Mobilizing the European Agricultural Recovery Fund for an accelerated transition towards a double-performance European agriculture

September 2020

Precision agriculture provides farmers and livestock farmers with solutions adapted to their context. Data from sensors, cameras, satellites and meteorological stations are processed by algorithms that use Decision Support Tools (DST) to provide advice on the most relevant actions that can be taken.

The use of these tools ensures better input efficiency at the farm level. The latter are adjusted to the quantified needs of crops and animals while ensuring optimal yields. They are **crucial tools in the transition of European agriculture towards a dual-performance agriculture: more economical in terms of inputs, taking care of the environment, and more economically efficient.**

Digital agriculture also has the potential to simplify the administrative burden, both in respect of the implementation and control of CAP measures, and in respect of the data entered by farmers.

While studies highlight the benefits of such tools, the transition from the "research" phase to the agricultural sphere is still slow. To date, digital agriculture remains poorly democratized.
In addition, there are other main obstacles: the cost of these technologies, the fear that such long-term investments could quickly become obsolete.

However, in view of their economic, social and environmental benefits, it would be urgent to extend within the European Union the use of precision farming tools in crop production and the use of sensors and robots in animal husbandry.

The European Union must be an actor in the democratization of these tools, making them accessible to all farmers and livestock breeders whatever the type and size of their farms, their farming practices and their backgrounds.

Mobilizing 60% of the recovery plan to support innovative precision investments in agriculture in 2021 and 2022 will allow a special plan of 10 billion investment for an accelerated transition of European agriculture towards double performance. The investments of this plan could be supported up to 53% (share EU recovery fund 90%, 10% counterpart Member State), mobilizing 4.8 billion of the 8 billion of the said recovery plan.
The additional 3 billion from this recovery fund should be allocated, in synergy, to actions for skills acquisition and promotion of European products.

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What are the incentives for an accelerated transition?

While €8 billion will be added to the financing of the second pillar of the CAP to relaunch the agricultural sectors, a relaunch to be carried out in coherence with the Green Deal objectives, these funds should be used in a targeted way, to really prepare the future and the rebound of the European agricultural sectors.
This implies giving priority to the funding of double performance transition investments, as well as measures to increase farmers' competence in innovative techniques, to strengthen the structuring of the sectors and the promotion of European products.
The objective would therefore be to devote at least 5 billion euros of this allocation to support investment in precision agriculture in 2021 and 2022, in addition to the "investment" measures that will be implemented in the framework of the reformed CAP from 2023 (and those pursued during the transition period).
These 5 billion euros would constitute a decisive incentive for a special plan of 10 billion euros of investments in order to widely spread the use of DSTs on all European agricultural surfaces and to accelerate the accessibility of digital tools to livestock farms.
This change will lead to substantial savings in inputs, which will ensure greater sustainability and profitability of European production, an operational response:
- to citizens' expectations regarding the environment, food quality ...
- and to the imperatives of cost competitiveness, but also of promoting quality approaches.

These investments will have to be reasoned in different ways in order to be adapted to the diversity of farms. While farms above a certain size can make the investments alone, it will be appropriate to encourage collective investments in other cases, particularly in regions where farms may be smaller. Investments within the framework of cooperative, CUMA or of a third body, such as GAIA in Greece, should be used to their full potential as soon as they prove their effectiveness. The financing of coordination between producers, as well as technical support and equipment maintenance can and should be carried out by cooperatives. The traceability of the final products and the treatments provided to them should also be ensured by them.

Crop production:

Digital tools related to crop production can be classified into 5 levels according to their degree of precision, the equipment required and their cost. The use of precision farming tools (sensors, weather stations, satellite images, cameras, DSTs for input management) are present at each level. Weather stations require an investment of between €400 and €2,000 (Weenat, 2020). Some DSTs are free of charge. Those that prescribe the quantities of inputs to be applied from sensors and satellite images of crops have a maximum cost of €20/ha/year (Farm Europe, 2019).

- The first level, the most accessible, consists in using the information given by these tools to adjust the applications to the scale of a set of plots with the same pedoclimatic conditions and phytosanitary risks. The second level consists in adjusting the inputs at plot scale.

- From the third level onwards, in field crops, these tools are associated with modulation tools. These include precision sprayers, which are more expensive. The most accessible ones cost around €3,000. They are connected to a needs mapping service. Sprayers that modulate doses based on data from on-board cameras can cost more than €40,000. Modulating nitrogen doses ensures fertilizer savings of between 4 and 47% depending on production and environments. At the same time, it maintains or increases yield by up to 10%. The financing of such a sprayer can be done over 5 to 10 years. A saving of 11 to 90% is noted, depending on the case, concerning pesticides (herbicides, fungicides and insecticides). An increase in the gross margin from 7 to 38€/ha/year is possible.
Machine Guidance (MG) and Controlled Traffic Farming (CTF) complete this level, raising the precision of the actions carried out. These technologies make it possible to avoid crossing trajectories during treatments and to gain in precision at the intra-plot scale. Their cost varies from around €1,300 if the tractor is already equipped with GPS. It can go up to €50,000 for those with the most options. MG saves 2% on seeds and fertilizers, 6.32 to 10% on fuel and 6.04% on labor. It increases the gross margin between €38 and €612/ha/year. CTF complements the MG with the analysis of itinerary data and treatments from previous years. It saves 3 to 15% in fertilizers, 25% in pesticides, 25 to 70% in fuel and 70% in labor. A 15% increase in yield has also been observed. Increases of 40 to 80% in nitrogen efficiency have been recorded, increasing the gross margin from 57 to 115€/ha/year (Balafoutis et al., 2017).

- Levels 4 and 5 add to the tools of the previous levels robotization as an alternative to pesticides for the management of bio-aggressors (weeds, diseases and pests) as well as precision irrigation. The aim of robotization is to ensure that no more fertilizer and pesticide residues are detectable. Input adjustment takes place at the plot level in level 4 and at the plant level in level 5. Weeding robots cost between €25,000 and €80,000. They allow a reduction in pesticide quantities of 20 times compared to standard protection. They also reduce fuel use and working time.
Precision irrigation allows the amount of water irrigated to be adjusted to crop needs, soil moisture and weather forecasts. The most advanced systems can automatically trigger irrigation if those parameters are below a certain threshold. Flow controllers for pivot irrigation systems are the most affordable starting at €1,300 and pivot control irrigation management systems can cost up to €35,000. Drip irrigation costs around €40/ha. Savings of up to 34% are observed depending on the irrigation system. Their effect on yield is more contrasted, ranging from a reduction of 18% to an increase of 31%. Thus, input efficiency ranges from -12% to 97% for pivot control systems. Water savings of about €30/ha/year have been observed in the UK (Balafoutis et al., 2017). It is around the Mediterranean area that precision irrigation has the greatest potential. Water and energy consumption are reduced by 10-14% on average (FIGARO Irrigation Platform, 2016). In Greece, the net benefit can be as much as €480/ha for a cotton crop (Balafoutis et al., 2017).

Livestock:

Precision livestock farming is based on the use of sensors and robots.
Sensors can be on the animals to monitor their health (metabolic disorders, infections, lameness, udders, heat, pregnancy and calving). GPS can be used to monitor the location of the animals. These checks can be carried out using collars that cost around €120 per unit, plus €4,000 for data storage and interpretation and €180 in annual costs. These on-board sensors can save up to €100 per cow, increase productivity by up to 30% and reduce working hours by up to one hour per day (IDELE, 2019; LITUUS, 2019). Feed storage and quality can also be assessed, as well as the composition of the milk. Milk analyses can be used to anticipate infections, heat... A farmer will detect 50 to 55% of heat, while an automated detector will detect 50 to 99%. The anticipation linked to these analyses allows a gain of around €2,000 (Huneau & Gohier, 2017).

Robotization makes it possible to simplify milking, cleaning of stables or straw and feed distribution (mixing, quantity of feed distributed, number and time of passage and scraping of refusals). A feeding robot, preparing the mixtures and distributing the rations costs around €230,000 for 150 dairy cows. This type of robot can be financed for 12 years and amortized in 15 years. The annual investment cost is between 25 and 44% greater than for a tractor and a mixing machine, with a saving of almost 50% in maintenance costs and charges, compared to the latter. Similarly, a reduction of 15 to 20% in the workforce is observed. In the end, some studies point to an annual saving of almost 60% compared to the use of a tractor and a mixing machine. Other studies estimate an increase in production costs of €6,097/year but a saving of 400 hours of work (Autellet, 2019).

A milking robot costs around €120,000 for 80 cows. Although they reduce working time, milking robots increase the consumption of concentrate, and thus the costs of feeding. An increase in the number of somatic cells, reducing the quality of the milk can happen. Combined with the cost of the investment and the installation of the robots, this reduces the final remuneration for 1,000 liters from 70€ to 48€. This loss is compensated by an average increase of 11% in the volume of milk per cow per year (Autellet, 2019; Cogedis, 2019).

Skills acquisition:

Whatever the tool and its cost, training is necessary. Their costs vary between €420 and €1,400 (Idele, 2020).

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