Advanced Course

Creating added value in Precision Livestock Farming: from sensors to decisions

Madrid (Spain) • 4-8 May 2026

Sensor technology and data-driven systems are profoundly reshaping food production by enabling continuous monitoring, automation, and smarter decision-making across a wide range of sectors. In agriculture, particularly in livestock production, these advances are equally transformative, allowing producers to capture processes and outcomes with a level of detail that was previously impossible. Sensors such as accelerometers, GPS trackers, environmental sensors, and computer vision systems, among others, provide detailed insights into animal behaviour, health, welfare, environmental impact, and performance at scale.

The application of sensors and data-driven technology in livestock production is commonly known as Precision Livestock Farming (PLF). PLF systems allow farmers to detect diseases earlier, tailor feeding strategies, and reduce environmental impacts through better control of emissions and resource consumption, helping the livestock industry satisfy increasing demands from consumers for sustainability, welfare, and environmental responsibility.

Despite the multiple advantages of PLF technologies, their implementation can be challenging. High installation and maintenance costs may be unaffordable for small and medium-sized farms, and many systems require stable internet connectivity and reliable power, which are not always available in rural areas. Regulations on data ownership, privacy, and the ethical use of monitoring technologies remain limited. Another barrier to wider adoption is processing large volumes of data and creating added value from it, as farmers may lack the tools and understanding to use this information effectively for sustainability in environmental, economic, and social terms.

In this regard, the general aim of this course is to provide a comprehensive understanding of PLF by familiarising participants with concepts, technologies, and practical applications.

- Be familiar with the concept of PLF
- Have enhanced their technical insight into various PLF technologies
- Understand the process of gathering and transforming raw data into information for decision making
- Be aware of the advantages and limitations of PLF systems
- Be acquainted with regulations associated with PLF and data management

Organisation

The course is part of the Horizon Europe Re-Livestock project "Facilitating Innovations for Resilient Livestock Farming Systems" (GA No. 101059609) and is jointly organised by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) through the Mediterranean Agronomic Institute of Zaragoza (CIHEAM Zaragoza), the Spanish National Research Council (CSIC), the Universitat Politècnica de València and the Horizon Europe Digi4Live project, in collaboration with Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), and the COST Action EU-LI-PHE.

The course will be led by expert lecturers from universities, research centres, and private companies across several countries. It will take place at the CSIC facilities in Madrid, Spain, on 4-8 May 2026 in morning and afternoon sessions. Please note that participation in the course is limited to in-person attendance only. Online participation is not available.

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. Lectures will be complemented with practical work, technical trips, and case studies. The practical work will focus on understanding how data is obtained from sensors and on improving skills in manipulating raw datasets and programming machine learning models.

Programme

0. Welcome to participants, message from organisers. Programme explanation (1 hour)

1. Introduction to Precision Livestock Farming (PLF): Definition, historical context and evolution, impact on efficiency and sustainability, examples of technologies (1 hour)

2. Technologies used in PLF systems (3 hours)
- 2.1. RFID
- 2.2. Accelerometers
- 2.3. GPS
- 2.4. Automatic feeders/drinkers
- 2.5. Computer vision
- 2.6. Satellite image analysis
- 2.7. Environmental sensors
- 2.8. Sound analysis
- 2.9. Herd management software

3. Practical implementation and interoperability of PLF systems (2 hours)
- 3.1. Hardware/software recommendations
- 3.2. Communication protocols
- 3.3. Case studies and best practices that add value to research and production

4. Protocolisation of data analysis (8 hours)
- 4.1. Data standardisation (2 hours)
  - 4.1.1. Formats and standards
  - 4.1.2. Representation and storage (clouds, repositories)
  - 4.1.3. Case study: How proper standardisation adds value to decision-making
- 4.2. Artificial Intelligence and Machine Learning (2 hours)
  - 4.2.1. Applications
  - 4.2.2. Data pre-processing
  - 4.2.3. Prediction performance with early detection algorithms
  - 4.2.4. Case study: Adding value with predictive models for livestock management
- 4.3. Practical work activity: From sensors to decisions, hands-on with sensors, data standardisation and machine learning (4 hours).

5. Real case applications of PLF systems (4 hours)
- 5.1. Health and animal welfare assessment
- 5.2. Herd management and precision feeding
- 5.3. Grazing management
- 5.4. PLF-collected data for Life Cycle Assessment (LCA)

6. Regulation (2 hours)
- 6.1. Ethics when using PLF technologies and artificial intelligence
- 6.2. Data ownership and access rights
- 6.3. Regulatory challenges and supporting policies

7. Round table: "The future of precision livestock farming: limitations and challenges" (2 hours)
- Limitations in the application of precision livestock farming
- Certification and validation of technologies
- How to add value through innovation in a changing regulatory framework

8. Field trips
- 8.1. Animal Data Analytics, Segovia
- 8.2. Asociación Raza Avileña Negra, Ávila

In collaboration with:

ILVO

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EUROPEAN NETWORK ON LIVESTOCK PHENOMICS

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Guest lecturers

Díaz de Otálora, Xabier – Universitat Politècnica València, Valencia (Spain)
Estellés, Fernando – Universitat Politècnica València, Valencia (Spain)
Maselyne Jarissa – ILVO, Merelbeke-Melle (Belgium)
Niemi Jarkko – LUKE, Seinäjoki (Finland)
Rivelli, Ines - CSIC-EEZ, Granada (Spain)

Admission

The course is designed for professionals with a university degree and oriented towards public and private planners and decision-makers, technical advisors, researchers and academics, and professionals involved in the innovation of livestock production systems.

30 places will be available for face-to-face participation with access to lectures, practical sessions, case studies and technical trips.

Knowledge of English will be valued in the selection of candidates, as it will be the working language of the course.

Registration

- Candidates may apply online at the following address: **https://admission.iamz.ciheam.org/en/**
- Applications must include a curriculum vitae and a copy of the supporting documents most related to the course subject.
- The deadline for submitting applications is 1 February 2026. If places are still available after this date, applications will remain open until 1 March 2026, only for candidates who are not applying for financial support and do not require a visa.
- Applications from candidates requiring authorisation to attend the course may be accepted provisionally.
- There are no registration fees for this course, but participants must cover their own travel and accommodation costs.

Financial support

Candidates from CIHEAM, the European Union, and neighbouring countries may receive financial support for travel and accommodation costs. The deadline to apply for financial support is 1 February 2026.

Preference will be given to low- and medium-income countries. If you wish to request financial support, please complete the relevant section when you apply online 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 on-site participants to have medical insurance valid in 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 Organisation, upon payment of the stipulated sum.

Contact:

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https://www.iamz.ciheam.org/education/advanced-courses/