# Improvement of the technical-economic management of extensive livestock farms in the Catalan Pyrenees, using geolocation and animal monitoring systems

## Summary

The project aims to provide the extensive livestock farming sector (cattle, horses and sheep) with new technological tools to obtain and manage as much data as possible from a herd with minimum involvement by the farmer. Geolocation and monitoring of animals uses various algorithms to analyse the information collected in order to identify possible incidents and improve the management of animals and pastures.

This Operational Group, consisting of the Unió de Pagesos (Farmers' Union of Catalonia), the Institute of Agrifood Research and Technology (IRTA), Digitanimal, SL and the cooperatives Pirenaica Societat Cooperativa C. LTDA and Agrària Ramadera del Pallars de Sort, SCCL, focuses on exploring the full potential that these technologies can provide to help overcome the main challenges facing the sector:

1.- Improving the economic viability of farms.
Adjustment of the devices to herd activity patterns to improve technical-health-financial management.
Provision of the location and monitoring of the movements and condition of animals and herds.
The task requiring the most labour is supervising the herd and monitoring the animals' health (behaviour, diseases, births, etc.). Reducing working hours is a key factor in lowering costs and increasing the financial viability of farms.

2.- Efficient and sustainable use of natural resources and the maintenance of biodiversity.
Analysis of the grouped data related to the animals' location to determine grazing pressure, preserve the pasture's quality and ensure the sustainability of the silvopastoral system.

3.- Proximity of herds to wildlife.
A third challenge is the fact that herds live in proximity to other wildlife. The technology for detecting wildlife attacks will be assessed, and patterns of behaviour to detect and document them will be established.

## Objectives

Facilitate control of herds, management of technical-health and pasture data to improve the productivity and viability of extensive livestock farms by using geolocation systems and by monitoring animals using collars.

Characteristics of the technological tools:

- A position sensor that shows the location.
- A triaxial accelerometer, which shows the level of activity.
- A surface temperature sensor.
- A low-consumption long-range communications module.
- A cloud server, and various databases and algorithms for extracting patterns and creating notifications.
- A long-life battery.

## Description of the measures planned in the project

Act 1 - Implement the use of a geolocation and monitoring system for animals to identify the shortcomings and improvements required in order to carry out the subsequent actions.
Act 2 - Study the behaviour of the herds to determine patterns that can be used to manage pastures on a sustainable basis.
Act 3 - Study the animals' activity and temperature data to ascertain their condition and adjust the patterns of activity to the conditions in the study area, to improve the farms' technical-health-financial management.
Act 4 - Assess the costs and savings involved in using the tested technology, compared to the current management of the farms.
Act 5 - Test this technology in the herd in situations simulating wildlife attacks, to record the animal's/herd's reaction and adjust patterns of activity in the event of possible wildlife attacks.

## Expected results and practical recommendations

1. Demonstrate the usefulness of having animals/herds geolocated for routine herd monitoring and management tasks, including administrative management.
2. Display the information on grazing pressure provided by the geolocation of animals/herds to facilitate decision-making regarding their management.
3. For each species (bovine, equine and ovine), determine the optimal number of animals in a herd needing geolocators for effective work with this technology.
4. Develop a geolocation system for animals to improve the management of pastures in the area of study.
5. Develop a geolocation system equipped with electronic devices (accelerometers and physiological sensors) showing the condition of the animal and digital documentation of information to improve the technical-health management of extensive livestock farms.
6. Adapt the patterns of activity of the animals/herds to the characteristics of the extensive mountain livestock farming which guarantees the reliability of the alerts created by the system, using associations between deviations from the patterns and various measures of interest from the perspective of health, reproduction and pasture management.
7. Obtain data demonstrating the technical and economic benefits of using this technology.
8. Obtain patterns of behaviour during wildlife attacks to be able to detect and document them.

## Leader of the Operational Group

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## Subject area(s) of application

| | |
|---|---|
| ☒ | Agricultural production system |
| ☒ | Agricultural practice |
| ☐ | Agricultural equipment and machinery |
| ☒ | Livestock farming and animal welfare |
| ☐ | Vegetable production and horticulture |
| ☐ | Landscape / Territorial management |
| ☐ | Pest and disease control |
| ☐ | Fertilisation and nutrient management |
| ☐ | Soil management |
| ☐ | Genetic resources |
| ☐ | Forestry |
| ☐ | Water management |
| ☐ | Climate and Climate Change |
| ☐ | Energy management |
| ☐ | Waste and by-product management |
| ☒ | Biodiversity and environmental management |
| ☐ | Food quality/processing and nutrition |
| ☐ | Supply chain, marketing and consumption |
| ☒ | Competitiveness and agricultural and forestry diversification |
| ☐ | General |

## Geographical area(s) of application

| PROVINCE(S) | REGION(S) |
|---|---|
| Lleida | El Pallars Sobirà and L'Alt Urgell |

## Dissemination of the project (publications, seminars, multimedia, etc.)

1) Organisation of outreach sessions all over the region, taking advantage of the programme of seminars in the Technology Transfer Plan.
2) Preparation of material for publication of the main results. Two types of document will be published:
- The usefulness of geolocation for each species.
- The technical and economic benefits of using geolocation collars.
3) Unió de Pagesos, through its specialist magazine, La Terra, with a circulation of 6,000 copies, will publish details of the work linked to the project that may be of interest to the sector, and will distribute all the editable material to its subscribers, most of whom are farmers from all over Catalonia. It will also be distributed at seminars, agricultural schools, etc.
4) The various members of the OG will disseminate the project using their dissemination mechanisms on web platforms and social networks (Facebook and Twitter).

## Project website

Unió de Pagesos will allocate an exclusive section to the project on its website, where it will attach the associated information. www.uniopagesos.cat

| More information on the project | |
|---|---|
| PROJECT DATES | TOTAL BUDGET |
| Start date (month-year): July 2019 | Total budget: €105,704.03 |
| Completion date (month-year): | DARP funding: €43,784.04 |
| Current status: Underway | EU funding: €32,003.75 |
| | Own funding: €29,916.24 |

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*Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1282/2018, of 8 June, announcing the call for the grant.*

Generalitat de Catalunya
**Departament d'Agricultura, Ramaderia, Pesca i Alimentació**

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