

**Meat and Meat Products**

Code: 102649  
ECTS Credits: 6

| Degree                              | Type | Year | Semester |
|-------------------------------------|------|------|----------|
| 2501925 Food Science and Technology | OT   | 4    | 1        |
| 2502445 Veterinary Medicine         | OT   | 5    | 0        |

**Contact**

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**Use of Languages**

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No

**Teachers**

Josep Yuste Puigvert

**Prerequisites**

There are no official prerequisites, but it is essential that the CTA students deepen the knowledge of Methods I and II, pilot plant practices; the Veterinary students the knowledge of Morphology and function of muscle tissue and Food Technology. Those from the two degrees, the knowledge of Biochemistry and food science.

**Objectives and Contextualisation**

The meat industry is one of the main among all food industries and in some contexts it is the majority. In Catalonia it reaches a third of the total and occupies up to 37% of the workers of the alimentary one. On the other hand, the science of meat and its derivatives has been studied systematically and cartesian for many years, so that it brings knowledge to this basic sector of food for various reasons.

The above facts lead to the consideration of offering CTA students the possibility of furthering this science through an optional subject.

**Knowledges**

The student must acquire adequate knowledge of the meat properties, the processes of conservation and / or transformation that are applied in industries, the effects of processing on the microbiological and organoleptic characteristics, the nutritional and functional properties of meat and finally, the less common treatments being in development.

**Skills or aptitudes**

The student must acquire the skills of analysis, intervention and resolution, since as a professional he will have to deal with situations (problematic or not), such as routines, changes, innovations, developments, conflicts, lack of conformity, etc. The professional must also exercise educational or training functions to improve the activities or solve the problems, whether you are a technician or an inspector.

## Attitudes

The student must be aware of his role as a professional who should contribute to a better supply of meat to the population, with an adequate knowledge of the demands of this responsibility. The student will also have to feel the need for continuous development of their knowledge and skills, with an interest in their own professional improvement

## Competences

### Food Science and Technology

- Apply knowledge of the basic sciences to food science and technology.
- Apply the principles of processing techniques and evaluate their effects on the quality and safety of the product.
- Apply the scientific method to resolving problems.
- Develop individual learning strategies and planning and organisation skills.
- Identify pathogenic, spoilage, and industrially-useful microorganisms, along with the conditions that are favourable or unfavourable to their growth in foods and in industrial and biotechnological processes.
- Search for, manage and interpret information from different sources.
- Show understanding of the mechanisms by which raw materials deteriorate and the reactions and changes that take place during storage and processing, and apply the methods for controlling this.

## Learning Outcomes

1. Apply the scientific method to resolving problems.
2. Apply the technological processes that are specific to milk and dairy products, meat and meat derivatives, fish products, egg products and vegetable products, and understand the modifications to the final product that these processes make.
3. Develop individual learning strategies and planning and organisation skills.
4. Discern the critical control points in each food production process in businesses in the dairy, meat, fishing and aquaculture, eggs and egg products and fruit and vegetable sectors, and also in group catering businesses.
5. Foresee and solve problems that are specific to the food industries.
6. Recognise the changes, spoilage and adulterations that can affect milk, meat, fish products, eggs, vegetables and products deriving from these, and also products made in group catering businesses.
7. Recognise the importance of fermentation processes and appreciate the role of microorganisms in industrial processes.
8. Relate the characteristics of foods to their physical properties.
9. Search for, manage and interpret information from different sources.
10. Select food conservation methods that slow down deterioration.

## Content

### Chapter I. SCIENCE OF MEAT AND OBTAINING OF FRESH MEAT

#### Unit I. PHYSICOCHEMICAL CHARACTERISTICS OF MEAT

Topic 1. Composition. General tables. Factors that modify it. Water: water activity and water retention capacity. Lipids. Muscle structure, muscle fibers (aerobic and anaerobic) and proteins. Carbohydrates. Minority substances

#### Unit II. POST-MORTEM MUSCULAR BIOCHEMISTRY

Topic 2. Transformation of muscle in meat. Concepts. Muscular contraction and energy sources. Main events. Factors that influence the post-mortem changes. Molecular mechanism of rigor mortis. Rigidity resolution: ageing and softening.

Topic 3. Abnormal development of rigor mortis. Effects of stress: DFD, PSE and other meats. Industrial implications and methods of prevention and detection.

#### Unit III. INDUSTRIAL PROCESSING OF CARCASSES

Topic 4. Carcasses and deboning. Concepts. Classification of the carcasses: estimation of the amount of meat. Issues of quality assessment. Cold industrial deboning. Hot deboning.

Topic 5. Co-products and by-products. Concepts Factors that condition their consumption. Description of the main visceras. Casings: natural and artificial (edible and non-edible). Technology of natural gut

Topic 6. Low temperatures: cooling and freezing. Concepts and parameters. Systems: mechanical compression and cryogenic fluids. Storage Modifications and useful life. Defrosting. Differentiation between frozen and non-frozen meats.

Topic 7. Packaging. Concepts. Criteria for the selection of packaging. Materials. Packaging systems. Microbiological changes.

#### Unit IV. QUALITY OF MEAT

Unit 8. The natural microbiota and the added one. Origin and evolution of microorganisms in fresh meat. Main microbial groups. Frequent parasites in meat. Control methods. Useful microorganisms and alterators.

Bioconservation

Topic 9. Physical-chemical and organoleptic quality. Instrumental and sensory measurement and / or determination systems. Relationships. Consumer quality.

### Chapter II. TECHNOLOGY OF MEAT AND DERIVED PRODUCTS.

#### Unit V. GENERALS ON TECHNOLOGY OF MEAT PRODUCTS

Topic 10. General technological processes. Chopping. Defects of minced products. Pre-mixing and mixing. Stuffing. Defects of stuffed products. Coextrusion. Smoking: natural (in cold and hot) and artificial. Desirable and undesirable effects of smoking.

Topic 11. Cured processing. Methods and purposes. Meat characteristics that affect curing systems. Components. Toxicity of nitrites and possible alternatives. Systems for the application of salts. Preparation of brine. Defects of cured products.

Topic 12. Fresh preparations and products. Description. Additives. Elaboration. Storage.

#### Unit VI. DEHYDRATED-CURED MEAT PRODUCTS

Topic 13. Description. Whole products: Iberian and non-Iberian. Chopped products Curing technology. Chambers: features and controls.

Topic 14. Technology of whole products. Stages. Natural microbiota. Modifications during the process. Storage. Accelerated maturation. Defects. Technology of minced products. Formulation and stages of elaboration. Starter cultures. Modifications during the process. Storage. Defects.

#### Unit VII. COOKED MEAT PRODUCTS

Topic 15. Description. Whole products Chopped products: consistent and spreadable. Cooking technology: parameters and types. Methods of monitoring the temperature reached in the thermal center.

Topic 16. Technology of whole products. Stages. Modifications during the process. Packaging and storage. Defects. Technology of emulsion products, consistents and spreadables. Formulation and stages. Modifications during the process. Packaging and storage. Defects

#### Unit VIII. OTHERS

Topic 17. Other raw materials, products and minority treatments. Mchanically recovered meat. Restructured meats. Dehydrated meats. Freeze-dried meats. Emerging technologies. Combined treatments. Cultured meat.

Hands-on practicum

Laboratory: 3 days, 7.5 hours total

Pilot Plant: 3 practices (2, 2.5 and 4 hours).

Seminars: Description of meat products (2 hours); videos on industrial processes (2 hours); Discussion of the results of the practices and tasting of products (2 hours).

## Methodology

- Master classes where the student acquires the basic concepts of the subject.
- Laboratory practices: complete and reinforce the knowledge acquired in the master classes.
- Pilot plan practices: complete and reinforce the knowledge acquired in the master classes and allow the acquisition of pilot work skills.
- Seminars: they complete and reinforce the knowledge acquired in the master classes and allow the acquisition of skills in process modeling and interpretation of conceptual tables.

The practical sessions are of compulsory attendance and the lack of assistance must be justified

- Preparation of cases:

Preparation and evaluation of the proposed cases, telematically or in pairs. It involves the search, selection and analysis of information.

The teaching material used in the subject will be available on the Virtual Campus and / or Moodle Classrooms.

## Activities

| Title            | Hours | ECTS | Learning Outcomes |
|------------------|-------|------|-------------------|
| Type: Directed   |       |      |                   |
| Encompassed      | 6     | 0.24 | 2, 4              |
| Encompassed      | 7.5   | 0.3  | 2                 |
| Encompassed      | 8.5   | 0.34 | 4, 10             |
| Encompassed      | 31    | 1.24 | 2, 6, 8, 10       |
| Type: Supervised |       |      |                   |
| Supervised       | 35    | 1.4  | 1, 9, 3           |
| Type: Autonomous |       |      |                   |
| Autonomous       | 60    | 2.4  | 1, 9, 3           |

## Assessment

I) 50% note: from various tests that will be done throughout the course: Practices (attendance, attitude and results), tests in class before beginning the big blocks, self-study

II) 50% note: final exam that includes all the subjects treated. It will be an examination of all the knowledge, abilities and aptitudes reached. All the information provided throughout the course will be contemplated.

## Assessment Activities

| Title         | Weighting | Hours | ECTS | Learning Outcomes          |
|---------------|-----------|-------|------|----------------------------|
| Final test    | 50%       | 1     | 0.04 | 1, 2, 9, 3, 4, 6, 7, 8, 10 |
| Partial tests | 50%       | 1     | 0.04 | 1, 5                       |

## Bibliography

General manuals (they all are in the library or in the food technology offices)

- \* Bello, J. 2008. Jamón curado. Aspectos científicos y tecnológicos. Perspectivas desde la Unión Europea. Díaz de Santos, Madrid.
- \* Brauer, H. 2009. Technology for boiled sausage production. Allgemeine Fleischer Zeitung, Frankfurt am Main, Alemania.
- \* Brauer, H. 2009. Technology for cooked ham production. Allgemeine Fleischer Zeitung, Frankfurt am Main, Alemania.
- \* Carballo, B. M., G. López de Torre i A. Madrid. 2001. Tecnología de la carne y de los productos cárnicos. Mundi-Prensa Libros, Madrid.
- \* Hui, Y. H., W.-K. Nip, R. W. Rogers i O. A. Young. 2001. Meat science and applications. Marcel Dekker, Nova York, Nova York.
- \* Kerry, J. P. i D. A. Ledward. 2009. Improving the sensory and nutritional quality of fresh meat: new technologies. Woodhead Publishing, Cambridge, Regne Unit.
- \* Lawrie, R. A. i D.A. Ledward. 2006. Lawrie's Meat science, 7a ed. Woodhead Publishing, Cambridge.
- \* Nollet L.M.L. i Toldrá F. (Eds.). 2009. Handbook of Muscle foods analysis. CRC Press, Boca Raton.
- \* Ordóñez, J. A., M. I. Cambero, L. Fernández, M. L. García, G. García, L. de la Hoz i M. D. Selgas. 1998. Tecnología de los alimentos. Vol. II. Alimentos de origen animal. Síntesis, Madrid.
- \* Tarté, R. 2009. Ingredients in meat products: properties, functionality and applications. Springer Science + Business Media, Nova York, Nova York, EUA.
- \* Toldrá F. (Ed.). 2008. Meat biotechnology. Springer, New York.
- \* Toldrá, F. 2009. Safety of meat and processed meat. Springer Science + Business Media, Nova York, Nova York, EUA.
- \* Toldrá, F. 2010. Handbook of meat processing. Wiley-Blackwell, Oxford, Regne Unit.
- \* Warris, P.D. 2010. Meat science: an introductory text. Wallingford. 2nd ed

Electronic books (accessible from a computer connected to a UAB IP or through xpv net)

· <http://www.knovel.com/web/portal/main> (Food science)

· <http://www.sciencedirect.com>

o Encyclopedia of meat science

o Encyclopedia of food and nutrition

Scientific and technical journals

\* *British Poultry Science*

\* *Cárnica 2000*

\* *EUROCARNE*

\* *Fleischwirtschaft International*

\* *The Journal of Applied Poultry Research*

\* *Journal of Muscle Foods*

\* *Meat Processing*

\* *Meat Science*

\* *Procesamiento de la Carne*

\* *Poultry Science*

Adreces web

- American Meat Institute (AMI): <http://www.meatami.com>

- American Meat Science Association (AMSA): <http://www.meatscience.org>

- Centre de Liaison des Industries Transformatrices de Viandes de l'UE (CLITRAVI):  
[http://europa.eu.int/comm/civil\\_society/coneccc/organe\\_consultatif/detail\\_cb.cfm?CL=en&GROUPE\\_ID=26](http://europa.eu.int/comm/civil_society/coneccc/organe_consultatif/detail_cb.cfm?CL=en&GROUPE_ID=26)
- International Meat Secretariat (IMS): <http://www.meat-ims.org>
- Union Européenne du Commerce du Bétail et de la Viande (UECBV): <http://www.uecbv.be>
- World's Poultry Science Association (WPSA): <http://www.wpsa.com>
- AML. Meat safety: <http://www.meatsafety.org>
- Joint Institute for Food Safety and Applied Nutrition, Food safety risk analysis clearinghouse.:  
[http://www.foodrisk.org/meat\\_poultry.cfm](http://www.foodrisk.org/meat_poultry.cfm)
- Asociación Española de Empresas de la Carne (ASOCARNE): <http://www.asocarne.com>
- Asociación de Industrias de la Carne de España (AICE): <http://www.aice.es>
- Asociación Nacional de Almacenes Frigoríficos de Carnes y Salas de Despiece (ANAFRIC):  
<http://www.anafric.es>
- Departament de Salut. Inspecció i control sanitari de la carn:  
<http://www.gencat.net/salut/depsan/units/sanitat/html/ca/aliments/spsalc.htm>.