

Course Description

Food Safety in the Dairy Sector

Tailored Courses under the DFC Scholarship Programme

1. Overall description of course

Course title: Food Safety in the Dairy Sector

Course dates: 27 April – 15 May 2020.

Format: Laboratory-based MSC-level course with subjects as shown.

Course responsible: Hanne Ingmer (hi@sund.ku.dk), Department of Veterinary and Animal Sciences, University of Copenhagen.

Target Group: The course will target 25 participants. Participants must be related to the Danish Strategic Sector Cooperation (either directly or indirectly). The course is highly relevant for a diverse group of professionals with an interest in the overall subjects, including universities, public authorities and private companies. Participants must as a minimum have a bachelor degree in a relevant field and must have a good command of English.

Teachers: Staff of the Department of Veterinary and Animal Sciences (IVH), University of Copenhagen; invited guests and speakers from the Danish Veterinary and Food Administration, Department for Food at the Technical University of Denmark, other departments of the University of Copenhagen.

Exam: Pass/non-pass with diploma based on 100% participation in course activities.

Goal and focus

The goal of this course is to build on the experience from the Danish dairy sector and the food authorities in Denmark and use the information to evaluate local food chains spanning from primary production to final product and implement the knowledge and experience from the Danish experiences into dairy farming and dairies on a global level.

The overall focus of this course is for the participants to acquire in-depth knowledge about safety and quality of milk. The course will focus on good hygienic practice in milk production and processing and include both identification and prevention of chemical and biological hazards.

The course will include visits to dairy cow farm, a dairy company and SEGES.

Background - The Danish Dairy Sector

The Danish dairy industry consists of the international dairy group Arla Foods and 30 smaller dairy companies, together processing 4.7 billion kg milk from a total of 61 production plants in Denmark. Cooperatively owned by Danish and Swedish milk producers, Arla Foods is Europe's largest dairy group. The Arla group processes more than 90 percent of the Danish and two thirds of the Swedish milk pool. It also runs dairy operations in a number of other countries, with Arla UK as its biggest business. The remaining 30 Danish dairies are evenly distributed between cooperatively and privately owned companies. The small dairies typically specialise in various product areas within cheese, butter and liquid milk production. A large part of their production is exported by specialised exporters.

The value of all Danish dairy exports totals EUR 1.8 billion annually and the domestic market is, to a large extent, a market for domestic dairy production. Yet exports of dairy products, in particular cheese, preserved milk products and butter, account for more than 20 percent of all Danish agricultural exports. The largest market for Danish dairy products is the other EU countries.

Like the dairy processing sector, the Danish milk producers have seen large structural changes, with production now taking place on a small number of large farms. In 2010, approx. 4,100 dairy farmers each had an average of 127 cows and a milk quota of 1,142 tonnes. This places the Danish dairy farmers among the largest and most modern in Europe. More than half the cows live in new loose-housing systems.

To promote development of the dairy industry the Danish Dairy Foundation has been established with the primary objective is to initiate and coordinate dairy research projects within a forum comprising representatives from the Danish dairy industry as well as researchers conducting research related to the dairy industry. The projects contribute to establishing the framework for the research-based innovation that takes place within the dairies within areas such as technology, microbiology and nutrition and Health.

2. Learning goals

As a result of the course the participants will be able to:

- critically evaluate the dairy production chain and pinpoint weak points that can be integrated as critical control points in own control programs
- have a detailed knowledge of methods that are used for detection of pathogens and applied in surveillance programmes
- communicate with and influence authorities of relevance to local dairy industries

3. Approach to mandatory learning elements (see 'Guidelines for DFC Scholarship Programme')

Learning by seeing The course will have multiple exposure visits to farmers, dairies, authorities and as well as to stakeholders such as Chr. Hansen, the producer of starter cultures. These visits will provide the course participants with information and first hand experience of how the Danish dairy industry has become a success and how challenges are handled all the way from the farm to the quality of the final products. In addition, the course will have a series of highly relevant lectures on for example hygiene in the dairy industry, mastitis and state-of-the-art methods in detection and surveillance.

Learning by doing/applying: Some of the topics will be supported by hands-on experience in the laboratory. The laboratory exercises are intended to provide practical skills and understanding of the methodological possibilities but also illustrate the limitations in detection and surveillance.

Learning by example (Peer learning) / Translate learning into action (Action Plan): During the course there will be cases related to the course topics, which are intended to give the course participants the possibility to translate the acquired knowledge to a similar type of problem and develop a solution using the tools and information provided in the course. Lastly the course participants will be requested to reflect on how the principles and knowledge acquired in the course can be translated to national settings.

Passing on learning: To this end presentation and communication skills will be trained.

4. Tentative course programme

The course will cover the below topics.

- Identification, detection and prevention of hazards in milk.
- From farm to fork in different countries – how is milk produced, transported, processed and sold.
- Microbial hazards in raw and pasteurised milk (*Brucella* spp., toxigenic *Escherichia coli*, *Salmonella*, *Listeria monocytogenes*, *Campylobacter*, *Mycobacterium bovis* and protozoan parasites).
- Chemical hazards in raw and past milk (pesticides, traces of antibiotics and mycotoxins transferred from livestock feed to raw milk and dairy products).
- Antimicrobial resistance; the DANMAP (Danish Programme for surveillance of antimicrobial consumption and resistance in bacteria from animals, food and humans).
- Methods for testing feed, milk, milk powder and other dairy products for microbial and chemical hazards.
- Detection: Use of risk assessment in improving safety in the dairy sector (choice of hazard to monitor)
- Risk-based sampling strategy.
- Prevention of chemical and microbiological hazards
 - Feed (pesticides, mycotoxins), feed storage/management practices (relevant for mycotoxins), veterinary drug use (Prudent use of antimicrobials and antimicrobial stewardship) and withholding milk from antibiotic treated cows (antibiotics)
 - Herd health management of relevance for milk quality and safety, pathogens causing mastitis, milking hygiene.

- Good hygienic practice in milk production and processing
- Quality issues in milk production
- Food control, inspection of farms and dairies – how this is done in Denmark

The course will have the following activities and themes (15 course days):

- 2 days: Dairy farming in Denmark - theory and visit to dairy farm with presentation of management control systems and quality check (visit, theory and group work centered on national farm systems)
- 1 day: The Danish program for tuberculosis as a case for development of food safety of milk including brucellosis, paratuberculosis and Strep. agalactiae. Prevention of infectious diseases in dairy farming including surveillance systems and monitoring programs (theory and case work)
- 1 day: Visit to Danish Veterinary and Food Administration (FVST) and their testing laboratories (visit, discussion of detection methods, audits and control of dairies)
- 2 days: Mastitis in dairy cattle - detection and prevention (theory and practical laboratory exercises)
- 2 days: Traditional and new intervention methods for pathogens in the dairy cattle and dairy industry: Importance of hygiene and possible implementation of new interventions such as phage therapy (theory and laboratory exercises)
- 3 days: Methods for testing feed, milk, milk powder and other dairy products for microbial and chemical hazards. (theory, laboratory exercises and cases)
- 1 day: Visit to dairy with presentations and discussions including own control programs
- 1 day: Visit to Chr Hansen and discussion of dairy starter cultures and the probiotic market
- 1 day: Methods in surveillance including antimicrobial testing, typing and genome analysis (theory, laboratory exercises and cases)
- 1 day: Work on presentation of the local dairy industry - what have you learned and how can you pass it on nationally?; literature search, data base introduction