MEF4CAP

Monitoring and Evaluation Frameworks for the Common Agricultural Policy

Lessons learned brief

Demonstration Case 4, Spain: Integrating open-source satellite data with farm level data

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Short summary of the Demonstration Case, its rationale and objectives

This Demonstration Case 4 (abbreviated DC4) is being developed by the Spanish Co-ops in collaboration with the EA Group cooperative and Digitanimal (an IT company). The demonstration case explores a system that shows the near real-time position of herds in the field together with the areas that experience the most intensive grazing activity. The objective is to improve sheep breeders' understanding of the movements of the herds. More specifically, the demonstration case defines a workflow which translates the herd position data collected from Global Positioning System (GPS) devices, which are attached to some of the sheep, into geo-referenced information ready to be incorporated in a Geographical Information System (GIS). Once the position is processed and ingested in the GIS environment, the next task is to bring together herd position, satellite data, and information from the Land Parcel Information System (LPIS). Indexes derived from satellite imagery will support the identification of the most-intensively grazed areas within the LPIS parcels and the information derived from the positioning system will show the actual movements of the herd in the field.

Twenty-five GPS trackers/collars were placed on selected sheep to track the different batches of the herd throughout the production cycle of the animals. The GPS trackers use two different technologies, Sigfox (some of them provided with an SD memory card for areas with less connectivity) or GSM, providing not only the position, date, and time of the flocks in near real-time but also the temperature of the animals and the accelerometer parameters, i.e., for determining the activity distribution of the animals throughout the daily cycle.

Livestock farmers provide the information on herd movements. The data used is a combination of on- and off-farm data, including: LPIS, herd characteristics (type, size, age), feeding and average growing indicators (by herd), GPS data tracks, and meteorological information (from the AEMET network[1]). Farmers own their data and are therefore free to leave the system at any time. This is formalised in a contract. The aim of the system is that farmers will go beyond simply reporting the indicators that the new Common Agricultural Policy (CAP) eco-schemes require. They are entitled to use this data for the management of their livestock activity.

To this end, farmers have access to a dashboard where they can observe the movement of their livestock, the areas where they graze, and all the data collected.

One of the lessons learned is that it is very important that farmers have all the information and receive targeted training to be able to handle the equipment.

It is possible to draw some lessons reflecting on the technologies suggested in the DC, on the data and indicators which were generated and on the potential for adoption. First of all, what is the "readiness" level (technological, social) of the technologies suggested in this DC? Are they ready to be adopted or do they need more time for this? And if not immediately ready, why is this?

All the technologies used in DC4 are available on the market and ready to be adopted, though they will require end users required relevant training. It is important that the supplier determines whether there is enough signal for the equipment to be able to transmit the information. If there is no coverage, the option of saving data in on a memory card can be

[1] The Spanish National Meteorological Agency.

considered, but this would mean the information is not available in real-time. For this DC, using SD memory card technology for data capture was sufficient and a good alternative for areas without coverage.

In relation to this, one of the lessons learned regarding the technology and the farmers' expectations was that not everyone operates in the same conditions, and hence adoption may differ depending on this. For example, one of the farmers was hoping to have real-time monitoring of his cattle herd, but his area has no signal for this type of equipment, so he needed to use collars with SD memory or install an antenna to amplify the signal. His expectations of real-time tracking cannot be met, but the objectives set out in this demo case can be.

Even though data stored off-line can be obtained at the end of certain periods.

Can the technologies be adopted by all type of farmers or different ones should be used depending on farmer types (small scale, large scale, etc.)

The developed methodology can be replicated for extensive grazing herd monitoring in cooperatives and/or for any livestock farmer. The technology used can be applied anywhere with minimal adaptation. However, the example we gave has highlighted some of the remaining hurdles for technology implementation in areas with connection problems. Collars with a Sigfox network extend battery life, but with GSM it is certain that you will always get data, regardless of the signal. In addition, it is not necessary to place collars on the whole herd; it is possible to use only a limited number of collars from which to make a proportional calculation. This makes it economically viable.

What about the data and indicators generated in this DC? Anything missing that needs to be considered?

The main source of data are collars. Each of the devices placed on an animal emits or store data. In addition to these data, it is also necessary to provide information about the collared animals such as breed, sex, date of birth, date of collaring, and date of delivery, among other things.

The main indicators obtained from DC4 are cattle load per hectare, days/hours of outdoor grazing and carbon sequestration per hectare (proxy). For the carbon sequestration proxy indicator, a collaboration will be made with the University of Cordoba as they have some proven methodologies for this calculation. One of the requirements for the calculation is that the data flow must be constant and robust, i.e., there cannot be too many days without data, as this would not be valid. For this, collars with SD memory are ideal, as they collect data several times a day, store them in such a way that they can be downloaded later without losing information.

What motivates this stakeholder to adopt the proposed technologies?

On several occasions, farmers have been asked what their motivations are for adopting the technology proposed by DC4. Among the main ones they mentioned was facilitating decision-making and the benchmarking of farms. They also consider that the use of GPS trackers allows farmers to control their herds remotely, reducing costs and time (burden reduction). One reason of interest for farmers is to have the ability to measure carbon sequestration since, they indicated, it will provide arguments to defend the livestock sector. Another important reason is to prove compliance with the Spanish extensive grazing eco-schemes which require that the herds graze outdoors at least 120 days per year with a maximum stocking density of 1.2 LU/ha.

Which barriers stakeholders face when adopting the technologies?

The technology used is affordable, and a few collars are required to monitor the entire herd. However, this type of technology was not needed in the past because checking hours and stocking rates was not a requirement. This is why it is now often perceived as a regulatory imposition which comes with extra expense and increased burden. It is therefore important to communicate the benefits and wide-ranging use of the technology to overcome the adoption barrier.

Among the farmer's own barriers is the lack of knowledge about these technologies. The handling of the collars is very simple, but some detailed knowledge is required. Minimum coverage and bandwidth are needed to send data in real-time, or an antenna must be installed to amplify the signal; in the case of GSM technology, the battery life is shorter (six months), so the battery needs to be changed more frequently than with Sigfox collars.

For example, one situation that arose during this DC is that one of the farmer - who is not very experienced as the cattle belonged to his father – claimed that the weight of the collars caused the death of some animals. This resulted in him ending his participation in February 2023. Consequently, the collars had to be relocated to other animals belonging to other breeders.

We need to consider that we are talking about the interaction between two different working systems i.e., traditional livestock farming, and a technological one which introduces GPS tracking. Fitting, removing and maintaining of the collars should coincide with the farmer's work and the times when livestock are brought together. Therefore, it must be adapted to both ways of working.

…and given these barriers, which actions/measures should be in place to overcome them? By whom?

To reduce adoption barriers, some measures could be taken to facilitate the process. In the case of lack of knowledge, technical advisory services and the government could provide training courses with case studies to familiarize farmers with information capture and handling of technological tools. The administrative burden could be lessened through the support of the cooperatives' advisory services to help breeders, through the implemented technology, to easily demonstrate to payment agencies that their herds comply with the requirements of the Eco-Schemes.

Regarding the issue of low internet connection in rural areas, more investments in infrastructure is needed, which could be covered mainly by the government and private sector. Finally, financial mechanisms (subsidies) could be used, where testing of the technology is encouraged and once the benefits are experienced, the farmer is able to scale the technology, collaring more animals.

Feedback from the national workshop

The national workshop was held online on 13 February 2023, with 35 extensive livestock cooperatives members and staff from different regions of Spain. During the meeting, the legal framework of the extensive grazing eco-scheme was presented to provide the audience with some background information about the DC. In addition, the Spanish Co-ops staff outlined DC4 objectives, collaborations, as well as the actions taken so far and what is expected in the future. This presentation included an overview of the GIS dashboard with updated information from

the GPS trackers from July 2022 till February 2023, explaining the main findings (most suitable technology, GIS possibilities, future data sets integrations, etc.) and challenges (connectivity issues, data analysis problems, etc.). Moreover, Digitanimal, the technology supplier, introduced the technological capabilities and the experiences of three livestock farmers from the EA Group. In addition, the advisory services from the cooperative shared their view on the placement of the collars on the cattle and the follow-up that has occurred so far.

The attendees showed interest in the proposed technologies and a fruitful dialogue was established on its application to livestock management.

The dialogue focused on the possibilities of GPS technologies and satellite imagery. The participants asked about the livestock farmers' experience and the possibilities in tracking the animals and about identifying areas where the cattle graze using satellite images.

Among the livestock farmers who attending the event, some mentioned the need to have tools that allow them to publish accurate information about the activities they carry out in order to promote their work, as there is some bad publicity around it, which they believe is justified only in a few cases. With continuous monitoring, information gathering and a communication strategy, they could mitigate the messages that, they believe, are misinforming the consumer.

Final reflections including on the applicability of the DC results to other contexts (other users, other member states, other indicators).

The technology is easy to implement, but awareness of the benefits and possibilities needs to be improved to make it more attractive to farmers. Although this technology is affordable, it may at first appear to be an unnecessary investment for farmers as they are not familiar with this type of tool. It is therefore desirable that specific subsidies or funding are considered to make it easier for farmers to understand its benefits for livestock management.

In addition to the environmental indicators needed to comply with the eco-scheme requirements, it is advisable to provide farmers with information that is of interest to them, and which can support with the daily management of their herd, thus producing a kind of compensation for the farmer’s burden.

