



CIHEAM

International Centre for Advanced  
Mediterranean Agronomic Studies  
Mediterranean Agronomic Institute of Zaragoza



Universidad  
Zaragoza



Fundación Española para el Desarrollo de la Nutrición Animal

## International Master in

# ANIMAL NUTRITION (5<sup>th</sup> edition)

Zaragoza (Spain), 28 September 2015 – 3 June 2016  
September 2016 – June 2017

### 1. Objectives

Modern animal production systems cannot continue to operate on a merely productionist basis. It is vitally important to ensure product quality and safety as well as variety in order to satisfy consumer demand and for the farms and livestock industries to remain competitive on the market. Furthermore, today both consumers and public administrations are showing increasing concern for issues of food safety, protection of the environment and greater animal welfare. Therefore it is necessary to vary the traditional bases of production to establish a balance between obtaining food resources of animal origin, guaranteeing quality production and ensuring the sustainability of production systems.

Animal nutrition, as one of the main pillars of livestock production, should therefore adapt to this new situation and continue to guarantee high productivity whilst paying attention to its influence on product quality and safety at the same time. Furthermore, it should minimize environmental impact and continue to contribute to the management of natural and rural areas, that are particularly fragile in the Mediterranean region.

Therefore it is necessary to train young professionals and scientists in this field so that from both the public and private sectors they can accommodate these changes and develop sustainable production systems.

The Master enables the participants to:

- Update scientific bases and fundamental mechanisms of animal feeding and nutrition.
- Gain experience in the application of the most advanced methods and techniques and in the formulation of specific feeding strategies of the main species of interest in animal husbandry.
- Be capable of planning, developing and managing nutrition programmes aimed at obtaining safe and high-quality food.
- Be introduced into research, critically applying acquired knowledge, capacities and abilities to the treatment of problems related to animal nutrition.
- Exchange experiences and points of view, enhanced through a programme developed in a highly international and interprofessional context.

### 2. Organization

The Master is organized by the Mediterranean Agronomic Institute of Zaragoza (IAMZ) of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), the University of Zaragoza (UZ) and the Spanish Foundation for the Development of Animal Nutrition (FEDNA), with the collaboration of the Polytechnic University of Madrid (UPM), and it is an official Master of the Spanish university system within the framework of the European Space for Higher Education.

The Master is developed over two academic years on a full-time basis [120 credits, following the European Credit Transfer System (ECTS)] and is structured in two parts.

The first part of the Master (60 ECTS) is professionally oriented and comprises lectures, practicals, technical visits, tutored personal work and a professional training stage. This part will take place at IAMZ and UZ from 28 September 2015 to 3 June 2016, and will be given by well qualified lecturers from UZ and from international organizations, universities, research centres, administration services and private companies in different countries.

The second part of the Master (60 ECTS) constitutes a period of initiation to research in which participants work on the Master of Science Thesis. This part will begin from September 2016 onwards and will last 10 months in which research work will be conducted followed by the elaboration of the thesis, that must be publicly defended and approved by an international examining board.

Participants may, if they wish, complete only the first part of the Master, that constitutes a postgraduate specialization course.

### 3. Diplomas

For those participants who have passed the necessary examinations and have obtained 60 ECTS taking the full first part of the Master, the UZ will recognize credits obtained in this first part to continue studies in the framework of its official postgraduate programme. CIHEAM will award the **Postgraduate Specialization Diploma** to these participants.

Participants who passed the first part of the Master may, once an experimental protocol has been presented, complete the second part to obtain the **Master Degree**. The official Spanish degree will be awarded by UZ and CIHEAM will award its **Master of Science Degree**.

### 4. Academic organization

The first part of the Master is held in three terms, with morning and afternoon sessions. This part is made up of complementary but independent units so that participants may attend, if they wish, only one or several. Point 9 shows credits awarded to each unit.

This part requires personal work and interaction among participants and with lecturers, its international characteristics favouring the exchange of experiences and points of view. Formal lectures are complemented by tutorials, laboratory practicals, computer practicals and technical visits.

During this first part the participants elaborate a project on an individual basis on innovative techniques or methodologies in animal nutrition and their application in a production context. Otherwise, the project may focus on the design of a nutrition programme for a



particular species, applied to a given production system and to the conditions of an area in the students' countries of origin.

Furthermore, participants carry out a professional training stage of one month in an industry, livestock farm or other type of institution related with the sectors of animal nutrition or agro-food products.

During the second part of the Master, participants complete 60 ECTS focused on the introduction to research and on the elaboration of a Thesis based on the results of an original research work, once the candidate has prepared an experimental protocol submitted under the supervision of the thesis tutor. Only those participants that have obtained an average score of 70 over 100 or more in the first part of the Master may opt for second part scholarships awarded by IAMZ. The experimental work for the elaboration of the thesis will be carried out in institutions collaborating with CIHEAM and the University of Zaragoza, or in the University of Zaragoza, in particular the Faculty of Veterinary Science, for a period of 10 months, under the direction of a tutor who should be a doctor of renowned experience.

The Master's website offers detailed information about the different aspects of the programme (<http://masters.iamz.ciheam.org/en/animalnutrition>).

## 5. Admission

The first part of the Master is designed for a maximum of 30 participants complying with the following conditions:

- University degree, preferably in agronomy, veterinary sciences, biology or another related field.
- Knowledge of biology, physiology and statistics. Previous professional experience in animal nutrition will be valued.
- Knowledge of Spanish which will be the working language. Given the diverse nationalities of the teaching staff, simultaneous interpretation into Spanish will be provided. However, knowledge of English and French will be considered in the selection of candidates, since bibliographical material may be distributed in any of the three languages. IAMZ organizes an intensive Spanish language course starting in July for those who require it.

## 6. Registration

Application forms may be obtained from:

**Instituto Agronómico Mediterráneo de Zaragoza**  
Avenida de Montañana 1005, 50059 Zaragoza (Spain)  
Tel.: +34 976 716000 - Fax: +34 976 716001  
e-mail: [iamz@iamz.ciheam.org](mailto:iamz@iamz.ciheam.org)  
Web: [www.iamz.ciheam.org](http://www.iamz.ciheam.org)

Candidates should send the completed application form to the above address accompanied by:

- *Curriculum vitae*, stating university degree, experience and professional activities
- Transcript of records (courses undertaken, with grades achieved)
- Certificates of language knowledge
- Reasons for applying to the Master

The deadline for the submission of applications from non-Spanish candidates is 4 May 2015.

The first deadline for the submission of applications from Spanish candidates and European candidates with knowledge of Spanish is 30 June 2015. Candidatures presented by this deadline will have preference. The second deadline will be 15 September 2015.

Applications from those candidates who cannot present their complete records when applying, or those requiring authorization, may be accepted provisionally. Registration will be formalized at the beginning of the programme.

Registration fees for each academic year of the Master amount to 2900\* euro. This sum covers tuition fees only. For candidates wishing to partially attend the first part of the Master, the fees will be calculated on a *pro rata* basis.

(\* This price is orientative and may vary slightly when 2015 official prices for credits of Master postgraduate programmes are determined at UZ.

## 7. Scholarships

Candidates of any nationality may apply for full or partial registration fee scholarships.

Candidates from CIHEAM member countries (Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey) may also apply for scholarships covering the cost of travel and full board accommodation in the Hall of Residence on the Aula Dei Campus. Candidates from other countries who require financial support should apply directly to other national or international institutions.

## 8. Insurance

It is compulsory for participants to have medical insurance valid for Spain. Proof of insurance cover must be given at the beginning of the Master. Those who so wish may participate in a collective insurance policy taken out by the IAMZ, upon payment of the stipulated sum.

Registration fees include accident insurance cover.

## 9. Structure and contents of the first part of the Master

Evolution of animal nutrition in the context of industry and society requirements

- PRINCIPLES OF ANIMAL NUTRITION (10 ECTS)
    - 1.1. Feed composition, nutrient digestion and metabolism
    - 1.2. Feed evaluation
    - 1.3. Nutrient requirements
    - 1.4. Feed intake
  - FEEDSTUFFS AND FEED TECHNOLOGY: COMPOSITION, QUALITY AND SAFETY (10 ECTS)
    - 2.1. Feed components and feed categories
    - 2.2. Feed technology
    - 2.3. Raw material and compound feed quality
    - 2.4. Feed safety
  - ANIMAL FEEDING, AND FOOD QUALITY AND SAFETY (15 ECTS)
    - 3.1. General aspects about animal product quality and safety
    - 3.2. Feeding for milk production: cattle, sheep and goats
    - 3.3. Feeding for meat production in ruminants: cattle, sheep and goats
    - 3.4. Feeding for meat production in monogastrics: pigs, poultry and rabbits
    - 3.5. Feeding for egg productionSubjects dealt with according to different productions (3.2 to 3.5):
    - Biological cycles and production systems
    - Lactation curve, milk yield and milk composition
    - Modification of milk quality and dairy products through nutrition
    - Non-nutritional factors influencing carcass and meat quality
    - Modification of carcass and meat quality through nutrition
    - Egg production performance and biosynthesis of egg components
    - Modification of egg quality through nutrition
    - Feeding strategies and rationing for young and adult animals
    - Prevention of digestive and metabolic disorders
    - Economic considerations
  - 3.6. Fish nutrition and feeding
- MATHEMATICAL AND STATISTICAL METHODS IN ANIMAL NUTRITION (5 ECTS)
  - 4.1. Data analysis and experimental design
  - 4.2. Meta-analysis of experimental data
  - 4.3. The use of modelling as a tool in animal nutrition
- REPERCUSSIONS OF NUTRITION ON THE ENVIRONMENT AND ON ANIMAL HEALTH AND WELFARE (6 ECTS)
  - 5.1. Health and nutrition
  - 5.2. Welfare and nutrition
  - 5.3. Animal production and environmental interactions
  - 5.4. Reducing environmental impact in intensive systems through nutritional management
  - 5.5. Livestock/environment interactions in extensive systems
  - 5.6. Environmental-friendly production systems
- INDIVIDUAL PROJECT (7 ECTS)
- PROFESSIONAL TRAINING STAGE RELATED TO ANIMAL NUTRITION (7 ECTS)

## LECTURERS PARTICIPATING IN THE 2013-14 EDITION OF THE FIRST PART OF THE MASTER

J. ACEDO-RICO, Consultant, Madrid (Spain)  
J. AGABRIEL, INRA, Clermont-Theix (France)  
R. ALASTRUE, Consultant, Zaragoza (Spain)  
P. ALBERTI, CITA-GA, Zaragoza (Spain)  
V. ALONSO, Univ. Zaragoza (Spain)  
R. AMEJEIRAS, Trouw Nutrition, Madrid (Spain)  
I. ARANA, Univ. Pública Navarra, Pamplona (Spain)  
A. ARIÑO, Univ. Zaragoza (Spain)  
J. BALCELLS, Univ. Lleida (Spain)  
A. BARROETA, Univ. Autónoma Barcelona (Spain)  
R. BAUMONT, INRA, Clermont-Theix (France)  
S. BAYARRI, Univ. Zaragoza (Spain)  
J.A. BELTRÁN, Univ. Zaragoza (Spain)  
V. BERTHELOT, AgroParisTech, Paris (France)  
F. BOCQUIER, SupAgro, Montpellier (France)  
G. CAJA, Univ. Autónoma Barcelona (Spain)  
S. CALSAMIGLIA, Univ. Autónoma Barcelona (Spain)  
M. CALVO, Univ. Zaragoza (Spain)  
M.M. CAMPO, Univ. Zaragoza (Spain)  
R. CARABAÑO, Univ. Politécnica Madrid (Spain)  
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J.J. CARRAMIÑANA, Univ. Zaragoza (Spain)  
I. CASASÚS, CITA-GA, Zaragoza (Spain)  
I. CASTELLANOS, Biología y Nutrición, Zaragoza (Spain)  
C. CASTRILLO, Univ. Zaragoza (Spain)  
R. CEPERO, Univ. Zaragoza (Spain)  
A. DALMAU, IRTA, Monells (Spain)  
C. DE BLAS, Univ. Politécnica Madrid (Spain)  
P. DE FRUTOS, CSIC-ULE, León (Spain)  
B. DE LA ROZA, SERIDA, Villaviciosa (Spain)  
A. DE VEGA, Univ. Zaragoza (Spain)  
I. DELGADO, CITA-GA, Zaragoza (Spain)  
J. DEMEY, IDEA, Caracas (Venezuela)  
P. DENNIS, Univ. Aberystwyth (UK)  
J.Y. DOURMAD, INRA, Saint-Gilles (France)  
M.P. ELLIES, Bordeaux Sciences Agro (France)  
A. FERRET, Univ. Autónoma Barcelona (Spain)  
F. FILLAT, CSIC-IPE, Jaca (Spain)  
M. FONDEVILA, Univ. Zaragoza (Spain)  
J. GARCÍA ALONSO, Univ. Politécnica Madrid (Spain)  
F. GARCÍA-LAUNAY, INRA, Saint-Gilles (France)  
P. GARCÍA REBOLLAR, Univ. Politécnica Madrid (Spain)  
P. GARNSWORTH, Univ. Nottingham (UK)  
J. GASA, Univ. Autónoma Barcelona (Spain)  
G. GONZÁLEZ MATEOS, Univ. Politécnica Madrid (Spain)  
M. GORRACHATEGUI, Consultant, Madrid (Spain)  
J.A. GUADA, Univ. Zaragoza (Spain)  
M. JOVER, Univ. Politécnica Valencia (Spain)  
M. JUÁREZ, CSIC-IE, Madrid (Spain)  
I. KYRIAZAKIS, Univ. Newcastle (UK)  
C. LÓPEZ-BOTE, Univ. Complutense Madrid (Spain)  
R.E. MACCHIAVELLI, Univ. Puerto Rico, Mayagüez (Puerto Rico)  
I. MARGINET, ASFAC, Barcelona (Spain)  
G. MARÍA, Univ. Zaragoza (Spain)  
B. MARTIN, INRA, Clermont-Theix (France)  
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J. MILNE, The James Hutton Institute, Aberdeen (UK)  
E. MOLINA, Univ. Lleida (Spain)  
D. MORGAVI, INRA, Clermont-Ferrand (France)  
J.L. OLLETA, Univ. Zaragoza (Spain)  
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R. OSTA, Univ. Zaragoza (Spain)  
C. PÉREZ ARQUILLUÉ, Univ. Zaragoza (Spain)  
J.F. PÉREZ HERNÁNDEZ, Univ. Autónoma Barcelona (Spain)  
C. POMAR, Agriculture and Agri-Food, Lennoxville (Canada)  
O. RIBÓ, EFSA, Parma (Italy)  
N. RIHANI, FAO, Roma (Italy)  
G. RINCÓN, ZOETIS, Kalamazoo (US)  
J. ROBERTSON, Univ. Aberdeen (UK)  
J. ROBINSON, SAC, Aberdeen (UK)  
C. RODELLAR, Univ. Zaragoza (Spain)  
R. ROSA GARCÍA, SERIDA, Villaviciosa (Spain)  
R. SALA, Univ. Autónoma Barcelona (Spain)  
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See updated information at

<http://masters.iamz.ciheam.org/en/animalnutrition>



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