacture of milk and dairy products

Credit points and level: 1 HN credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre. However, it would be beneficial if candidates had some background in the principles of food manufacturing and in the food industry as a whole. This could be demonstrated by relevant practical experience or the achievement of relevant Units at SCQF Level 7, such as:

- ◆ F6VM 34 *Food Industry Principles: An Introduction*
- ◆ F6VE 34 *Food Industry Practices: An Introduction*
- ◆ F6VG 34 *Food Manufacturing: Processing Practices at Ambient Temperatures*
- ◆ F6VJ 34 *Food Manufacturing: Processing Practices at Sub-Ambient Temperatures*
- ◆ F6VH 34 *Food Manufacturing: Processing Practices at Elevated Temperatures*

In addition, it would be helpful if candidates had some awareness of factors in the food industry closely related to manufacturing methods such as quality assurance and packaging. This could be demonstrated by relevant practical experience or the achievement of HN Units such as:

- ◆ F8L6 35 *Food Manufacturing: Post Manufacturing Processes within the Food Chain*
- ◆ F8L8 35 *Food Quality Management*

Core Skills: There are opportunities to develop the following Core Skills components in this Unit: *Communication* (Written Communication) at SCQF level 6; *Problem Solving* (Critical Thinking) at SCQF level 6; *Problem Solving* (Reviewing and Evaluating) at SCQF level 6. There is no automatic certification of these Core Skills components.

Higher National Unit specification: General information for centres (cont)

Unit title: Food Manufacture: Technology of Milk and Dairy Products

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: Assessment of this Unit can take a variety of forms. For example, it could be achieved through a report or a combination of a report and other forms of presentation such as the use of presentation software. Assessment of both Outcomes could be combined into a single report, presentation or portfolio.

Higher National Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Please refer to *Knowledge and/or Skills for the Unit* and *Evidence Requirements for the Unit* after the Outcomes.

Outcome 1

Assess the factors which influence manufacturing operations in the milk and dairy sector

Knowledge and/or Skills

- ◆ Characteristics of milk
- ◆ Ethical, legal and consumer factors

Outcome 2

Evaluate methods and processes used in the manufacture of milk and dairy products

Knowledge and/or Skills

- ◆ Manufacturing techniques
- ◆ Quality management
- ◆ Packaging

Evidence Requirements for the Unit

Candidates will need to provide evidence to meet all the Knowledge and/or Skills items by showing that they can:

- 1 assess the factors which influence manufacturing operations in the milk and dairy sector of the food industry. The assessment should include the following:
 - ◆ an explanation of three different characteristics of milk supported by valid reasons to explain the impact that these characteristics have on manufacturing operations in the milk and dairy sector
 - ◆ valid reasons to demonstrate the impact that ethical, legal and consumer factors have on manufacturing methods used in the sector. References to legislation should be accurate and current; ethical factors should reflect issues with which the sector is currently engaged; consumer factors should be backed up by accurate and current information on consumer attitudes and preferences.

Higher National Unit specification: statement of standards (cont)

Unit title: Food Manufacture: Technology of Milk and Dairy Products

- 2 evaluate the methods and processes used in the manufacture of three different dairy products: for each product the evaluation should include the following:
- ◆ an explanation of the manufacturing techniques used to manufacture the product supported by a reasoned commentary on the extent to which each technique is suitable for the manufacture of the product. The assessment of suitability should make reference to safety and hygiene as well as to advantages and disadvantages associated with the technique.
 - ◆ valid reasons to justify the main methods used to assure the quality of each product and a reasoned commentary on the extent to which they are efficient and effective in assuring quality
 - ◆ valid reasons to justify the effectiveness of the packaging used for the product which include an explanation of the way in which the packaging is affected by the manufacturing methods used for the product and explain the impact that manufacturing operations have on the packaging of the product

For both items 1 and 2, candidates should refer to specific examples of manufacturing operations and products from organisations in the milk and dairy sector.

As part of their evaluation of manufacturing techniques in item 2, candidates should perform two different manufacturing techniques used in the milk and dairy sector. They should prepare and set up equipment in an appropriate manner in each case and carry out the activity in accordance with prevailing safety and hygiene requirements. To ensure that candidates meet these requirements, they should be observed on all occasions. A record should be kept of each observation. Candidates should also keep records of the results of each practical activity.

Assessment Guidelines for the Unit

Candidates could present evidence of their evaluations in a number of ways. This could be a short report, a poster presentation or use of presentation software. Candidates could be given questions and could present their work as responses to these questions. Assessment for both Outcomes can be combined into a single report or presentation.

Alternatively, candidates could group their evidence into a portfolio which covers all aspects of both Outcomes. Overall the portfolio would cover several items of evidence which can be synthesised into an overall evaluation of the manufacturing operations in the milk and dairy sector and the factors which influence them. Observation sheets of the practical activity could be incorporated into the portfolio.

Administrative Information

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Unit title:	Food Manufacture: Technology of Milk and Dairy Products
Superclass category:	WM
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History of changes:

Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title: Food Manufacture: Technology of Milk and Dairy Products

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit is designed to enable candidates to perform and evaluate manufacturing methods and processes used in the manufacture of milk and dairy products. It includes an assessment of specific manufacturing operations as well as the factors which influence manufacturing methods in this sector. It also covers the links between manufacturing operations and other aspects of the food supply chain such as packaging. In addition, candidates will perform practical work.

It is one of several Units which allow candidates to examine a particular sector of the food industry. Related Units include:

- ◆ (F8M8 35) *Food Manufacture: Beverages Technology*
- ◆ (F8M7 35) *Food Manufacture: Bakery Technology*
- ◆ (F8M9 35) *Food Manufacture: Technology of Meat and Fish Products*

All these Units are intended to enable candidates to apply their knowledge and understanding of the general principles food manufacturing in the context of a specific sector of the food industry. Candidates will, therefore, be able to draw on their practical experience or their work in the relevant Units in Food Manufacturing:

- ◆ F6VG 34 *Food Manufacturing: Processing Practices at Ambient Temperatures*
- ◆ F6VJ 34 *Food Manufacturing: Processing Practices at Sub-Ambient Temperatures*
- ◆ F6VH 34 *Food Manufacturing: Processing Practices at Elevated Temperatures*

Candidates will also be able to make use of other relevant Units, such as (F6VF 34) *Food Industry Principles: An Introduction*; (F6VE 34) *Food Industry Practices: An Introduction*; (F8L6 35) *Food Manufacturing: Post Manufacturing Processes in the Food Chain*; and (F8L8 35) *Food Quality Management*.

As a result this Unit can serve several different purposes. It provides an opportunity for candidates to integrate and consolidate knowledge and understanding from the HN Food Science and Technology framework as a whole. By asking candidates to apply their previous work to the manufacture of milk and dairy products, it gives them a chance to find out more about a specific aspect of the food industry. This, in turn, may help them to make choices about employment in the food industry. An important part of the Unit is that candidates are given the chance to increase their awareness of what companies in the milk and dairy sector do and the products that they make.

Also, where this Unit is delivered as part of the HN Food Science and Technology framework, it is likely that candidates will attempt this Unit towards the end of their HND in Food Science and Technology. By this stage, they will have built up a strong background in food manufacturing and related matters such a quality assurance and safety. In addition, they may have some ideas on particular sectors of the food industry in which they might like to work.

Higher National Unit specification: support notes (cont)

Unit title: Food Manufacture: Technology of Milk and Dairy Products

The following give some further details on each of the 2 Outcomes.

Outcome 1

The main emphasis of this Outcome is to identify and take account of the key factors which affect the manufacture of milk and dairy products. Candidates can then evaluate the significance of these factors for manufacturing operations.

The main raw material is milk. Candidates should be aware of the biological and chemical properties of milk and explore factors such as milk composition, milk yield and milk spoilage (including environmental contaminants). They should also take into account hygienic procedures used in the production of raw milk including treatment of the udder, the milking process, post milking treatments and storage of milk.

Consumer preferences could include references to changing social patterns (eg in attitudes towards drinking milk) as well as to the ways in which milk products are distributed (eg the increasing role of supermarkets). Legal issues should make reference to current legislation (eg on testing of milk) while ethical issues could take account of nutrition, diet and government sponsored healthy eating, sustainability and environmental campaigns.

Reference could be made to Genetically Modified (GM) organisms and products.

There may be an overlap between consumer preferences and ethical issues. Candidates should recognise that this is the case, but the key point for this Outcome is that evaluation takes into account all factors which may affect manufacturing operations for milk and dairy products.

Outcome 2

Dairy products include the following: cream; ice cream; yoghurt; butter; cheese, nutraceutical drinks; etc.

Manufacturing techniques: Pasteurisation — Low Temperature Long Time (LTLT) and High Temperature Short Time (HTST); Ultra High Temperature (UHT) processing

Manufacturing equipment and flow of production.

Quality management: Quality assurance systems and hazard analysis in the manufacture of dairy products quality auditing, HACCP (Hazard Analysis and Critical Control Points); food safety and food quality specifications and control techniques.

Packaging: function and selection of packaging; packaging technologies; aseptic technologies; packaging machinery

Higher National Unit specification: support notes (cont)

Unit title: Food Manufacture: Technology of Milk and Dairy Products

Guidance on the delivery and assessment of this Unit

Guidance on Delivery

This Unit can be delivered in the context of actual practice in the manufacture of milk and dairy products. Throughout, candidates should relate the material to specific situations and products in this sector. Candidates can be encouraged to make use of any experience that they have of companies in the milk and dairy sector. Delivery can include visits to companies making dairy products if these can be arranged.

It may also be possible to invite guest speakers from the sector — there may be former candidates working in the sector which would mean that a visit would have the dual purpose of discussing the manufacture of milk and dairy products and enabling candidates to get first hand information on the types of employment opportunities open to them.

The Unit lends itself to research by candidates particularly as they already have a background in food manufacturing processes and techniques and in microbiology and food chemistry. They can report their findings back to other members of their cohort, perhaps through a group presentation. Depending on the available information and communications technology, candidates may be able to share information through electronic arrangements such as a conference, blog or wiki. This may also help candidates, who are undertaking HN Science and Technology framework, to see how the various Units are related to each other. If this Unit, and related specialist sector Units, are delivered towards the end of the HND programme, they can contribute to rounding off the whole course by emphasising the ways in which the various parts of the course are integrated and can be applied to current situations in the food industry.

As part of their work for this Unit, candidates must undertake practical work using pilot plant equipment to illustrate techniques such as pasteurisation. This should help them to understand the techniques and the equipment involved and, as result, enhance the quality of the evaluation of manufacturing processes and the factors which influence them. Candidates should be observed on each occasion on which they undertake practical work. Observation checklists can be used to ensure that candidates have performed the test accurately and followed correct health, safety and other procedures.

Assessment Guidance

Assessment of both Outcomes can be combined as this should help candidates make connections between the factors which influence manufacturing operations and the nature of the manufacturing operations themselves. For Outcome 2, candidates must select three different dairy products — from eg cheese, yoghurt, cream, ice cream, and butter. Candidates must perform two different manufacturing techniques used in the milk and dairy sector. Candidates could also cite products noted above as examples in their work for Outcome 1.

Higher National Unit specification: support notes (cont)

Unit title: Food Manufacture: Technology of Milk and Dairy Products

Candidates could present their assessment work on evaluation in a number of different formats. This could be done in the form of a report or reports and, if desired candidates could be asked to adopt a suitable report format. This may be useful practice for future work in industry. Candidates could make use of a poster presentation or use suitable presentation software. Depending on delivery methods, it may be possible for candidates to use a personal blog as a means of generating and presenting evidence.

If desired, it would be possible to ask candidates to produce a portfolio of evidence. This may depend on the delivery methods adopted. If, for example, candidates are able to visit companies they may be able to gather evidence as a result of the visit eg on the manufacture of a particular product. Personal research may also allow candidates to gather evidence which can be used for assessment. Overall, candidates may accumulate a number of different pieces of evidence and a portfolio is well suited to bringing these together. It could become a relatively straightforward matter for candidates to add an evaluative commentary which brings all the individual pieces of evidence together and integrates them into a suitable response.

Oral evidence should be recorded (eg audio, video etc) and retained.

Opportunities for developing Core Skills

Communication: Written Communication (Writing) at SCQF level 6

As part of their assessment work for this Unit, candidates are expected to provide a report on the evaluation of manufacturing methods and processes used in the sector and the factors which influence them. This could take the form of a written report in which candidates will be expected to present and analyse essential information in a logical and effective order. They will have to do this by using a structure which links the various points together and organises the content in a manner which distinguishes between explanation and evaluative conclusions drawn from the analysis. They will be expected to follow the conventions of report writing and ensure that their report is comprehensible to an industrial readership.

Problem Solving: Critical Thinking at SCQF level 6

Both Outcomes of this Unit require candidates to identify, and assess the relevance of, the various factors which affect manufacturing operations in the sector and which influence the way in which manufacturing operations are conducted. In Outcome 2 on manufacturing methods and processes, for example, the factors include different manufacturing techniques as well as the way in which these techniques are incorporated into manufacturing processes and procedures. The factors are all inter-related and overlap and candidates will be expected to identify the various relationships between these factors and assess the extent to which they contribute to the efficiency and effectiveness of manufacturing operations in the sector.

Problem Solving: Reviewing and Evaluating at SCQF level 6

Both Outcomes in this Unit require candidates to examine relevant factors and come to a conclusion. They will be expected to gather and information on manufacturing operations such as different manufacturing techniques, manufacturing procedures and quality. They will then be required to consider this information and on the basis of it draw conclusions which will enable them to judge the effectiveness of manufacturing operations in the sector.

Higher National Unit specification: support notes (cont)

Unit title: Food Manufacture: Technology of Milk and Dairy Products

Open learning

This Unit could be delivered by Open Learning. However, candidates must be able to undertake practical laboratory work under supervised conditions, something which may be time-consuming and difficult to organise. If suitable arrangements can be made, they would have to cover assessment and quality assurance.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements

General information for candidates

Unit title: Food Manufacture: Technology of Milk and Dairy Products

This Unit is designed to enable you to perform and evaluate manufacturing methods and processes used in the manufacture of milk and dairy products. This will require you to examine specific manufacturing operations in this sector of the food industry. In addition, you will look at the factors which influence manufacturing methods in the sector and the relationship between manufacturing operations and other aspects of the food supply chain such as packaging. You will also carry out practical work on two different manufacturing techniques used in the milk and dairy sector.

This Unit is one of a number of Units which give you the chance to apply your general knowledge of food manufacturing to a specific sector of the food industry, ie the milk and dairy sector. The Unit is about evaluating the methods and processes used manufacturing milk and dairy products including quality assurance and packaging. It also covers the factors which influence manufacturing operations in the milk and dairy sector.

This Unit enables you to develop and deepen your understanding of food manufacturing and the factors which affect it. It is an applied Unit and you will get the opportunity to apply your knowledge and understanding to current products and manufacturing in the milk and dairy sector. You will be expected to research aspects of the sector for yourself and will look at examples of specific dairy products. You may get the opportunity to find out what companies do for yourself by visiting companies which manufacture milk and dairy products. Overall, the Unit should help you to gain knowledge and understanding of firms in the food industry and the work that they do. It may help you, too, to get employment in the milk and dairy sector of the food industry.

The assessment for the Unit will require you to perform two different manufacturing techniques in the milk and dairy sector. You also have to evaluate manufacturing methods and processes in the milk and dairy sector, as well as the factors which influence manufacturing methods in this sector. You will be observed during your practical work and will have to perform it in accordance with industry safety and hygiene requirements. As assessment work could be presented in a variety of ways, your tutor will explain how you should present it for this Unit. You will have succeeded in meeting all the requirements of this Unit if you pass the assessment.