

Improving the Quality of Food From Farm

Code: 43032
ECTS Credits: 15

Degree	Type	Year	Semester
4313796 Quality of Food of Animal Origin	OB	0	1

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Use of languages

Principal working language: spanish (spa)

Prerequisites

Students should have basic knowledge about different livestock production systems and know basic vocabulary of the area. In case they had not previously studied related subjects, students will be provided with literature to enable autonomous learning.

It is recommended that students have at least a B1 level (EUROPASS) or an equivalent level of English level in order to better use the materials for consultation and work in English.

Objectives and Contextualisation

This module aims to make students aware of the possible ways to improve the quality of animal products from farm. In particular, the module will examine the impact of factors such as nutrition, management, genetics and animal welfare on the nutritional, technological and organoleptic quality of different products.

Students also will be introduced to the different strategies and production systems, aimed to obtain specific products to meet consumer demands, such as food with functional properties or food obtained by traditional production systems, ecological and/or respectful to animal welfare.

Finally, how to obtain safe consumer products will be another objective of the master. Control of the raw materials used in animal feed, good hygiene practices at farm level, as well as different strategies that allow traceability from origin, will be considered.

Skills

- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Continue the learning process, to a large extent autonomously.
- Define the main production systems that differentiate between animal products.
- Design, organise and execute projects related to this field of study, working alone or in a unidisciplinary or multidisciplinary team, displaying a critical sense and creativity, and the ability to analyse, synthesise and interpret information.
- Identify risks to food safety stemming from the feeding and handling of animals.
- Identify the possible effects of animals' food, handling, welfare and genetics on the nutritional, organoleptic and technological characteristics of animal products.
- Search for information using the appropriate channels and use this information to solve problems in the work context.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

Learning outcomes

1. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
2. Continue the learning process, to a large extent autonomously.
3. Design strategies to improve particular characteristics of quality in animal products and define their economic implications.
4. Draft a written report on the work done.
5. Identify regional, national and international regulations.
6. Identify scientifically sound information sources.
7. Identify the necessary requirements (laws, rules, handling instructions or others) for obtaining a differentiated animal product within a particular livestock farming project.
8. Implement a programme of best practices for hygiene on a livestock farm.
9. Make proposals for addressing specific practical problems.
10. Present work done in seminars, leading the discussion of problem areas.
11. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
12. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

Content

INTRODUCTION TO THE MODULE (1 h)

Objectives, activities, calendar, evaluation.

UNIT I. Improving the quality by improving farm management, animal genetic and nutrition.

Theory

1. INTRODUCTION TO THE UNIT (2h)

2. MILK

2.1. Milk quantity and milk quality. (1h)

Production cycles according to dairy species. Quality oriented production systems. Origin of milk components. Relationship between milk components and possibilities of change.

2.2. Variation of milk quality I: Intrinsic. (1h)

Variation factors. Intrinsic. Species. Stage of lactation. Parity. Pregnancy and dry-off. Suckling management practices. Persistency and extended lactations.

2.3. Variation of milk quality II: Extrinsic . (1h)

Milking routine and frequency. Environment: Altitude, Temperature and Light. Impact of heat stress on milk quality and dairy products.

2.4. Variation of milk quality III: Nutrition. (1h)

Rationing and milk quality. Concentrate to forage ratio. Specific action of feeds on milk quality. Corrective actions.

2.5. Intramammary infections and milk quality. (1h)

Milk bacteriology and raw milk shelf life. Clinical and subclinical mastitis. Validity of somatic cell counts. Impact of subclinical mastitis in milk quality and dairyproducts. The CNS case. Presence of inhibitors in milk.

3. MEAT

3.1. Meat quality traits of interest in animal production. (1 h)

Meat pH and water-holding capacity of lean. Color. Chemical composition of lean. Intramuscular fat. Tenderness, juiciness and flavor.

3.2. Carcass and meat quality genomics. (1 h)

Genomics of the malignant hyperthermia syndrome in pigs. Genomics of the muscular hypertrophy and the calpain/calpastatin system in beef cattle. The "callypige" gene in sheep.

3.3. Meat quality modification through animal nutrition. (2 h)

Fetal programming and skeletal muscle structure. Color. Palatability. Chemical composition. Fatty acid content.

3.4. Livestock handling and transport can affect carcasses and meat quality. (2 h)

Handling in the farm. Handling during transport. Handling at slaughterhouse.

4. EGGS

4.1. Update of egg quality concepts and consumer preferences. (1h)

Egg quality parameters. Guidelines for producers and grading stations. Trends and current European consumer preferences relative to egg and egg products.

4.2. Egg quality through the formation process. (1h)

Key points of the egg formation process and the impact on egg quality aspects, in particular shell and internal egg defects.

4.3. Factors affecting egg quality. (2h)

Modification of external and internal shell-egg quality according to different factors: Genetics and selected strains. Housing system and management on the farm. Nutritional and feeding factors . Handling, transport and storage post-farm. Repercussion on egg products.

5. FARMED FISH

5.1. Implication of muscle growth and development on fish flesh quality. (1 h)

Structure and nutritional composition of fish muscle. Biological bases for fish growth and development.

5.2. Nutritional and feeding factors on flesh quality. (2 h)

Diet composition and feeding regime. Salmonid pigmentation and fillet quality.

5.3. Effect of management and killing methods on fish flesh quality. (1 h)

Potential effect of pre-slaughter fasting, handling and transport. Slaughter methods. Ethical consideration.

Practicals and Seminars

Lab Sessions (2 h + 2 h).

Evaluation of different quality parameters of animal products obtained from different breeding systems.

Analysis of the effects of management, nutrition or genetics.

Case studies (8 h seminars).

The students will work on teams to solve practical cases on the analysis and design of breeding programs addressed to improve quality in a particular animal product.

Visits (3 h).

Visits to milk farm (with installations for the collection and treatment of milk) and/or slaughter house/boning hall/retail room/processing plant.

Unit II. Animal products with defined quality properties

Theory

6. TRADITIONAL MEDITERRANEAN ANIMAL PRODUCTION SYSTEMS (MAPS) AND GEOGRAPHICAL INDICATIONS. (3 h)

Commercialization of animal products. Different schemes for geographical indications (protected designation of origin (PDO), protected geographical indication (PGI)), different breeds or species, production system, feeding practices... Practical examples for a variety of PDO or PGI products (lamb meats, beef, birds, rabbits, milk, cheese, fish.. etc).

7. ORGANIC PRODUCTION SYSTEMS.(4 h)

From traditional to intensive production and from intensive to organic production. Basic principles of organic production. Organic vs. conventional production.

Organic livestock systems. Organic aquaculture. Current status of organic livestock and fish farming. Some examples.

8. GAME PRODUCTS. (1 h)

Game species (wild boar, deer, roe deer, fallow deer, chamois, ibex, mouflon, etc..). Small game species (hare, rabbit, duck, quail, partridge, thrush, pheasant, etc..). Game production systems (private hunting, social preserves, wildlife refuges, game reserves, hunting grounds, etc..).

9. ANIMAL-WELFARE FRIENDLY PRODUCTS

9.1. Concept of animal welfare.

How consumers perceive it and how consumer perception relates to the scientific definition of animal welfare (2 h)

9.2. Examples of animal welfare friendly products in pig and poultry production.

From scientific assessment of welfare to market opportunities (2 h)

10. FUNCTIONAL FOODS

10.1. CLA-enriched milk. (1h)

How to get naturally enriched milk throughout feeding strategies.

10.2. Milk bioactive peptides. (1 h)

Occurrence and physiological effects of bioactive peptides in milk.

10.3. Feeding strategies to modify lipid composition of eggs and poultry. (2h)

PUFA, W-3 and W-6 Enrichment . Antioxidant fortified eggs.

Practicals and Seminars

Lab Sessions (2 h).

Comparison of defined quality parameters between conventional and functional foods of animal origin (fortified egg, milk or meat).

Case studies (8h seminars).

The students will work on teams to solve practical cases on the definition of a new PDO, GPI products or alternatively applying the basic principles of organic production to a conventional farm.

Visits (3 h).

Visit to an organic farm.

Unit III. Consumer product safety

Theory

11.- QUALITY AND SAFETY CONCEPTS. TRENDS. COST / BENEFITS ANALYSIS. (1 h)

12. MAIN HAZARDS IN ANIMAL PRODUCTION. (1 h)

12.1 Introduction. (1h)

12.2 GMOs in the EU and in the world (1h)

12.3 Biological risks associated to feed: Mycotoxins. (1h)

12.4 Control plan for Salmonella in the EU. (1h)

12.5 The use of industrial by-products intended for animal feed. (1h)

12.6 Possible risks of feed additives and therapeutic treatments (1h)

13 QUALITY AND SAFETY CONTROL IN ANIMAL PRODUCTION

13.1 Production, self-control and traceability of forages and raw materials. (1h)

13.2. Basics in any good management program: The feed, the animals, the farm, wastes and residues, biosecurity and records.(1h)

13.3 Feed manufacturing. (1h)

13.4. Hazard Analysis and Critical Control Points (HACCP) in the feed manufacturing industry. (2h)

14. IDENTIFICATION AND TRACEABILITY PROCESSES 15.1 Traceability.

Concept and regulations. Quality and traceability. Elements of a traceability scheme. Ascending and descending traceability. Traceability auditing. Hazard analysis and critical control points (HACCP). (1h)

14.2. Animal identification.

History. Identification systems. Natural (biomarkers) and artificial identification traits (marks). ICAR guidelines for animal identification. Ear tags. Retinal imaging. Molecular fingerprinting. (1h)

14.3. Electronic animal identification.

Antecedents. Bases of radiofrequency and technology systems. ISO standards. Transponder types: injectable, ear tag, bolus and other devices. Transceivers. Retention, readability and reading efficiency. (1h)

14.4. Implementation of farm to fork traceability schemes

Tracing lots vs. individual animals. Tracing mixed products. Use of tracers. Identification and traceability implementation costs. (1h)

14.5. Traceability of animal derived products

Traceability of liquid products. Milk traceability and the letter Q system. Honey traceability. Egg traceability. Meat traceability. Fish traceability. (1h)

Practicals and Seminars

Practicals (2 h).

In field application of different electronic identification systems of livestock.

Case studies (8 h seminars).

The students will work on teams to perform Hazard Analysis and Critical Control Points (HACCP) at different stages of the food chain (feed mills, dairy farms, slaughter house..etc)

Visits (3 h).

Visit to a Feed Mill.

Methodology

The centre of the learning process is student's work. Students learn by working, it's the teacher's mission to help them in this task. (1) Providing them with information or showing them sources where they can get it and (2) guiding them so that the learning process can be performed effectively. Following this ideas, and according to the objectives of this module, the development of this course is based on the next methodology and activities.

1. Working methods based on participative lectures.

The student acquires the expertise of the course by attending lectures and complementing it with self- study of the topics explained. The lectures are intended as an essentially one-way method of transmission of knowledge from teacher to student although student participation will be also encouraged during the lecturers.

2. Methods Oriented to Discussion and/ or to Team work.

It's intended that through team or group work the student adopts an active role in the learning process. Cooperative learning increases student's motivation, it strengthens attitudes of involvement and initiative, improves the level of understanding, the degree of dominance of concepts and procedures and makes a positive social relationship.

Different group work activities are included in this module.

2.1 Case studies.

2.2 Classroom practices.

2.3 Laboratory practices

2.4 Seminars

2.5 Lecture / oral presentation of work.

2.6 Participation in complementary activities (visits).

3. Autonomous work

Autonomous work is mainly a student-centred methodology, although teachers have also a significant role on this process. The aim is to help students develop skills to set learning objectives, choose between different ways of learning, set their own pace, plan and organize their work, discover and solve problems, make decisions and evaluate their own progress. Independent learning promotes various transversal competences and becomes an indispensable teaching method.

Within this course different autonomous work activities arise.

3.1 Writing reports.

3.2 Problem solving.

3.3 Self- study.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Complementary activities (external visits)	9	0.36	9, 11, 12
Lab Sessions	8	0.32	9, 11, 12
Participative Master Class	53	2.12	12
Seminars for Case Studies	24	0.96	9, 10, 11, 1
Type: Supervised			
Solving Case Studies	60	2.4	6, 3, 4, 9, 7, 5, 8, 11, 2
Solving exercises	24	0.96	6, 9, 7, 5, 11, 2
Tutorials	9	0.36	2
Type: Autonomous			
Personal Study	188	7.52	6, 3, 7, 5, 8, 11, 2, 12

Evaluation

In order to assess student's progress, different activities and assessment methodologies are established:

Attendance and active participation in class (5%):

Active attendance in classes will be assessed by the teacher. Optionally teachers can provide some questionnaires in order to encourage participation.

Attendance at tutorials (5%):

During tutorials teachers will evaluate the abilities for independent work of each student.

Attendance at Complementary Activities (5 % each visit x 3 visits, 15 % total):

During the visits, they may raise small exercises or questionnaires that must be completed by students and, along with participation in the activity will be evaluated.

Accomplishment of practices (5 % each practice x 3 practices, 15 % total):

Some exercises that will also be evaluated may be established during practices.

Delivery reports and oral defence of Case Studies (20% each Teaching Units x 3 units, 60%):

Case studies are required to be solved in group and presented at seminars. They will tree diffente case studies for the different Units (I, II and III). The submitted report, presentation and public defence in seminars and teamwork facility, will be taken into account.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Attendance and active implication in classes.	5	0	0	9
Attendance to Lab Sessions	15	0	0	9, 11, 12
Attendance to complementary activities (external visits)	15	0	0	9, 11, 12
Tutorials	5	0	0	6, 2
Writting reports and public defence of Case Studies Unit I.	20	0	0	6, 3, 4, 9, 10, 11, 1, 12
Writting reports and public defence of Case Studies Unit II.	20	0	0	6, 4, 9, 7, 10, 11, 1, 12
Writting reports and public defence of Case Studies Unit III.	20	0	0	6, 4, 9, 5, 8, 10, 11, 1, 12

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