390343 - ANA - Animal Feeding and Nutrition

Coordinating unit: 390 - ESAB - Barcelona School of Agricultural Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology
Academic year: 2019
Degree: BACHELOR’S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan, Spanish, English

Degree competences to which the subject contributes

Specific:
CE-CA-20PA. (ENG) Tecnologías de la producción animal.
CE-CA-22PA. (ENG) Ingeniería de las explotaciones agropecuarias

Transversal:
CTS. (ENG) Uso solvente de los recursos de información. Gestionar la adquisición, la estructuración, el análisis y la visualización de datos e información en el ámbito de especialidad y valorar de forma crítica los resultados de dicha gestión.

Teaching methodology

The hours of directed learning consist on:
- Theoretical classes (large group); the teachers make an exposition with three parts: (1) introduce the learning objectives, (2) present the basic concepts (3) look for the student's involvement / from questions or case presentation in order to relate the indicated concepts.

- Practical classes (small group) will work the chemical analysis and the identification of the raw materials of the nutrition. Different types of feeds will be formulated through computer programs. A visit to a feed and livestock factory will be carried out

- Guidance of the student in the elaboration of management plans of the production for an exploitation. They will have to consult different sources of information specific to the work to be carried out.

The support materials in addition to the bibliography are class expositions, practical guides, complementary readings and everything available at ATENEA. Autonomous learning is promoted through part of this material as well as stimulating the search for new material by students.

The bibliography will be provided during the course of teaching. This will include books available in the library and internet pages from trusted funds.

Learning objectives of the subject

When connecting with the subject, students acquire the knowledge and skills to establish the nutritional needs of the different animals for different physiological and productive situations; designing rations based on the nutritional requirements and the productive objectives of the different species. To determine the best presentation and technology applicable to each ration and to implement management plans for production in different species and production systems. Thus, the student will know and value the available raw materials in response to the needs of animals.
# Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 40h</th>
<th>26.67%</th>
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</thead>
<tbody>
<tr>
<td>Hours small group:</td>
<td>20h</td>
<td>13.33%</td>
</tr>
<tr>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</table>
# 390343 - ANA - Animal Feeding and Nutrition

## Content

<table>
<thead>
<tr>
<th>FOOD IDENTIFICATION</th>
<th>Learning time: 5h</th>
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td></td>
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<tr>
<td>The foods, grouped by their taxonomies and their relationship with the contents in energy, protein and fats, are presented. Main producing countries and their links with geopolitics and history, both in the country and in the products in question are explained: grass and forage crops, silage and hay, fodder dehydrated, straw, roots, tubers and by-products. Cereals and by-products. Protein concentrates and additives.</td>
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<tr>
<td><strong>Related activities:</strong></td>
<td></td>
</tr>
<tr>
<td>Activity 1: theory classes</td>
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<td>Activity 2</td>
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<table>
<thead>
<tr>
<th>ANALYSIS AND EVALUATION OF FOODS</th>
<th>Learning time: 59h</th>
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<tbody>
<tr>
<td><strong>Description:</strong></td>
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<tr>
<td>Food evaluation methods are indicated for their main variables: protein, fat and fibres (Jeldahl methods for total nitrogen, Soxhlet for fat and Van Soest and Weende for fibres). The main foods, forages, concentrates and supplements are identified and evaluated. General concepts Methods of nutrient analysis. Gastrointestinal tract: anatomy and physiology. Methods for estimating nutritional requirements.</td>
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<tr>
<td><strong>Related activities:</strong></td>
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<tr>
<td>Activity 1</td>
<td></td>
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<tr>
<td>Activity 2</td>
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<tr>
<td>Activity 6: Food analysis</td>
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## ANIMAL FEEDING

### Learning time: 86h
- Theory classes: 20h
- Laboratory classes: 16h
- Self study: 50h

### Description:
The fundamental concepts of Nutrition and Animal Feeding are defined. For different species, cow milk and beef, sheep, pig, and poultry nutritional needs according to physiological state and design appropriate formulas, are calculated. The manufacture of feed is described and the properties of the different presentations and their use in the different production systems are documented. Parts of a feed factory: reception and storage, transportation of raw materials, dosage, melding, blending, granulation, final production, analysis of dangers and control of critical points.

### Related activities:
- Activity 1: theory classes
- Activity 2: Individual test
- Activity 3: Formulation of rations
- Activity 4: Visit
- Activity 5: Journey
- Activity 6: Food analysis
# Planning of activities

## ACTIVITY 1: CLASSES OF THEORETICAL EXPLANATION

<table>
<thead>
<tr>
<th>Hours: 76h</th>
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<tbody>
<tr>
<td>Self study: 38h</td>
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<tr>
<td>Theory classes: 38h</td>
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</table>

**Description:**

## ACTIVITY 2: INDIVIDUAL EVALUATION TESTS

<table>
<thead>
<tr>
<th>Hours: 2h</th>
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<tr>
<td>Theory classes: 2h</td>
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**Description:**
- Two individual written tests about the contents. The first test will include questions about contents 1, 2 (food evaluation techniques) and the second on content 3 (Food). Formulation of a complete ration appropriate for different species and productive stages.

**Support materials:**
- Statement of tests

**Descriptions of the assignments due and their relation to the assessment:**
- Resolution of the test. Represents 60% of the final mark of the subject (30% for each)
- The test will be performed at the end of the theoretical items of the corresponding contents

**Specific objectives:**
- At the end of the first test, the student must be able to describe the different available techniques, establishing the role of the Agricultural Engineer and the available legislation. To describe the theoretical foundations of the different technologies applied to the evaluation of foods, establishing the appropriate methodology for each species, identifying and specifying solutions to the main productive problems.
- At the end of the second test they will have to be able to define the fundamental concepts of Animal Nutrition, to know the raw materials involved, to identify and to describe feed manufacturing technologies, to calculate the nutritional needs of different species and physiological and productive states, and to relate nutrition to health, animal welfare and quality of products.

## ACTIVITY 3: FORMULATION OF RATIONS

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<th>Hours: 24h</th>
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<tr>
<td>Laboratory classes: 4h</td>
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<td>Self study: 20h</td>
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**Description:**
- To formulate the complete ration suitable for different species and productive stages.

**Support materials:**
- Class material, bibliography and Internet sites, spreadsheets and rationing software.

**Descriptions of the assignments due and their relation to the assessment:**
- The formula of rations with the appropriate comments and directions. It represents 10% of the final grade of the subject. It helps to monitor the Generic Competence.
ACTIVITY 4: VISIT

**Description:**
A processing centre will be visited in order to know both the management of the reproduction and the manufacture of feed. Writing a reproduction management plan in a livestock farm. Description of the farm, objectives to be achieved, task planning, task description, possible problems and solutions.

**Support materials:**
Class material and material delivered by the farm, bibliography, Internet resources.

**Specific objectives:**
- At the end of the first test the student must be able to:
  - To calculate nutritional needs based upon the different physiological states.
  - To evaluate the nutrient content of foods and their indications of use.
  - To make a ration and comment on its use.

ACTIVITY 5: CAMP EXIT

**Hours:** 19h
Laboratory classes: 4h
Self study: 15h

**Description:**
Two farm outings to study the reproduction of rabbits and chickens and the different nutrition systems. Data from nutrition tests will be collected and statistically evaluated. Egg fertilization will be assessed, and an incubator will be used.

**Support materials:**
Class material and bibliography.

**Specific objectives:**
- Manage and evaluate the reproduction of rabbits and poultry. Design, collect data and evaluate an animal nutrition test.

**Hours:** 9h
Self study: 3h
Laboratory classes: 6h
ACTIVITY 6: ANALYSIS OF FOOD

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<th>Description:</th>
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<tr>
<td>Two sessions of physical-chemical analysis of foods and nutrition assessment.</td>
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<tr>
<td>The methodology of food, physical and chemical evaluation is studied. Different samples shall be sent to the students who will have to evaluate them.</td>
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<tr>
<td>Support materials:</td>
</tr>
<tr>
<td>Classroom material, laboratory material, food samples, spreadsheets.</td>
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<tr>
<td>Descriptions of the assignments due and their relation to the assessment:</td>
</tr>
<tr>
<td>Nutrition evaluation report of the samples delivered. It represents 10% of the final grade of the subject. It helps to monitor the Generic Competence.</td>
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<tr>
<td>Specific objectives:</td>
</tr>
<tr>
<td>At the end of the activity, students will be able to recognize foods, categorize them based upon their nutrient content according to the bibliography but also by physical, chemical and visual techniques.</td>
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</tbody>
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Qualification system

The final mark of the subject (Nfinal) will be the weighting of the different tests and works evaluated: N1: two individual written tests, when finishing the theoretical and practical classes of the contents 1, 2 (test 1) and 3 (test 2). Specific weight in the final grade: 60%. (30% each)

N2: delivery of the commented rations of the various species (activity 3). Specific weight in the final grade: 10%.

N3: Qualification of the visit with production management plan, paper report and assistance. (activity 4) to be delivered one week after the activity. Specific weight in the final grade: 5%.

N4: Exit qualification, paper report and assistance. (activity 5) to be delivered at the end of the school period. Specific weight in the final grade: 5%.

N5: Qualification of the delivery of a reasoned nutrition evaluation report. (activity 6) to be delivered at the end of the school period. Specific weight in the final grade: 10%.

Nfinal = 0.60 N1 + 0.10 N2 + 0.10 N3 + 0.05 N4 + 0.15 N5

Bibliography