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POTENTIALS OF DIGITAL FARMING IN SMALL-SCALE AGRICULTURE

Farmers in Europe are diverse in their farm sizes and produces. Agriculture in Germany is mainly based on small and medium-sized enterprises. Most of them are not mechanized with modern machinery and cannot benefit from implemented processes based on precision farming principles (variable rate or site-specific farming). Precision Farming can significantly enable farms to increase resource use efficiency as well as to protect the environment. Furthermore, new elements of Digital Farming combined with Precision Farming can contribute to additional benefits e.g. as better process monitoring, better decision support and less administrative tasks by acquiring (sensors) and utilizing more relevant data (big data & AI).

Investments for equipment and data analysis are too expensive for small and middle scaled farms to apply e.g. VRA (Variable Rate Applications) in fertilization or site-specific spraying. In order to enable these farms the opportunity to optimize farm inputs with such methods, new arrangements in terms of IT infrastructure and interoperability are needed. Access to these technologies can be established over MRs (Machinery Rings) and contractors. MRs and contractors can use the capacity of these technologies more profitable and consequently can afford the latest innovations because of higher area treatments. With simple and interoperable connections between farms, MRs and contractors have a high potential to make digital farming solutions accessible and affordable for small and medium-sized farms [1].

In the DiWenkLa project, research is being conducted into how digital technologies can enable farmers in small structures to gain value-added and self-determined as well as secure access to processing, trade and the end consumer at low cost. As target products, the experimental field Baden-Württemberg (DiWenkLa) includes field vegetables and other arable crops in the Stuttgart metropolitan region, where horse husbandry is also being addressed with increasing digitization options. In the southern Black Forest, on the other hand, the focus is on cattle farming with grassland management [2].

Baden-Württemberg (BW) is a federal state with typically small-scale agriculture, both in terms of field and farm sizes. Furthermore, BW is characterized by high shares of sideline and special crops. A large number of economic partners in production with intermediate inputs as well as the receiving hand and digital service providers up to trade are integrated in the project. This should also allow farmers in small structures to gain value-added and self-determined as well as secure access to processing, trade, and the end consumer at low cost. This is because small-structured framework conditions could make the introduction of digital or smart farming more difficult. The willingness to invest in new technologies is consequently lower than in regions with comparatively larger land and farm structures. However, it can be assumed that for small farm structures, the availability of simple digital decision support tools that provide area-specific and timely recommendations for management as well as yield and quality expectations can imply significant efficiency gains [2, 3].

The regions of Baden-Württemberg appear to be a very suitable representative experimental field for similar regions for new, sustainably oriented and digitized technologies along the entire value chains of agricultural products and services. The focus is on products and associated services in the area of cabbage, lettuce, cereals, soy, cattle

and horse husbandry. They are typical of the selected experimental regions of the southern Black Forest and the Stuttgart metropolitan region. They are all integrated into digital experimental units with the support of farms and experimental units of local research institutions. The economic partners have access to digital technologies from the fields of automation of outdoor farming, crop modeling, sustainability, certification, feeding and livestock management and livestock management and drone technology are open for testing. They ensure resilient digital mapping in complete value chains from the farmer to the end consumer or user [2, 3].

Agriculture is classified as belonging to the national critical infrastructure. Therefore, there is a requirement for food production to be continued during any exceptional situation or crisis. Today most digital farming solutions depend on permanent internet connections and the users are highly relying on the availability of mobile or landline data communication. Having all data for the farm management on one cloud server or one provider is very risky in terms of resilient data availability. Therefore, a distributed and decentral structure would contribute to minimizing risks. A future digital farming system has to include resilient structures to decrease the vulnerability against these situations [1].

Data security and data ownership is an important aspect that concerns farmers when moving more towards digital systems today. At least since the judgment of the European court of justice from July 16th, 2020 about the agreement “Privacy Shield” between the USA and Europe. Implying that no data transmissions to servers in the U.S. or other countries can be applied if these countries do not guarantee European Privacy standards. Transparency with data handling and protection using open-source software could additionally generate trust for the user [1].

Digitalization is not a new step of mechanization. It is a new way of optimizing complex and dynamic agricultural outdoor processes. It is providing more relevant process data and offers new opportunities for data communication, storage and analysis and in general for the management of farms.

References

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