



Advanced Course

# Modelling, Measurement and Mitigation of the Environmental Impact of Livestock Production Systems

Zaragoza (Spain) • 12-16 December 2022



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## Objective

Climate change is probably the most important challenge mankind is facing nowadays. It has been proved that global warming is caused by anthropogenic C emissions (or greenhouse gases, GHG), released into the atmosphere. According to FAO estimations, livestock value chains are responsible for 14.5 % of all anthropogenic GHG emissions, most being produced by livestock production systems. Besides GHG, livestock production systems are also a major source of N and P emissions. It has been reported that livestock farming systems account for approximately one-third of total N emissions and 20 % of P emissions. Emissions of both elements have an impact on environmental degradation of soils and water sources, whereas N can also become a potent GHG (in the form of nitrous oxide) and air pollutant affecting human and animal health (in the form of nitric oxide and ammonia).

It is common that national or international institutions publish information on environmental impacts of livestock production systems at international, national or regional scale, e.g. National Greenhouse Gas Inventories, FAO or Global Research Alliance reports. However, this information is usually based on representative management systems while individual livestock production units are not usually aware of its actual environmental impact. Thus, to be a part of the solution for this environmental issue, it is important that professionals involved in livestock production at local scale understand basic concepts of the environmental impact assessment of individual livestock production units as well as feasible options to mitigate their impact. Moreover, the information generated at this local scale can be used to better estimate global emissions in future.

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During the course participants will:

- increase their understanding on how to estimate the environmental impact of different types of livestock farming systems and mitigation measures;
- know the sources and drivers controlling main emissions in livestock farming systems (i.e. C, N, P);
- improve skills on tools for modelling C, N and P emissions at farm/local/regional scale;
- learn different techniques to measure emissions in livestock farming systems;
- develop a critical perspective on mitigation strategies and their technical and economic feasibility.

## Organization

The course is jointly organized by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institute of Zaragoza (CIHEAM Zaragoza), the Global Research Alliance on Agricultural Greenhouse Gases (GRA), and the Food and Agriculture Organization of the United Nations (FAO). The course will count on the collaboration of Red Remedia. The course will be given by well-qualified lecturers coming from international and national research centres and universities of different countries.

The course will be taught in English through a combination of lectures, supervised practical work and technical visits. English-Spanish simultaneous interpretation will be available for lectures. The course will have two levels of participation; a) face-to-face participation (31 hours) with access to lectures, practical work and technical visits; and b) online participation (18 hours) with access to lectures via live streaming. The course requires personal work and interaction among participants and with lecturers. The international characteristics of the course favour the exchange of experiences and points of view.

The course will be held at CIHEAM Zaragoza over a period of one week, from 12 to 16 December 2022, in morning and afternoon sessions.

## Programme

### 0. Welcome and Introduction (course, speakers, programme) (2.5 hours)

- 0.1. Discussion based on the situation, perspectives and challenges in participants' countries

### 1. Livestock and climate change, sector trends, contribution to C, N and P emissions and mitigation strategies at global and regional levels. GHG impacts and emission sources in livestock production systems (1.5 hours)

### 2. C, N and P fluxes in livestock systems (2 hours)

### 3. Modelling and measuring emissions (17 hours)

- 3.1. Modelling or measuring?
- 3.2. Models to estimate emissions in livestock production systems
  - 3.2.1. Farm scale models
  - 3.2.2. System-National-Regional scale models
  - 3.2.3. Life Cycle Assessment (LCA) approach
  - 3.2.4. Practical work
    - 3.2.4.1. Estimating and comparing emissions at farm scale using models
    - 3.2.4.2. Estimating and comparing emissions at System-National-Regional scale using the GLEAM-i model
- 3.3. Measuring nutrient fluxes
  - 3.3.1. Field scale
  - 3.3.2. Farm scale
  - 3.3.3. Animal scale
  - 3.3.4. Manure scale
  - 3.3.5. Technical visit: Measuring devices at field, animal and farm scale

### 4. Mitigation options. Technical and economic feasibility (5 hours)

- 4.1. Feed
- 4.2. Animal
- 4.3. Manure
- 4.4. System
- 4.5. Practical work: Evaluate mitigation options at farm level using models

### 5. Economic implications and decision-making at farm scale (2 hours)

### 6. Conclusion and lessons learnt (1 hour)

## Guest lecturers

Álvaro, Jorge – CSIC, Estación Experimental de Aula Dei (EAAD), Spain  
Del Prado, Agustín – BC3, Basque Centre for Climate Change, Spain  
Estellés, Fernando – Universidad Politécnica de Valencia, Spain  
Klumpp, Katja – INRAE, Institut national de recherche pour l'agriculture, l'alimentation et l'environnement, France  
Mottet, Anne – FAO, Food and Agriculture Organization, Italy  
Pardo, Guillermo – BC3, Basque Centre for Climate Change, Spain

### More info:



[edu.iamz.ciheam.org/LivestockProductionSystems/en/](http://edu.iamz.ciheam.org/LivestockProductionSystems/en/)

### Contact:

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## Admission

The course is designed for professionals with a university degree, and oriented towards public and private planners and decision-makers, technical advisors, livestock producers, environmentalists and R&D professionals involved in the management of the environmental consequences of livestock farming in a context of climate change.

- 20 places will be available for face-to-face participation (lectures, practical works and technical visits)
- 30 places will be available for on-line participation (lectures).

## Registration

- Candidates may apply on-line at the following address:  
<http://www.admission.iamz.ciheam.org/en/>
- Applications must include the curriculum vitae and a copy of the support documents most related to the subject of the course.
- Applications are open from 16 September to 23 October 2022.
- Applications from candidates requiring authorization to attend the course may be accepted provisionally.
- Registration fees for the course amount to 500 euro for face-to-face participation and 400 euro for online participation. This sum covers tuition fees only.

## Scholarships

Candidates from CIHEAM member countries, FAO member countries, and institutions of GRA member countries in Africa, Latin America and the Caribbean, and Asia may apply for scholarships covering registration fees. In some cases scholarships may cover the cost of travel and full board accommodation. If you wish to request a scholarship, please complete the relevant section when you make your online application to participate in the course.

Candidates from other countries who require financial support should apply directly to other national or international institutions.

## Insurance

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