



Unit 14: International Dairy Production

Delivery guidance

Learning aim A

This unit could be introduced by discussing the importance of legislation and welfare standards in key aspects of milk production, such as husbandry and sustainability. This will lead seamlessly into learning aim A, which focuses on the dairy production systems. This learning aim draws upon the knowledge learners will receive from Unit 10: Farm Livestock Husbandry, establishing any prior knowledge that learners have of dairy production, as producing any livestock has similarities that can be drawn upon when studying this unit.

Learners require a sound knowledge and understanding of the importance of the welfare needs of cattle and how these needs can be met, as well as the variation in the different production systems and their impact upon cattle welfare, husbandry, management and production numbers.

It is envisaged that once learners have a good understanding of the current conditions in the dairy industry, tutors can then cover the different production systems and maintenance of welfare standards of cattle, as well as the targets for these systems, such as production rates. Tutors will need to cover the factors that affect the decision as to which production system is used, as well as cattle breeds. Biosecurity, environmental impacts and pollution control will also have to be considered.

Learning aim B

For learning aim B, learners will need to carry out diet management and feeding practices during the production cycle to maintain health and production targets. In order to do this, classroom-based sessions will initially be required to ensure that learners have secured a thorough understanding of the nutritional requirements of cattle and how this changes throughout their different life and production stages. Presentations, tutor-led discussions and active learning sessions will need to take place in the classroom to ensure that learners understand the nutritional requirements and how these are met in the different milk production systems.

In addition, learners will also need to have an awareness and understanding of the different types of cattle diet available and their uses, including any causes, treatments and prevention of common nutritional problems and deficiencies.

Practical activities will enhance learner understanding and skills regarding the use and recognition of different cattle feeds, following different feeding plans and using different feeding equipment. A variety of offsite visits can be arranged to give learners the opportunity to assess grazing suitability, including methods, grass height, stocking rates and feed intake first-hand, as well as different grazing systems and their aim to lower farm carbon footprints and improve herd health.

Learning aim C

For learning aim C, learners will need to know how to carry out routine husbandry of dairy cows during the production cycle to meet current welfare and husbandry standards. They will need to consider the preparations required for milking and milk production and management of a dairy herd, such as feeding programmes and methods, and identifying cows that need assistance. Learners will have to be able to



demonstrate their knowledge and care of dairy cows and how to maintain high levels of animal welfare in accordance with legislative requirements and best practice.

This learning aim would be best delivered initially through active learning, such as discussions, group activities and individual activities, in a classroom-based setting to ensure a sound knowledge and understanding of the welfare needs and legislative demands when producing milk. Practical activities can be arranged in a milk production setting (ideally with a variety of production systems such as both indoor and outdoor) or if this is not possible, practical work can be carried out in one setting while tutors can arrange for visits to other production systems. This will give learners the opportunity to witness the husbandry practices of cattle in different types of production systems. Guest speakers can also be invited into the centre to discuss these practices and assist learners with any queries they may have relating to the industry.

Approaching the unit

‘Unit 14: International Dairy Production’ is an internally assessed optional unit available to learners studying the BTEC International Level 3 Qualifications in Agriculture. It is both a knowledge- and a skills-based unit and learners will find the knowledge, understanding and skills developed in this unit invaluable when pursuing a career in any aspect of the agricultural industry.

Tutors should use a wide variety of methods in the classroom-based sessions in order to ensure that learners achieve a good level of knowledge and understanding of dairy herd management used; diet management and health and production targets; and the routine husbandry practices of cattle during the production cycle. This unit demands that knowledge is combined with extensive practical learning and it is envisaged that the centre facilities will be used along with strong external connections with milk producers and employers.

Guest speakers from the agricultural industry, such as dairy producers, would also enhance the learners’ experience when delivering this unit.



Assessment model

Learning aim	Key content areas	Recommended assessment approach
A Investigate dairy production systems and dairy cow welfare	A1 Dairy production systems A2 Dairy cow welfare A3 Dairy cow reproduction	A report on a selected dairy production system and the production cycle
B Carry out diet management and feeding practices during the production cycle to maintain health and production targets	B1 Nutritional requirements B2 Diet management and feeding practices B3 Grazing B4 Nutritional problems	A portfolio of evidence, to include: <ul style="list-style-type: none"> • planning documents • evidence of carrying out routine dairy cow feeding and husbandry tasks safely to meet current standards and health and production targets.
C Carry out routine husbandry of dairy cows during the production cycle to meet current welfare and husbandry standards	C1 Milk hygiene C2 Routine husbandry C3 Health and disease	



Assessment guidance

This is an internally assessed optional unit available for the BTEC International Level 3 Qualifications in Agriculture which is assessed using a number of independent tasks. The recommended assessment approach suggests two different assignments.

The first assignment covers learning aim A, which is a written report where learners are to concentrate on milk production systems and the dairy production cycle. In order to gather the evidence for this learning aim, tutors can arrange for learners to embark on practical activities working with dairy cows in different production systems. They can also organise various visits to relevant establishments with different dairy production systems and/or talks from guest speakers such as milk producers from the industry. This will allow learners to compare and contrast different production systems and select the one that they would like to report on for their summative assessment.

The second assessment covers learning aims B and C and learners are required to build a portfolio of evidence that demonstrates they have considered planning documents; evidence of carrying out routine dairy cow husbandry and feeding tasks safely; and meeting industry standards as well as following health and safety requirements. In order to gather the research for this assessment, learners will be able to use the practical activities carried out while completing the unit. In addition, the offsite visits and guest speakers can help by outlining the routine husbandry practices and grazing and feeding requirements in different dairy production systems.



Getting started

This gives you a starting place for one way of delivering the unit, based around the recommended assessment approach in the specification.

Unit 14: International Dairy Production

Introduction

This unit gives learners an understanding of the different dairy production systems and their advantages and disadvantages for welfare and production levels.

Learners will gain a sound knowledge of all the different production systems and how these systems maintain the health and welfare of dairy cows for a range of different purposes.

Learning aim A: Investigate dairy production systems and dairy cow welfare

- Tutors could begin this learning aim with a discussion establishing any prior learner knowledge. This can lead to a description of the different production systems, what they involve and the considerations of these, as well as any welfare implications of them (repeated pregnancies leading to mastitis.)
- For learning aim A1, tutors can deliver a presentation about the current welfare standards in dairy production. This can include the advantages and disadvantages of different dairy production systems, including zero-grazing system, cubicle, loose housing systems and extensive grazing systems.
- Tutors can form learners into two groups to research housing-based, grass-based and extensive grazed systems. They are to research their allocated system and produce a poster stating their advantages, disadvantages and the welfare implications as well as current public opinion. These posters can be copied and distributed to the class so that they have a comprehensive set of notes for reference.
- Learners can be formed into different small groups to research the factors that may affect a farmer's choice of production system, including financial, economic, marketing, locational and environmental factors, current trends in farming practices and legislative requirements. The findings from this research will be presented in a class discussion.
- Tutors can arrange for a guest speaker, such as a dairy producer, to come into the centre to talk to learners about different housing and rearing systems and their impact on profitability.
- Tutors can deliver a short presentation about the importance of different biosecurity measures and disease prevention used in dairy production.
- Learners can then complete a matching activity where they are given different scenarios such as outbreaks of disease on their farm and outbreaks of disease at a local auction with various biosecurity measures, including disinfection and foot dips. They are then to match the two together and explain why they are the most appropriate for that scenario.
- Facilitate a class discussion about the environmental impact of biosecurity measures and ways that this impact can be reduced.
- Learners are to carry out practical work with cattle, working through a practical book to ensure that they cover health and safety, movement of cattle, preventing pest and vermin in dairy production systems, feeding and watering using a range of different systems and a range of bedding types. They are to record evidence of this in their practical workbook as they go along.
- A presentation about nitrate vulnerable zones and the impact upon the health and welfare of dairy cows.

- For learning aim A2, learners are to form into pairs and tutors to allocate each pair with a different housing-related welfare issues, including housing, milk yield, culling of adults and calves and large-scale dairy farming. They are to research them and produce factsheets. These factsheets can be copied and distributed to the group to ensure all learners have a comprehensive set of notes for reference.
- Tutors can deliver a short presentation reminding learners of the five animal needs and their importance and the balance between them and meeting production aims and welfare standards.
- Working in small groups, allocate learners with each of the following topics: use of medicines and hormones, milking systems, handling of dairy cows and nutrition. They are to research them and feedback their findings into a group discussion where spider charts will be produced on the interactive whiteboard and uploaded to the VLE for future reference.
- A tutor-led discussion on the welfare organisations that impact upon dairy cow welfare. Include discussing the impact of milk production on the cow and calf
- Form learners into small groups and allocate them with state and public animal welfare organisations and a dairy milk expert organisation where this exists. They are to research and produce posters outlining their aims and objectives and how they assist dairy farmers.
- A short presentation about the legalities of dairy production, including codes and practice and welfare improvement schemes.
- For learning aim A3, tutors to deliver a presentation on the signs and indicators of ovulation, the oestrus cycle, the role of hormones, heat observation and optimum time for service.
- Arrange for another guest speaker (ideally a vet) to come into the centre to talk to learners about heat detection, relevance to calving interval and herd calving index and devices and techniques for pregnancy diagnosis.
- Tutors to deliver a presentation on the different reproductive technologies available in dairy production, such as artificial insemination, hormone therapy, embryo transfer and sexed semen. Arrange for a guest speaker to come into the centre and discuss the advantages and disadvantages of each technique.
- Form learners into small groups and allocate them with problems in rebreeding: disease, timing of artificial insemination, body condition and deterioration of animal's welfare. They are to research them and annotate the interactive whiteboard. These spider diagrams can be captured and uploaded to the VLE for future reference.
- A tutor-led discussion about the breeding records (including computer based, breeding boards and veterinary records) that must be kept.
- A presentation about select replacements, including breeding requirements, linear assessments, bull selection, culling rates and numbers of heifers.
- Throughout the delivery of this learning aim, learners will have carried out class- room sessions, practical sessions and employer involvement that they can utilise when producing their summative assessment, which is in the form of a written report looking at dairy production systems and the dairy production cycle.



Learning aim B: Carry out diet management and feeding practices during the production cycle to maintain health and production targets

- Tutors can begin this learning aim with a short discussion to recap and establish any prior learner knowledge regarding different nutrients.
- For learning aim B1, facilitate a group discussion about the different nutritional requirements of cattle at the different stages of the production cycle (including mid and late pregnancy, calving, lactation and newborns).
- Working in small groups, allocate learners with different feed types (including forages, concentrates and supplemental feeding) and either dry cow or transition diets. They are to research them and feedback their findings into a group discussion where spider charts will be produced on the interactive whiteboard and uploaded to the VLE for future reference
- For learning aim B2, learners are to work in the dairy cow area and identify the different feeding and watering equipment. They are then to discuss the advantages and disadvantages of these equipment in terms of efficiency, ease of use, hygiene and cleanliness.
- Learners are to participate in a practical activity where they must examine cattle feed and assess its quality, interpreting the nutritional content, including energy levels, dry matter and metabolisable energy, from the packaging. They will then examine feed storage and assess its suitability for maintaining feed quality and preventing contamination.
- Facilitate a class discussion about feeding records and recording systems, as well as weight gain at different stages and the importance of recording weights for each life stage.
- A short discussion about the importance of protein and crude protein, dry cow diet and transition diets.
- A tutor-led discussion on feeding behaviour of herds and individuals
- For learning aim B3, a practical activity where grazing is assessed for its suitability for milk cattle grazing.
- Facilitate a class discussion about the advantages and disadvantages of the different grazing methods, including continuous and rotational methods, diversity of grass species and quality of grazing.
- Arrange for an offsite visit so that learners can witness first-hand grazing and stocking rates, as well as how employers assess and establish grazing systems to lower farm carbon footprints and improve herd health.
- For learning aim B4, tutors can deliver a short presentation on the common nutritional problems in cattle, such as poor appetite, reduced growth and lethargy.
- Learners can be formed into small groups and are allocated with different nutritional problem. They are to conduct research and produce a poster outlining the causes of the problem, its recommended treatment(s) and prevention. These posters can be copied and distributed to the class so that they have a comprehensive set of notes for reference.
- Tutors to deliver a short presentation about the nutritional diseases and disorders in dairy cattle, such as specific nutrient deficiencies, excesses, parasitism and disorders. Conduct a practical activity where grazing is assessed for its suitability for dairy cow grazing.
- Formative assessment would take place during the practical sessions for the delivery of these learning aims, while summative assessment would be in the form of a practical portfolio and learners will have gathered evidence for this throughout the practical sessions.

Learning aim C: Carry out routine husbandry of dairy cows during the production cycle to meet current welfare and husbandry standards

- Tutors could begin this learning aim by facilitating a group discussion about the routine husbandry requirements of cattle. Ask learners to draw upon their practical experience from learning aim A and build on the notes they have taken from their practical workbooks.
- For learning aim C1, you could begin with a tutor-led discussion about the processes involved in clean milk production, including constituents of milk, the mammary gland, milk let-down and operator hygiene.
- Form learners into groups and allocate them with: parlour preparation, milking routines, machine milking, hand milking, circulation cleaning and milking machine maintenance. Learners are to research and produce posters.
- A presentation about current hygiene standards in milk production. Contamination from a range of sources. Detection and failure to detect abnormal milk.
- A tutor-led discussion about the importance of monitoring milk hygiene and methods of monitoring, including Bactoscan, somatic cell count, antibiotics, taint and extraneous water.
- A short presentation about what mastitis is and how and why cows get it.
- Moving on from this, working in small groups ask learners to research mastitis and its control, pathogens, causes, treatment, prevention and plans, and produce leaflets.
- Learners are to undertake a substantial amount of practical sessions working in the milk production area carrying out a range of practical activities. Practical workbooks/portfolios should be used to document these activities.
- For learning aim C2, with cattle and calves, they should be involved in all aspects of husbandry, and practical workbooks (or portfolios) should be used to ensure that learners are competent at carrying out routine husbandry with dairy cows and calves.
- Within their practical sessions, learners will cover housing, bedding, equipment, biosecurity, feeding, watering, health checking, unit hygiene and maintenance and use of veterinary medicines. Calf husbandry should also include handling and restraining.
- Tutors to deliver a short presentation about the records that need to be kept when keeping dairy cows for milk production.
- Learners are to prepare notes about isolation, why we isolate, when to isolate and how, which should then be discussed as a class.
- Facilitate a tutor-led discussion on the signs of normal and abnormal health, the use of medications in beef production, the role of the vet and responsible use of veterinary medications under legislation.
- Tutors can facilitate a class discussion about the government requirements and documentation necessary for both cattle movement and standstill.
- A short presentation about health and safety, PPE and risk assessment.
- Moving on from this, arrange for a practical activity where learners go out into practical areas and carry out a risk assessment and then feedback their findings into a group discussion.
- Facilitate a class discussion about the care of calves and pre calving and how high welfare standards impact upon survival rates and reduce instances of mortality.
- Arrange for a visit or practical activity in the dairy cow area when calving is taking place (or the use of video footage if this is not possible) and observe a range of instances where calves require care.
- Learners are to form into pairs and tutors can allocate each pair with one factor related to the care of a newborn calf, such as: calving, calf revival, rearing, colostrum, navel care,



nutrition, weaning, handling and haltering, temperature taking, disbudding, ear tagging, stomach tubing, prevention of dehydration using electrolytes and vaccination. They are to carry out research and produce factsheets. These factsheets can be copied and distributed to ensure all learners have a comprehensive set of notes for reference.

- A guest speaker, ideally a large-scale dairy producer, to talk to learners about care of dairy heifers, including rearing, lactation, home rearing, numbers and culling, growth targets, stocking rates and specific care.
- The summative assessment for learning aims B and C is a portfolio of evidence. Learners will have completed practical activities and offsite visits and attended talks from guest speakers. All of the evidence should have been gathered throughout the teaching of these learning aims and will just need to be collated and referenced for submission. For learning aim C3, learners should be shown in a practical setting how to recognise signs of normal and abnormal health. Present a group of cows or calves to the learners and have them suggest any animals which they feel are showing signs of incorrect health. This may be done during a vet visit. Have learners isolate specific animals and have them carry out a health check as they see most appropriate. Guide learners after they have made their initial inspections and where possible have the vet suggest if any of these issues can be cured by the herd manager or if a vet would be required. Remember to differentiate between viral, fungal, bacterial and nutritional ailments and issues.
- In a calf rearing environment have learners health check the housing system to ensure the best health statues for the calves can be reached. Perhaps learners could be put into small groups to assess the housing system and then report back to the rest of the class upon completion. Go on to detail areas which learners may have missed and explain how each component part of a system avoids a certain disease such as inadequate ventilation causing pneumonia or woodwork harbouring ringworm from one generation or batch to the next. Go on to complete this in a housing system for milking and dry cows and even link up with a beef production lecture to complete this for fattening cattle too. Compare different systems on different units noting the benefits and drawbacks of each.
- Have a vet or a qualified foot trimmer explain to learners the ailments caused by different factors specifically on a cows feet. Have them demonstrate how to correctly trim cattle feet and where possible have learners carry this out too under supervision. Do a locomotion and associated foot and mobility score before and after any foot trimming so learners can see any immediate differences which are made such as the removal of any hoof inclusions.
- Inevitably with livestock deadstock will be produced. Demonstrate to learners best practice of moving deadstock, its correct storage until disposal and give a formal classroom lecture on the importance of its proper disposal using foot and mouth disease and anthrax as two possible examples of what happens when deadstock is incorrectly disposed.

Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

This unit links to:

- Unit 5: Operational and Environmental Activities in Land-based Enterprises
- Unit 10: Farm Livestock Husbandry

Resources

In order to deliver this unit, centres will need access to a range of different livestock in order to carry out practical husbandry, feeding and breeding activities. If there is only one milk production system at the centre, liaison with other milk producers will be required.

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC Internationals in Agriculture. Check the Pearson website (<http://qualifications.pearson.com/endorsed-resources>) for more information as titles achieve endorsement.

Textbooks

Campbell JR and Marshall RT, *Dairy Production and Processing: The Science of Milk and Milk Products*, Waveland Press Inc., 2016 ISBN 9781478611202 – a useful text that outlines different milk production systems

Gillespie JR and Flanders FB, *Modern Livestock and Poultry Production*, Delmar Cengage Learning, 2015 ISBN 9781133283508 – a useful text that covers the different production of all livestock

Marek RE, *Dairy Cows: Nutrition, Fertility and Milk Production*, Nova Science Publishers Inc., 2011 ISBN 9781611229585 – a useful text that outlines all aspects of milk production

Noordhuizen J, *Dairy Herd Health and Management: A Guide for Veterinarians and Dairy Professionals*, Context Products Ltd, 2012 ISBN 9781899043361 – a useful text that focuses on the health and welfare of dairy cows throughout milk production

Watson JS and More JA, *Breeding and Rearing of Cattle: Milk and Beef Production*, Hervey Press, 2014 ISBN 9781446530160 – a useful text that focuses on the breeding and rearing aspect of cows for milk production

Websites

'*Compassion in World Farming (CIWF)*' – a welfare organisation concerned with the welfare of farm animals

'*Royal Society for the Prevention of Cruelty to Animals*' – The RSPCA is a animal welfare organisation that is concerned with the welfare of farm animals in the UK.

'*The Dairy Council*' – a UK organisation dedicated to the production of milk and milk products and the welfare of dairy cows.

Pearson is not responsible for the content of any external internet sites. It is essential for tutors to preview each website before using it in class so as to ensure that the URL is still accurate, relevant and appropriate. We suggest that tutors bookmark useful websites and consider enabling learners to access them through the school/college intranet.