

Production of Raw Materials

Code: 103255
ECTS Credits: 6

Degree	Type	Year	Semester
2501925 Food Science and Technology	OB	1	2

Contact

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Use of Languages

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

Teachers

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Prerequisites

There are no official prerequisites but it is desirable that the student has acquired the knowledge based on the principles of Biology studied during the previous semester, which will facilitate the understanding the factors that contribute in plant and animal production

Objectives and Contextualisation

This is a first-year basic education course that develops the scientific and technical bases that man uses to improve the performance and quality of food from plant and animal origin for their commercialization in agreement with the current requirements of consumers and the agri-food industry.

The specific training objectives are:

- 1) Acquire the fundamental knowledge of the foundations of plant and animal production and the different production systems. Sustainable production
- 2) Knowing the main techniques used to obtain, conserve and transform products of plant and animal origin of highest yield and of the highest possible quality.
- 3) Knowing the main vegetable and animal species used in food, its productive objectives and the different forms of use.
- 4) Understand the relationship between botanical, physiological, environmental factors, production system, harvesting, post-harvest, and the chemical composition and quality of the raw materials and foods obtained.

5) Knowing the factors, both intrinsic and extrinsic, that influence the characteristics of products of animal origin

Competences

- Display knowledge of the physical, chemical, biochemical and biological properties of raw materials and foods.
- Identify the sources and the variability of raw materials in order to predict their impact on processing and food.
- 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. Define the biochemical processes of fruit and vegetable ripening.
2. Describe the methods for controlling the deterioration of raw materials of plant and animal origin.
3. Describe the principal raw materials and classify them in terms of their usefulness in nutrition.
4. Describe the processes of plant respiration and transpiration.
5. Enumerate the factors that influence the obtainment of raw materials of animal origin during the farm production cycle.
6. Identify the economic importance of raw materials in relation to their origin and production.
7. Identify the importance of correct timing in crop-picking, in terms of the product's destination.
8. Relate the factors of plant production to the chemical composition of the products.
9. Relate the intrinsic and extrinsic factors that influence the obtainment of raw materials of plant and animal origin to the composition and properties of the above products.
10. Relate the production systems of raw materials of plant and animal origin to their composition and properties.

Content

MASTER CLASSES

PART I. CROP PLANTS AND THE ENVIRONMENT

Lesson 1. Plant production. Origin and evolution of agriculture. Concept. Targets. Scientific and technical bases of plant production. Classification of production systems. Classification of foods of plant origin.

Lesson 2. Plant growth and development factors. Concepts. External factors: Sun radiation, temperature, water, soil. Internal factors: Genetic, Plant Growth Regulators. Applications of Plant Growth Regulators.

Lesson 3. The soil and plant requirements. Organization. The solid phase. The liquid phase. The gas phase. Properties and edaphic features. Soil fertility.

Lesson 4. Mineral nutrition of plants. Essential elements. Absorption of nutrients. Symptoms of deficiency and toxicity. Foliar analysis. Hydroponic crops.

PART II. TECHNOLOGY OF PLANT PRODUCTION

Lesson 5. Soil Fertilization. Concept and classification of fertilizers. Inorganic and organic fertilizers. Choice, application and errors in the use of fertilizers. Correction of land properties: amendments.

Lesson 6. Water and irrigation systems. Water and cultivated plants. Quality of the water of irrigation. Irrigation systems.

Lesson 7. Weeds. Definition Damage caused by weeds. Classification. Weed control. Types of herbicides and

dangers of their use.

Lesson 8. Diseases of plants. Disease or pest agents. Development and identification of diseases. Fighting and control methods. Use of pesticides.

Lesson 9. Propagation of cultivated species. Sexual propagation. Autogamous plants. Hybrids and varieties. Pure lines. Control of seeds quality.

Lesson 10. Propagation of cultivated species. Asexual propagation. Nature and importance. Techniques of asexual multiplication. Grafting techniques. Rootstocks. Layering.

Lesson 11. Techniques of micropropagation. Tissue culture Current situation and perspectives. Tissue culture systems. Installation and equipment. Preparation of culture media.

Lesson 12. Herbaceous crops. Cereals. Legumes Other crops of interest. Rotation and alternative crops.

Lesson 13. Cultivated vegetables. Economic importance. Crop requirements. Cultural operations. Natural enemies and pests.

Lesson 14. Woody crops I. Economic importance. Main products. The vineyard plantation. The vineyard for winemaking and for direct consumption. Olive tree cultivation

Lesson 15. Woody crops II. Temperate fruit trees culture. Fleshy fruits and nuts. Citrus fruit culture. Tropical and subtropical fruit crops.

PART III. INTRODUCTION TO ANIMAL PRODUCTION

Lesson 16. Classification and importance of products of animal origin. Definition of zootechnics and animal production. Evolution of animal production. Food Security. Classification of products of animal origin. Production of meat from different species (pork, poultry, beef and sheep), milk and eggs in the world, in the EU, in Spain and in Catalonia.

Section A: PRODUCTION OF EGGS

Lesson 17. The commercial egg. Productive sector. Productive cycle of laying hens. Egg production curve for a laying flock. Description of the productive sector. Traceability (Identification and Labeling). Egg labels (organic, free-range, barn and cage). Classification, storage and marketing of eggs.

Lesson 17. Structure and formation of the egg. Structure, composition and functions of the different parts of the egg. Differences between species. Egg formation process and alterations.

Lesson 19. Egg quality. Factors affecting egg shell quality and egg internal quality (albumen and yolk) in laying hens. The effect of storage time on egg quality. .

Section B: PRODUCTION OF MILK

Lesson 20. Milk from cow and other species. Milk: physical-chemical definition. Composition of milk and relationship between components. Chemical composition of milk from different mammalian species. Quality of milk. Productive factors that influence the sanitary and bromatological quality of milk.

Lesson 21. The mammary gland. Functional structure of the udder. Physiology of milk production. The fractions of milk in the udder, the dairy aptitude and milking routines. The milking machine.

Lesson 22. Lactation curve. Amount and composition. Lactation curve. Standardization and modeling of the lactation curve. Factors that condition milk production and composition

Lesson 23. Production cycle of dairy animals. Description of the productive cycle: calving, lactation, mating and drying. Life cycle of dairy cows, sheep and goats. Dairy breeds.

Section C: PRODUCTION OF MEAT

Lesson 24. Muscle and meat. Definition of meat. Macroscopic and microscopic structure of the muscle.

Lesson 25. Growth and development. Definition. Stages. Main factors that affect growth rate. Forms of growth expression. Modifications due to development. Concept of precocity. Allometry and allometric coefficient.

Lesson 26. The carcass. Process from the farm to the consumer. Definition of carcass and fifth quarter. Transformation of the live animal in carcass and offal. Chain of sacrifice. SRM (Specified Risk Material). Carcass yields. Commercial carcass classification by species. Evolution of the muscle between the slaughter and meat consumption. DFD and PSE meats. Muscle abnormalities in the broiler (wooden-breast, White Striping,...). Productive factors that influence the organoleptic characteristics of meat.

Lesson 27. Pig, poultry and rabbit production. Biological and productive cycle of swine and rabbit species. Crossings, handling and farm types. Structure of poultry production. Productive cycle of broilers, other varieties of chicken meat and turkey.

Lesson 28. Production cycle of ruminants for meat. Productive cycle of beef, lamb and goats. Types of meat. Breeds.

Section D: AQUACULTURE

Lesson 29. Production cycle of molluscs and crustaceans. Main species of molluscs and crop crustaceans. Biological and productive cycle. Type of culture.

Lesson 30. Production cycle of fish. Main marine and freshwater species of commercial interest. Biological and productive cycle. Type of culture

SEMINARS

S1. Agriculture and environment. Sustainable agriculture and alternatives (1h).

S2. Applications of Biotechnology to Plant Production: Transgenic crops (1h).

S3. Quality and conservation of plant products (1h).

S4. Protected and forced crops (1h).

S5. Glossary and basic concepts about Animal Production (1h).

S6. Sustainable Development Goals (SDGs) (1h).

S7. Swine production: Genetic selection. The problem of pig slurry (1.5h)

PRACTICAL CLASSES

P1. The soil. Physical and chemical properties (5 h)

P2. Recognition of raw materials and foods of plant origin (2.5 h)

P3. Influence of different intrinsic and extrinsic factors on the quantity and characteristics of the eggs and milk produced (2.5 h)

P4 Visit to the UAB farms (2.5h)

P5 Influence of different intrinsic and extrinsic factors on the characteristics of the meat produced (2.5 h)

Methodology

The methodology used in this subject to achieve the learning process is based on the fact that students work on the information that is available to them. To achieve this goal, the subject is based on the following activities:

Master classes: With these classes the student acquires the basic scientific-technical knowledge of the subject that must be completed with the personal study of the topics explained. During the theoretical classes of the Part III products of animal production origin, several training activities will be carried out and will be evaluated.

Seminars: Seminars are sessions with a small number of students where the scientific-technical knowledge exposed to the master classes are worked to complete their comprehension and deepen each one, favoring the discussion, exchange of ideas, capacity of analysis and synthesis and critical reasoning. In the seminars there will be several activities that will be evaluated.

Practical lessons: The objective of the practical lessons is to complete, apply and reinforce the knowledge acquired in the master classes and seminars. During the laboratory and farm practical sessions, students will work on different materials (soils, seeds, flours, plants, ...), performing different types of analysis and observations. In the classroom practices, students will be asked about different issues that will have to be resolved.

Self-learning work: The students will do two case studies. It is intended that the student from a real situation can solve a problem posed. The mission of the case study is to promote the capacity for analysis, reasoning and expertise in the resolution of problems related to the professional field.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes	30	1.2	1, 2, 4, 3, 5, 7, 6, 8, 9, 10
Practical lessons	15	0.6	3, 8, 9, 10
Seminars	7.5	0.3	2, 5, 7, 8, 9, 10
Type: Supervised			
Student tutoring	4.5	0.18	1, 2, 3, 5, 7, 6, 8, 9, 10
Type: Autonomous			
Self study	60	2.4	1, 2, 4, 3, 5, 7, 6, 8, 9, 10
Self-learning work	30	1.2	9, 10

Assessment

In order to evaluate the degree of achievement of the competencies, the following instruments will be counted:

Exams: The students' knowledge will be assessed individually in theory, seminars and practices, as well as their capacity for analysis and synthesis. Two written tests of type test and / or short questions will be made. The two partials exams will mediate between them as long as the marks obtained are at least 4.5. The activities carried out during the theoretical classes and seminars of the part of animal production can score 0.5

points that will be added to the mark of the examination of this part. The final mark of the theory part will be the average between the marks of the two parts. The students who do not score a minimum of 5 after completing the two partial tests will have second chance. This evaluation has a weight on the final mark of 70%.

Practical lessons: The practical sessions are mandatory and will be evaluated individually. This evaluation has a global weight of 10%.

Case study: The capacity for synthesis and coherence will be assessed in the discussion of results and decision making and will have a value of 20% on the final mark of the subject.

To pass the subject, it is essential to have passed the theory part (≥ 5) and have attended a minimum of 80% of the practical lessons.

It will be considered that a student is not assessed if he has participated in assessment activities that represent $\leq 15\%$ of the final mark.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Partial exams (2)	70% (35% Plant+35% Animal)	3	0.12	1, 2, 4, 3, 5, 7, 6, 8, 9, 10
Practical lessons	10%	0	0	3, 8, 9, 10
Self-learning	20%	0	0	9, 10

Bibliography

BIBLIOGRAPHY

- BUXADÉ C. 1995. Zootecnia. Bases de Producción Animal (10 Tomos). Ediciones Mundi-Prensa.
- CAÑEQUE V., SAÑUDO C. 2005. Estandarización de las metodologías para evaluar la calidad del producto (animal vivo, canal, carne y grasa en los rumiantes). Ed. Mundi Prensa. Madrid.
- CASTELLÓ y col. 2010. Producción de huevos. Real Escuela de Avicultura.
- GIL ALBERT. 1992. Tratado de arboricultura frutal. Vol. I, II, III, IV. Ed. Mundi-Prensa. Madrid. GUERRERO A. 1999. Cultivos herbáceos extensivos. Ed. Mundi-Prensa, Madrid.
- GUERRERO A. 2000. El suelo, los abonos y la fertilización de los cultivos. Ed. Mundi-Prensa, Madrid.
- HARTMAN, H.T., HESTER D.E. 1992. Propagación de Plantas. Ed. CECSA. Mexico.
- LOPEZ BELLIDO, L. 1991. Cultivos herbáceos Vol. I. Cereales. Ed. Mundi-Prensa. Madrid ORDOÑEZ JA. 1998. Tecnología de los alimentos. Vol. II. Alimentos de origen animal. Ed Mundi-Prensa. Madrid.
- ORDOÑEZ JA. 1998. Tecnología de los alimentos. Vol. II. Alimentos de origen animal. Ed Mundi-Prensa. Madrid.
- VILLALOBOS F.J., MATEOS L., ORGAZ F., FERRES E. 2002. Fitotecnia: bases y tecnologías de la producción agrícola. Ed. Mundi-Prensa, Madrid.
- WITTWER, S.H. 1995. Food, Climate and World Food Production. CRC Press, Inc. Florida. USA.

Enllaços web

- + Comisión Europea, Agricultura y Desarrollo Rural: http://ec.europa.eu/agriculture/index_es.htm

+ DAAM (Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural):
<http://www20.gencat.cat/portal/site/DAR/>

+ FAO (Food and Agriculture Organization): <http://www.fao.org/>

+ Informació agrària: <http://www.infoagro.com/>

+ INM (Instituto Nacional de Meteorología): <http://www.inm.es/>

+ MAAMA (Ministerio de Agricultura, Alimentación y Medio Ambiente): <http://www.marm.es/>

+ Servei meteorològic de Catalunya: <http://www.gencat.net/servmet/>