



# Governing Farmers through data? Digitization and the Question of Autonomy in Agri-environmental governance

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## ABSTRACT

The digitization of the agricultural sector is connected with a number of promises that have been widely debated in both the public and the academic spheres. But attention has been mainly focused on farm production or management techniques, often neglecting the realm of governance, which has also begun a digital transformation. This article explores the premises of an informational model of governance and the integration of a logic of big data into agri-environmental governance in Switzerland. More specifically, it examines this process from the perspective of the autonomy of the farmers, by looking more specifically at how these changes in governance create or not possibilities for farmer autonomization, in terms of identity, action, and structures. In spite of some discourses that present digitization as a tool to lighten administrative constraints and a way to aid in the independent management of agricultural activity, our analysis reveals a more qualified picture: at the present time, digitization reinforces the bureaucratic approach to governance, and the contribution of digital technologies to the interests of the farmers themselves remains minimal. In conclusion, it appears that the accent that has been placed on the service done for farmers is primarily part of a rhetoric aimed at encouraging involvement, and that rhetoric contributes to making other interests, which are more central to the constitution of an informational governance model, invisible.

## 1. Introduction

In recent years, research on the development of digital technologies in agriculture has undergone rapid growth (Klerkx et al., 2019; Wolfert et al., 2017). The idea that agriculture is on the brink of a new revolution has gained ground, establishing itself in the phrase “agriculture 4.0” (Rose and Chilvers, 2018). Thus, a number of agricultural innovations are currently being investigated by researchers, and the question of how to govern and promote responsible digital agri-food innovation has become a key concern (Rotz & al. 2019a; Fielke & al. 2022). However, very few studies have so far looked at the digitization of the governance of agriculture itself. And yet, in certain research fields, this emergence of a digitized governance has sparked a significant wave of interest: one such field is the study of urban management, along with the emergence of the concept of smart cities (e.g. Klauser et al., 2014). Likewise, the potential for digital technologies to overtake the current limits of environmental governance practices has been recognized, in particular because these new tools would make it easier to understand the nature of the problems to be addressed and to monitor practices and evolutions, and would make it possible to implement more participatory approaches (van der Wal and Arts, 2015). Inspired, in particular, by Castells’s concept of an informational economy, Mol has proposed the concept of informational governance to describe this emerging mode of

environmental governance, where “information becomes a crucial (re) source with transformative powers for a variety of actors and networks” (2006: 501). According to this framework, information and data have turned into something beyond mere tools, becoming a source of power in themselves. According to Mol, this transformation of governance is supposed to be accompanied by a rearticulation of power relationships, in which the state loses its dominant position in environmental policy-making, giving way to “a diversity of interdependent actors in multilevel networks around flows of information” (ibid.). In the realm of agri-environmental governance, however, the hypothesis of such a transition to a radically different mode remains poorly documented and requires empirical verification. Reflection on the integration of digital tools as a way to respond to various objectives of agricultural policies, in particular, is still in its infancy (Ehlers et al., 2021). It is true that research has developed critical approaches to the digital transition, showing the dominance of private actors within the collection and evaluation of agricultural data (Bronson and Knezevic, 2016; Carbonell, 2016; Carolan, 2018). The use of digital information technologies in the governance of particular sectors—in particular the use of blockchain-type technologies—has also been described and analyzed (Antonucci et al., 2019; Caro et al., 2018), including a focus on the role of “digitalized infrastructures” in the redefinition of power relations in food supply chains (Donaldson 2022). And finally, recent developments

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centered on the notion of “responsible innovation” (Bronson, 2019; Eastwood et al., 2019; Rose and Chilvers, 2018; Fielke et al., 2022) have opened up new pathways for critical engagement and a governance that reflects the innovation of the agriculture 4.0 era. However, very few analyses have set up a dialogue between these phenomena and the more general evolution of agricultural policies and agri-environmental governance. These studies have not truly examined what this digital transformation does to governance, nor what the implications are of a governance that relies on digitization and data.

With this article, we would like to help fill this gap by documenting and analyzing an example of the transition of an agri-environmental governance system to an informational model, where the logic of big data is becoming more and more dominant. More specifically, we will explore the way in which this transition is involved in a variety of ongoing developments and projects that reflect an evolution in the farmers’ monitoring practices, on the one hand, and the use of agricultural data, on the other. We will examine these two dimensions of the digitization of agri-environmental governance from the perspective of farmer autonomy, as a key element of sustainable agriculture. Autonomy has been framed as an essential element for farmers to resist and adapt to diverse challenges (van der Ploeg, 2008; Stock and Forney, 2014). Emery and colleagues (Emery, 2015; Stock et al., 2014) also argue that “actual autonomy” which is maintained through socially motivated collective action is more likely, in the long run, to support environmental sustainable modes of farming than a narrower understanding of autonomy as individual entrepreneurial independence. In relation with the question of farmer autonomy, the digitization of agriculture has provoked an indirect debate in the literature between an emancipatory vision of technology (e.g. Zambon & al., 2019), and a critical vision, which emphasizes the interconnected relationships of dependency and processes of economic and political domination (e.g. Carbonell, 2016; Fraser, 2018). Within this debate, the place that is potentially given to the state is above all that of an external actor supporting and accompanying the development of digital technologies. In the case that we are examining here, however, the state plays a major role in the digitization of agriculture from the perspective of governance and the systems of control and monitoring linked to the implementation of agri-environmental policies. In this paper, we draw more specifically on Stock and Forney’s (2014) conceptualization of farmer autonomy as a three-dimensional concept: autonomy as key elements of farmers self-representation and identity; autonomy as an essential tool for the management of vagaries or agricultural daily practices; and autonomy as a resource to navigate structural constraints related to markets and policies. We propose to examine the mobilization of digital technologies in agri-environmental governance at the interface of the public and private sectors, through the prism of the autonomization of farmers—and, by contrast, of their relations of dependency—that has already taken place at the present time, within a highly constrained system of governance.

The main question addressed in this article can then be formulated as follows: what are, in the Swiss context, the various observable effects of the digitization of agri-environmental governance on farmers’ living and governance environment in terms of their autonomy in its three dimensions: identity, practice, and structure? In other words, does this digitization of agri-environmental governance have positive and corrective effects on the possibilities for farmer autonomization, or does it on the contrary accentuate the structural processes of alienation and domination?

## 2. Swiss agriculture, digitization and agri-environmental monitoring

In order to situate the discussion on the digitization of governance developed in this paper, a very brief overview of the Swiss agricultural context is needed. Swiss agriculture is made of slightly less than 50’000 family-owned farms, employing a total of 149’500 people. Heads of

farms are largely male, with around 6% of farms being officially managed by women. Farms are small in international comparison, with only one on five farming more than 30 ha of land. The main productions are dairy, meat, and crops, but regional variations are important given the mountainous nature of a large portion of the country. Most of Swiss agricultural production flows in the domestic market. However, specific products with a high added value, like cheese, are exported. In relation to the digitization of agriculture, even though Swiss farmers are generally well equipped with technologies and machinery, they have continued to show a limited amount of interest in smart farming’s digital solutions with the possible exception of milking robots (Groher, Heitkämper and Umstätter, 2020a).<sup>1</sup> A closer look at the adoption of digital technology in livestock production (Groher, Heitkämper and Umstätter, 2020b) indicates that smart farming tools are mostly adopted on large and specialized farms. And even in these cases, easy-to-use sensors and measuring devices are preferred to complex data processing technologies. Digital tools are barely integrated in the program of agricultural schools, as shown by Ammann et al. (2022) for the example of farm management information systems. However, this paper focuses on the digitization of governance tools, and not farming tools.

The governance of the Swiss agricultural went through dramatic transformation, since the citizens of Switzerland voted, in 1996, for a fundamental transformation of the federal agricultural policy, based on the concept of multifunctionality (Wilson, 2007) combining ecological standards and subsidies with a partial deregulation of agricultural markets. This transition from a productivist approach to a multifunctional approach has led to the advent of a complex system of agri-environmental monitoring.<sup>2</sup> Since the beginnings of public agricultural policies, the establishment and development of agricultural statistics have constituted an important issue. In Switzerland, this description of agricultural structures and productions using numerical data has a long history, characterized by collaboration between professional organizations and the cantonal and federal government. In the 21st century, the development of compensation for environmental services in the form of direct payments has transformed the purpose of this monitoring of national agriculture. Now it is also a matter of justifying and legitimizing this new kind of public spending by collecting and compiling agri-environmental data that are specific to the actions demanded by each different instrument of agricultural policy. Thus, each farm has to be able to justify its receipt of nearly 60,000 Swiss francs per year (as an average) by providing a report of its practices to promote biodiversity, its management of effluents, its use of inputs (such as pesticides and fertilizers), its respect for standards of animal welfare, etc. These data are then verified by the canton, which validate them and transmit them to the Federal Office for Agriculture. Thus, the cantonal administrations play an important intermediary role between the federal state, on the one hand, which provides both the basic legal and

<sup>1</sup> The success of milking robots is in fact interesting to note. According to Schewe and Stuart (2015), and as our field observations confirm, the automation of milking can be seen as an element of practical empowerment, freeing the farmer from the time and labor constraints of milking and allowing them to spend their time on other activities on or off the farm (i.e. “labor flexibility”). In addition, Schewe and Stewart go on to say, the purchase of a robot is sometimes a replacement for the hiring of a non-family worker, which can also reinforce a sense of farmer autonomy. That said, however, recent studies, particularly in Norway, have shown that the link between farmer well-being and automatic milking is far from being universal (Hansen et al., 2020).

<sup>2</sup> We should explain the term *monitoring*, which is generally understood as a “set of techniques making it possible to analyze, control, and oversee” (*ensemble de techniques permettant d’analyser, de contrôler, de surveiller*) (CNRTL, 2012). This deliberately broad definition allows us to include the different scenarios that have developed since the reform of agricultural policies, ranging from analysis for scientific research purposes through the tracking of livestock in the face of epizootics, and to relate such practices with diverse control activities by public and private organizations.

regulatory frameworks and the money for the subsidies, and the farms, on the other. Although they have only limited room for maneuver in this domain, they are able to adapt the national directives, to a small degree, to the agricultural realities of their territory. Participation in the direct payment system is voluntary for farmers. Nevertheless, more than 98% of Swiss farms are integrated into this system. Indeed, few farms are economically in a position to do without the direct federal payments.

This system of public agri-environmental monitoring maintains fairly close connections with its private counterpart, which is essentially linked to the development of the systems of standards associated with the environmental certification and labels for food. In Switzerland, many standards and certification schemes coexist. Some are led by retailers, others by sectorial or farmer organizations. Some are related to specific qualities of products, others to geographical provenance, and others to the implementation of specific farm practices. Some are accessible by most of the farmers, as they mostly translate the basic federal regulations into a label, and mainly secure the access to specific markets, while others are related to more demanding standards, such as organic agriculture, and are generally related to a premium for the farmer. Consequently, most of the Swiss farms are related at least to one private certification scheme, and many are involved in several schemes simultaneously. These two systems, the public and the private, developed in dialogue with each other and are largely based on the collection of similar data. Their monitoring of farms is often coordinated, for that matter. Taken together, this all forms an agri-environmental governance structure with complex and highly stable connections (Forney, 2021), in which the collection of agricultural data plays a central role.

The development of digital tools for entering, circulating, and storing data has enabled the strong development of this agri-environmental monitoring. Compared to the analog work that was still dominant in the 1990s, digitization not only eliminates problems of legibility or of incoherence but also facilitates the processing of the data, which are encoded from the time they are first entered, usually by the farmer themselves. And while federal authorities invested very little in the digitization of agri-environmental monitoring at the beginning, the cantons saw very clearly the benefits they would derive from it. In order to address the problem of the initial cost of the digital transition, they gradually formed groups around regional projects. Thus, five systems have emerged, with the same basic functions.<sup>3</sup> Beginning in the 2000s, however, the federal government also established its own databases and structures. The first important step was the creation of the Animal Trafficking Databank (BDTA). This centralized databank set up a system of traceability for individual farm animals following the health crises that shook the farming communities in the 1990s, especially the “mad-cow” crisis. Another project, ASA (Administration of the Agricultural Sector), was launched in 2008 with the aim of supporting the “execution of legislative acts on the national level in the field of agriculture” (*l'exécution des actes législatifs en vigueur à l'échelon national dans le domaine de l'agriculture*) as well as of being “used to respond to private needs such as the monitoring of labels” (*utilisé pour répondre à des besoins privés comme les contrôles de label*) (OFAG, 2009). More recently, the federal government also launched contribution calculation modules for use at the cantonal level. This involvement of the federal government in the digitization of agricultural administration also shows a will to standardize the data collected at the cantonal level, with a growing influence by the Federal Office for Agriculture (OFAG) over the entirety of the system. Today, the cantons are required to populate the federal databases, for instance the information system for agricultural policy

<sup>3</sup> These five systems are: Acorda for the French-speaking area (Geneva, Vaud, Neuchâtel, Jura); Gelan for the Central Plateau area (Bern, Fribourg, Solothurn); Agricola for eastern Switzerland (Aargau, Zurich, St. Gallen, Appenzell, Schwyz, Glarus, Grisons, Obwalden, Nidwalden, Uri, Ticino); Lawis for certain German-speaking cantons (Basel, Lucerne, Zug, Schaffhausen, Thurgau); and Valais by itself.

(SIPA), the database for standardized controls in the agri-food sector (Acontrol), or referencing by the geographic information system (SIG). They continue to be free to use their own tools, but new requirements imposed by the federal administration, in particular with reference to the format of data and the calculation of benefits, along with the frequent updates in calculation methods, strongly encourage their adoption of the federal instruments. So, the desire to capture and govern the sustainability of agriculture through digitization and data engendered a standardization of collection and processing tools, as well as a centralization of data. In the process, the federal administration took a prominent position that results from the centrality of agricultural policy and from the system of direct payments within the organization of the sector. This observation contradicts the deep transformation of power relations in information governance, as announced by Mol. At the same time, private actors developed software that was primarily intended to support farmers in the data collection they needed to do, but also in the need to make their farms efficient. Indeed, the private actors, whether professional organizations – e.g. IP-Suisse or Bio Suisse, as owner of a standard and label – or certifiers, are also forced to adjust to these administrative standards and to the procedures that now regulate agri-environmental governance through data.

### 3. The digitization of agri-environmental governance and the question of farmer autonomy

In attempting to understand the specificity of a digitized agri-environmental governance and to interrogate the emergence of an informational model of governance (Mol 2006), the distinction proposed by Kitchin and Lauriault (2015) between small data and big data is particularly useful. The data that are enlisted in current governance practices, as well as their processing, usually continue to be anchored within a bureaucratic and standardized approach, characterized by an analog epistemology—small data—from which the informational approach founded on big data should be distinguished. Thus, the change in model implies a transformation in the nature of the data. According to Kitchin and Lauriault, big data is differentiated from small data by a series of characteristics: enormous volume; high speed that approaches real time; broad diversity; the ambition of exhaustiveness ( $n = \text{all}$ ); high resolution; and a relational nature that allows for the pooling of various databases (464). In this article, we will use these various characteristics to assess the degree to which agri-environmental governance in Switzerland has transitioned towards an informational, big data model of governance. In order to do this, we rely on a data-critical approach, in which we will closely examine “the technological, political, social and economic apparatuses and elements that constitute[s] and frame[s] the generation, circulation and deployment of data” (Kitchin and Lauriault 2014:6). As a first observation, we can note that the relationship to data in agri-environmental monitoring described above remains closer to the definition of “small data.” Indeed, the data that are mobilized in the course of this monitoring are characterized by “their generally limited volume, non-continuous collection, narrow variety,” and the fact that they “are usually generated to answer specific questions” (Kitchin and Lauriault 2015: 463). The data that are collected usually focus on classic and limited agronomic and economic categories. The usual rhythm of agricultural data is still based largely on the annual rhythm of public statistics and agricultural policy, which produces a time lag in the monitoring of the sector. The picture presented to the public is always based on data from the previous year. All these aspects are contradictory to the definition of “big data” (Kitchin, 2013) and seem to point to an incomplete move to an informational governance model.

Beyond the discussion of the nature of the modes of agri-environmental governance, there is the question of their implications, especially for the actors who are their primary target, the farmers. The research has already clearly identified certain risks. The asymmetry of power between individual actors, for example farmers, and the large digital companies thus becomes evident (e.g. Carbonell 2016). The

question of unequal access to the technologies, depending on wealth or knowledge, also arises (Fleming et al., 2018), along with the question of the role of technologies in the reproduction of inequalities (Fraser, 2018). In addition, beyond the specifics of the agricultural field, the extraordinary potential of big data in terms of surveillance (Koskela, 2003; Lyon, 2014) brings up important ethical questions about the extraction, processing, and evaluation of data (Zuboff, 2015). The question of surveillance has also been explored from the perspective of its potential for empowering marginalized actors and reinforcing democratic processes and the common good (“empowering surveillance”) (Monahan et al., 2010). Thus, Ottinger (2010) discusses the use of environmental surveillance data by local groups in conflicts that pit them against powerful actors, where that data gives such groups the power to define problems, enforce the law, and make informed choices. Shilton (2010), meanwhile, examines the conditions of the development of an “empowering digital surveillance” using the criteria of participation, local control, transparency, and social justice. More generally, we propose to reframe these questions here using the concept of “farmer autonomy” as suggested by Stock and Forney (2014). Thus, the authors distinguish among three dimensions of autonomy, understood as a social tool: an identity autonomy, linked to “selves that demonstrate freedom (within constraints)” (168); an autonomy of practical action, “in a positive self-constitution of living in a way they [farmers] want to—creating room to manoeuvre” (169); and a more structural autonomy, in the sense of “a tool that helps navigate and buffer one within the ambiguity of regulatory, audit and market fluctuations” (169).

When it is applied to the digitization of governance, the notion of autonomy makes it possible to analyze the mobilization of digital technologies through the prism of their capacity for emancipating and empowering farmers, who are currently caught in a system of governance that is marked by strong dependencies. Some critical approaches towards agri-environmental governance have pointed a finger at the loss of autonomy connected to governance by administrative documentation (Forney, 2016; Mesnel, 2017), opening the way for a debate over the bureaucratization of agri-environmental governance and its effects. For the purposes of such a reflection, the works of Graeber (2012) and of Hibou (2015), in particular, offer a useful critical framework. Graeber highlights the violence resulting from the processes of the simplification and schematization of reality by the tools of bureaucratic knowledge such as forms, standardized rules, and statistical categories. Hibou, like Graeber, emphasizes the alienating effects of neoliberal bureaucracy, which lead to a loss of meaning in work. The mobilization of the concept of farmer autonomy will thus allow us to contribute to the debate over the effects of the ongoing transition to an informational governance, whose effects on farmers’ living environment, in terms of empowerment and democratization, remain uncertain (Soma et al., 2016). Two important points have to be underlined about the way we address this issues in this paper: first, as developed below in the methods section, we explore the question of farmer autonomy not from the farmers’ point of view, but mostly from the perspective of diverse actors involved in the governance of agriculture. Second, because this digitization of governance is still in its infancy, we aim to identify emerging processes that might become central in a close future.

#### 4. Methods and data

We developed our study in the context of Switzerland. In order to interrogate and document the potential transition to an informational agri-environmental governance, we carried out exploratory fieldwork, targeting a variety of stakeholders within agricultural governance. Our objective was to obtain a cross-section of perspectives on the various evolutions of governance practices connected with the introduction and development of digital tools. More specifically, our study was based on three kinds of material: observations of public events; a series of semi-structured interviews; and an analysis of a variety of documents.

The observation component included participation in a Community

Day for the Digitization Charter, an event that brought together all kinds of stakeholders in the agri-food sector around questions connected with digitization. This participation served several purposes. First, it allowed us to evaluate current concerns in terms of agricultural digitization, based on the presentations given by both public and private stakeholders. It also gave us a glimpse into the audience that was interested in this subject. And finally, it gave us the opportunity to identify and approach some key stakeholders for our initial interviews. Because the farmers themselves were under-represented at this event, we chose to also visit SwissExpo, a well-established Swiss farming show. Our goal there was to discern the position of digital questions at a popular event, but also, above all, to meet farmers whom we could then interview.

Alongside these events, we were then also able to carry out a series of semi-structured interviews with multiple participants in this changing governance practices. In addition to the people we had met at the two events just mentioned, we filled out our sample by actively seeking stakeholders—through online research, notices in the press, and personal recommendations—who were directly or indirectly involved in the process of digitization. Some of these people are the drivers of this transition, and others are people whose activities are affected by the transformation. This allowed us to obtain a relevant sample of 23 representatives, including people active in public administration (5), agricultural organizations (4), agricultural training and advising (5), certification (2), agri-digital projects (4), and a few farmers (3). The interviews, which took place at the interviewees’ respective premises, generally started with an open phase in which we encouraged the interviewee to give their own definition of digitization and to tell us what the important issues were that they had observed either in their own activity or more generally in the agri-food sector. In the second phase, we used that first conversation to enter into a deeper discussion of the themes that had been raised, and then went on to bring up the projects to circulate agricultural data. This methodology allowed us to adapt to each context, depending on the specific concerns of each of the various stakeholders, while also maintaining a common thread among the interviews.

In addition to these events and interviews, we took advantage of the online availability of a great deal of information to carry out documentation work. Newspaper archives that were transmitted during an interview,<sup>4</sup> as well as the agricultural reports for 2008 to 2019, published annually by the federal administration, allowed us to briefly retrace the evolution of the digitization of agriculture. As for current developments, we relied on a large body of material including the agricultural journal *Agri*, the Swiss government’s press conferences and websites, the press conferences and websites of digitization projects such as Agroplus and Barto, and various media collected from our interviewees (such as project or conference PowerPoint presentations) and at the events (magazines and flyers).

The fieldwork developed in dialogue with first analyses of the data, following a process of interaction that characterizes ethnographic methods (Hammersley and Atkinson, 1995). One of the results has been to move the focus from farmers to other actors of the governance system. Indeed, our first attempt to document farmers’ perspectives on digitization led to a partial failure: farmers had very little to say about this topic that seemed far away from their real preoccupations. From their perspective, digitization seemed to be still a vague and distant question. On the other hand, other actors of agri-environmental governance had many stories to tell. This is why, in this paper, we are looking at this question not specifically from the subjective viewpoint of the farmers but rather from a desire to explore the conditions of farmer empowerment within informational governance, as identified by the analysis and cross-referencing of the perspectives of our various interlocutors.

<sup>4</sup> One of the digital companies we met provided us with copies of newspaper articles they archived. Those articles were selected and kept because they were mentioning the company and its activities.

## 5. Transformations in the system of governance through data

As said, the relationship to data in the agri-environmental monitoring still corresponds to *Kitchin and Lauriault (2015)*'s definition of “small data.”, as most of the characteristics of “big data” are not really present. And yet, with the increasing digitization of agricultural governance, some indications point to a gradual shift towards a big data-style informational governance, reflected in the evolution of the data and their use according to six dimensions used by *Kitchin and Lauriault* to qualify big data: volume, speed, diversity, ambition for completeness, resolution, and relational character (*Kitchin and Lauriault 2015*: 464). This shift is particularly visible in two major transformations, the first at the level of surveillance practices, and the second at the level of the exchange and circulation of agricultural data.

### 5.1. Data as surveillance tools: targeting and systematizing control

In general, and as several of our interlocutors noted, the digitization of the tools of agricultural monitoring has facilitated an acceleration in the collection and processing of data. More and more data are thus collected, at more frequent rates, thanks to the opportunities afforded by digital tools. Thus, the variety and data of volume have begun to increase significantly. This potential offered by digitization to provide a nearly total picture of reality opens the door to a fantasy of complete monitoring in real time.

Indeed, the interviews that we carried out testify to a gradual transformation in farms' monitoring and surveillance modes. While the paper format required concise reports that only noted the shortcomings found by inspectors, the digital format makes it possible to expand the number and precision of the data collected by the mandators, who are primarily the cantons and the labeling organizations. As one member of a supervisory body that we met put it, this reflects a decline in trust, on the part of the supervising officers, towards the fieldwork carried out by the inspectors. Their summary reports are no longer sufficient, and they must now fill out exhaustive checklists to document all of the inspection criteria.

As *Kitchin and Lauriault (2014)* noted, digital technology offers the impression that it is possible to abstract and reproduce the reality on the ground through data. That encourages an emphasis on the precision and meticulousness of the data that are collected and used in governance practices, paralleling the claim to exhaustiveness and high resolution that is intrinsic to big data (*Kitchin and Lauriault 2015*). A member of a cantonal agricultural service questioned the relationship between the additional burden that falls on farmers in entering this data and the real added value in terms of knowledge:

*Sometimes it's a little annoying, because people have so many things that they think it would be great to have, but in reality it doesn't do them any good. After all, somebody has to furnish all the data, and most of the time that's the farmer. [...] At some point they don't just want to know something like such-and-such an orchard is at such-and-such a location, with such-and-such a variety ... but then in the same place, you may have three different varieties. They want the different varieties to be drawn on those locations. But how is that helpful? Tell me, in what way does it help you make a harvest estimate?* (Interview 16, cantonal administration)<sup>5</sup>

These transformations also favor the development of new practices

<sup>5</sup> “Des fois c'est un peu agaçant parce que les gens ont tellement de trucs qu'ils trouvent que ça serait génial d'avoir, mais en réalité ça leur sert à rien. Il y a quand même quelqu'un qui doit fournir les données et puis dans la majorité des cas c'est l'agriculteur [...] Un moment ils veulent non seulement savoir un peu tel verger est à tel endroit avec telle variété ... mais sur une même surface tu peux avoir peut-être trois variétés. Ils veulent qu'on dessine les variétés sur les surfaces ! Mais ça te sert à quoi ? Dis-moi, à quoi ça sert pour faire une estimation de récolte?”

in the systems of oversight, especially in oversight systems that are targeted using algorithms. For example, the project Smart Animal Health, developed by the Federal Office for Agriculture, “aims to develop a method for collecting and evaluating data on the health and well-being of animals in a reliable and digital manner” (*visé à développer une méthode afin de collecter et d'évaluer les données sur la santé et le bien-être des animaux de manière fiable et digitale*) (OFAG, 2020). Whereas until now, animal welfare checks were carried out more or less at random—that is to say, the farm to be inspected was chosen at random—now the aim is to optimize the system by sending the inspectors to the farms that the algorithm has identified as potentially problematic, as a collaborator on the project explained to us:

*The hope is that the data will open doors to us for overseeing and for letting those in charge know where inspections need to be made, in order to give some relief to those who always do things right and to better monitor those who don't.* (Interview 10, collaborator on agri-digital project)<sup>6</sup>

In spite of the good intentions, this type of project brings up questions in particular about the selection and validity of the criteria that are taken into consideration in evaluating risks. One member of a supervisory body pointed out how unpredictable animal abuse cases can be and noted his skepticism about the use of algorithms:

*The situation can change very fast. Sometimes, people have family problems, a divorce ... that can turn very quickly into a depression or a suicide attempt or something else, and it is always exactly in such cases when there are problems with the farm afterwards [...] So it's really always a little hard to say: this farm is a risky one, that one is not. Because the situation can change all the time, you know, there is a factor that you can't [anticipate].* (Interview 7, certification agent)<sup>7</sup>

In short, thanks to digital tools, the data reconfigure the relations of oversight within agri-environmental monitoring. This transformation tends to extend to the entire agri-food sector, as we shall see.

### 5.2. Data as resources to be valued: new uses and users for agricultural data

For several years now, the digitization of governance has resulted in a gradual reconfiguration that, as we shall see, connects greater mobility in the data with the coming into play of new private or semi-public actors.

On the level of the federal state, the Federal Office for Agriculture (OFAG) tends to support a centralizing strategy. As one of its representatives puts it, “Here, we are relatively closed, and for now, things go in just one direction” (*Chez nous, c'est relativement fermé et, pour le moment, ça circule à sens unique*). The fact that the OFAG has become more involved in the national digital projects in the last few years is a source of satisfaction for some stakeholders, especially within agricultural organizations. In 2016, the Swiss Federal Council adopted the strategy of a “Digital Switzerland,” including several challenges for agriculture, including the challenge to encourage cooperation between actors in the agri-food sector. A “charter on digitization in Swiss agriculture and agri-food” (*charte sur la numérisation dans l'agriculture et le*

<sup>6</sup> “On espère que les données nous ouvrent les portes pour surveiller et pour indiquer aux responsables où il faudra contrôler, pour soulager ceux qui font toujours bien et pour mieux contrôler ceux qui font moins bien.”

<sup>7</sup> “La situation peut changer très rapidement. On a des fois des gens qui ont des problèmes familiaux, un divorce ... ça peut vite des fois tourner en dépression ou tentative de suicide ou autre et c'est justement toujours dans ces cas qu'il y a des problèmes après avec la ferme [...] Donc c'est toujours un peu difficile de dire: ça c'est une ferme à risques, ça c'en n'est pas une. Parce que la situation peut changer tout le temps quoi donc il y a un facteur qu'on ne peut pas [anticiper].”

secteur agroalimentaire suisses)<sup>8</sup> was drawn up in 2018 and immediately ratified by a majority of the key stakeholders in the sector. The aim was to put together a community that would meet every year to talk about current digital issues (such as data protection in 2019, artificial intelligence in 2020, and the Internet of Things in 2021). In addition, the OFAG has also been developing a project, called DfD2 (“Data for third parties”), that is intended to enhance and circulate its own data. Concretely, it is a computer application that will allow a farmer to share their data that is held by the Swiss Confederation—data that has been verified and consolidated by the federal systems—with certifying bodies, among other things (OFAG, 2021). According to a representative of the OFAG, this kind of data has the great advantage of having been verified and validated, which makes it attractive for the private sector:

*At any rate, that is how I see the interest of the organizations that could access this data: it is that they will have a certain degree of security, because there is the whole issue of harmonization and of who is responsible for the data, updating them, verifying. And this may be an issue for the private sector. (Interview 4, federal administration)<sup>9</sup>*

The private sector has been offering IT solutions for farm management since the 1990s, in particular Agropius, a Swiss leader in this field. But in the last few years, emerging projects have not only aimed to sell support software to farmers, but have also tried to enhance the agricultural data itself, through wider circulation and new applications. This is the idea behind Barto, a platform that combines administrative management with smart farming. Started by two para-state actors in 2015 – Agridea and ..., the platform allows farmers to enter their data just once and then share them with the various interested actors, such as the cantons or the labels. Most likely for financial reasons, Barto’s shareholding was extended to private actors, such as Fenaco, the powerful national agricultural federation, which now holds 34.5% of the company’s shares. Other private actors, in particular from the livestock sector, have also joined the movement. Even though for the most part these various groups have their own software support for farmers, they wanted to join Barto, according to our interviews, in order to be part of its development from the inside. Thus, in 2018, Barto became a private company and entered into a partnership with the German smart farming platform 365FarmNet, connected with the agricultural machinery maker Claas, in order to take advantage of a pre-existing system, as Jürg Guggisberg, the director of Barto, put it on the platform’s website.<sup>10</sup> Barto then broadened its offerings, adding private modules, for example for planning trajectories for connected machines. The data collected by Barto include many kinds of information about a given farm, such as its structure (geographic structure, number of machines, number of employees), cultivation and breeding activities, and future plans. These beginnings of a private data-centralizing platform have elicited a number of criticisms and worries in the agricultural sphere. The risk of monopoly and of a loss of autonomy has been pointed out, especially because of the preponderant role of powerful economic actors:

*People have the feeling that maybe if you work with Fenaco, you have to have a Claas and then all the equipment behind that that goes with the Claas, and then all the equipment behind that that goes with Barto, and then all of a sudden you don’t have a choice anymore. If you work with X, you have everything that goes with that, and that is maybe where, because they have less choice, the farmers start to see that there is a reduction,*

*after all, I mean a loss of freedom in their decisions and a loss of autonomy. (Interview 1, agricultural organization)<sup>11</sup>*

In fact, however, neither the hopes nor the fears connected with the new possibilities offered by the circulation of agricultural data seem to have reached the farmers to any great degree, at least not so far, unlike the technologies that are directly implemented on the farms, such as GPS guidance systems, milking robots, or herd monitoring systems, whose benefits are immediately tangible in the daily life of the farm. The farmers that we met saw the storage of data in digital form as the main advantage of the digitization of monitoring:

*The fact that we don’t have to maintain binders anymore for certain basic things like keeping track of the animals’ performance, being able to click on a cow and see all of her [milk] weighings, her lactations for her whole life as a pdf like that, which we can print or not, because it is always available, what a dream that is, it’s a really good thing. (Interview 8, farmer)<sup>12</sup>*

In sum, while systems that are specific to certain tasks are gradually being integrated into the farms, the aspirations held by both the public and private sectors for the implementation of new uses allowing the exploitation of farm data are at this point still only future projections.

## 6. Informational governance and farmer autonomy

While agri-environmental governance by small data is still dominant at this point, the movement towards big data and an informational governance appears to be well underway. As a result, the two kinds of data coexist, which recalls what *Kitchin and Lauriault (2015)* write about the gradual transformation of small data: “the small data landscape is changing through the development of data infrastructures. Small data gain value and utility when [they are] made accessible for reuse and are combined with other datasets.” This transformation, even though incomplete, also raises questions about its profound implications, especially within a reconfiguration of the power relationships and of the role of the state (*Mol 2006*). In the case of the Swiss system of agri-environmental governance, the mobilization of data simultaneously as both essential oversight tools and new resources with multiple uses are transforming the relationship between farmers and the agents of state and private governance.

In the stories told by the current digitization projects, it is the farmers who are generally put forward as the principal users and beneficiaries. First of all, digitization is presented as an efficient way to lighten the farmers’ administrative burden. And secondly, the mobilization of big data can make it easier for farmers to reach their production goals, through greater control of the technical and environmental parameters. When they are presented like this, digital technologies appear to improve farmers’ environment and working conditions. In the following, we shall examine this assertion by comparing it with the notion of autonomy as conceived by *Stock and Forney (2014)*. It should be reminded here, that most of these results are not based on farmers’ self-assessment of the impact of digitization on their experience of autonomy, but rather on the perceptions of other actors of the governance.

<sup>8</sup> <https://agridigital.ch/fr/charte/>.

<sup>9</sup> “En tout cas c’est comme ça que je perçois l’intérêt des organisations qui pourraient accéder à ces données: c’est qu’elles auront un certain degré ou un degré relatif de sécurité, parce qu’il y a toute la problématique de l’harmonisation et toute la problématique de qui est responsable des données, de les actualiser, de les vérifier. Et ça c’est peut-être une problématique du privé.”

<sup>10</sup> source: <https://www.barto.ch/fr/actualites/blog/collaboration-avec-365farmnet-77> (accessed on March 31, 2022).

<sup>11</sup> “On sent aussi que peut-être si vous bossez avec Fenaco, il faut avoir un Claas et tout le matériel derrière qui va avec le Claas et puis après tout le matériel derrière qui va avec Barto et puis voilà donc vous êtes plus dans un choix de nouveau. Si vous travaillez avec X, vous avez tout le cursus derrière et puis c’est peut-être là que, en réduisant ce choix, les agriculteurs voient qu’il y a quand même une réduction, enfin une perte de liberté décisionnelle et une perte d’autonomie quoi.”

<sup>12</sup> “Le fait de ne plus avoir de classeurs pour certaines choses basiques comme les contrôles de performance des animaux, de cliquer sur une vache et de voir toutes ses pesées [de lait], ses lactations de toute sa vie sous forme d’un pdf comme ça, qu’on imprime ou qu’on n’imprime pas parce qu’il est tout le temps à disposition, c’est le rêve quoi, ça c’est vraiment bien.”

### 6.1. Strengthening the rationales of bureaucratic monitoring

The very bureaucratic nature of Swiss agri-environmental monitoring has been described elsewhere (Forney, 2016, 2021). As noted above, several authors have emphasized the negative impact of the rationales of bureaucratization in terms of autonomy, including the loss of meaning and a lack of adaptability. In this context, digital tools are nevertheless presented, especially by their sponsors, as a chance to lighten the bureaucratic load that falls on farmers and thereby to reduce the negative effects of this bureaucratization. Thus, the OFAG announced the launch of an application connected to its system of data sharing (DfD2) by highlighting how it would be helpful to farmers:

We have to relieve farmers of all the red tape: the Federal Office for Agriculture is making every effort to reduce the clerical work required of farmers. (OFAG, press release, January 21, 2021)<sup>13</sup>

Barto, meanwhile, presents itself on its home page as “the intelligent solution for farmers” that “simplifies administration” (*la solution intelligente pour les paysans et les paysannes; simplifie l’administration*).<sup>14</sup> These phrases echo Dunleavy et al. (2006), who present the movement towards digital governance as a paradigm change and a decline in the rationales of New Public Management, heavily linked to neoliberal bureaucratization (Hibou 2015).

Our results, however, clearly indicate that the new possibilities offered by digital technologies in fact only reinforce certain bureaucratic rationales. The ability to collect more data, and more precise data, has driven a complexification of oversight and a multiplication of administrative categories. In addition, the demands for regularity and for the standardization of data, another essential element of bureaucratic logic, have not been reduced; in fact, the opposite is true. The transition to exhaustive questionnaires during farm inspections has rigidified the procedures. Previously, inspections focused on a global assessment, allowing a certain amount of space for the integration of complexity and for adaptation to the specifics of the case. The transition to a standardized system of reporting has drastically reduced the inspectors’ room for maneuvering. In such conditions, there is little probability that the digitization of governance will mitigate the loss of meaning produced by the rigid and arbitrary nature of the bureaucratic categories, as described in the literature. What is more, the rigidification of inspection standards is in direct conflict with the irreducible specificity of farming operations and situations and the uncontrollable nature of some environmental factors—the typical example being weather conditions—that affect agricultural activity. Taking this into account, the mobilization of digital technologies within Swiss agri-environmental governance is far from allowing a greater practical autonomy, understood as a tool for navigating and buffering the uncertainties connected with farming (Stock and Forney 2014).

This loss of meaning and of autonomy was, moreover, explicitly thematized in our interviews by certain mid-level agents of governance, in particular certain cantonal officials. It is interesting to connect this critique with the position that these actors occupy within the system of governance and with its evolution. Currently, the regional actors (in agricultural organizations or cantonal services) often personally know the farmers with whom they deal, as well as their farms and their general situations. During interactions connected with the practices of governance and of data collection, they are in a position to integrate this broader knowledge of the individual context, which enables certain adaptations and negotiations between the farmer’s local reality and the simplifying categories of bureaucracy. With the digitization of the procedures of collection and oversight, however, this role is tending to be

<sup>13</sup> “Il faut décharger les agriculteurs des formalités administratives: l’Office fédéral de l’agriculture s’efforce dans toute la mesure du possible de réduire le travail de bureau exigé des exploitants agricoles.”

<sup>14</sup> [www.barto.ch/fr](http://www.barto.ch/fr).

weakened, and with it, the room for adaptation to the particular situations of the farmers who find themselves increasingly subjected to the reductive categories of the bureaucratic tools of governance. In particular, the desire to facilitate the automatic entry of data, or direct entry by the farmers, threatens a strategic role that is currently held by these actors, namely that of providing access to the farmers and vouching for the reliability of the data. While the cantonal systems emerged at a time when it was necessary to devise the best possible way to obtain and process the data, now the tendency towards centralizing, automating, and standardizing data collection threatens to render this role obsolete, because the presence of an intermediary becomes unnecessary when there is a system being put in place on the national level. At the same time, the illusion of immediacy attached to the collection of big data could render the inevitable translation work that is required, between the oversight standards and the complexity of the empirical realities, invisible.

### 6.2. A technological mirage?

Many digital projects, including some modules offered by the Barto platform, for instance, also offer more technical services, such as stock management or crop monitoring. In the case of Barto, these services often use modules imported from their partner platform 365FarmNet, run by Claas. The promise made to farmers in this case is that the smart farming approach “should support you in your daily work on the farm and allow you to become more efficient” (*doit vous soutenir dans votre travail quotidien dans l’exploitation et vous permettre de gagner en efficacité*).<sup>15</sup>

There are several questions that arise, however, about the reality of this advantage for the farmers. First of all, we might ask ourselves which farmers are most likely to actually benefit from the use of complex digital technologies, which often involve large investments. Several studies have demonstrated the existence of a digital gap between various farming populations within the same country (Bowen and Morris, 2019; Marshall et al., 2020). In Switzerland, the diversity within the agricultural world is easy to see, connected in particular to the diversity of the terrain (from plains to mountains), the types of production, and the agricultural structures.<sup>16</sup> Beyond the question of individuals’ digital skills there is also the question of the appropriateness of particular farming models and the tools that are offered. This is the criticism that was raised, in particular, by one agricultural organization representative:

*Barto is an integrated system, and one that, to our mind, is not very ... that does not meet the expectations of most Swiss [...] farms ... A totally integrated system might perhaps be appropriate for an elite group of farmers who are wired in on all levels. But a farmer from Appenzell who has his 13 ha (which is more or less the average of farms in this region), I don’t know if he is going to have a robot at every stage. (Interview 21, professional organization)<sup>17</sup>*

In fact, the few interviews that we carried out with farmers confirmed the low level of penetration of smart farming (. None of these farmers, who were otherwise described as active users of digital tools, was running a fully wired, automated farm. Their use of smart

<sup>15</sup> <https://www.barto.ch/fr/pour-les-agriculteurs/smart-farming> (accessed on March 31, 2022).

<sup>16</sup> See, for example, the OFAG’s annual agricultural report (<https://www.agrarbericht.ch/>).

<sup>17</sup> “Barto c’est un système intégré, à notre sens qui n’était pas trop ... qui ne répond pas aux attentes de la majorité des exploitations (...) suisses ... Un système totalement intégré correspond peut-être à une élite d’agriculteurs qui seront connectés à tous les niveaux. L’appenzellois, l’agriculteur appenzellois qui a ses 13 ha, puisque ça correspond plus ou moins à la moyenne des exploitations de cette région, je ne sais pas s’il aura un robot à tous les échelons.”

technologies was generally limited to a few machines or to the use of some very specific management support tools. Although our results cannot confirm it definitively, the low level of adoption of the other tools of smart farming can be understood as a reflection of their limited capacity to empower the farmers. At any rate, this capacity appears to be insufficient to counterbalance the perceived risks, particularly in terms of dependence on powerful actors within the private economy. Research conducted in Ireland by [Kenny and Regan \(2021\)](#) identify similar factors – notably technology trust issues, and a perceived lack of sufficient benefits – deterring farmers engagement with Smartphone Apps ([Kenny and Regan, 2021](#)). In effect, the interest that private enterprises have in acquiring increased access to agricultural data has been widely documented in the literature, in particular in the context of “precision farming” in the United States, where multinational corporations such as Monsanto or John Deere have a great deal of control (e.g. [Bronson and Knezevic, 2016](#); [Carbonell, 2016](#)). The situation in Switzerland is of course different, because these globalized economic superpowers have only a weak presence there. This state of affairs can be explained by the high costs of adapting to the specifics of the country’s economic and legal system, the small size of the national market, and the presence of traditional national actors who are well entrenched locally. However, even on this smaller scale, the argument about the concentration of power remains valid. Fenaco, the agricultural federation that is Barto’s primary investor, dominates various segments of the market for agricultural inputs, and this dominant position could be strengthened, through Barto, on the level of data. At least, that is what some farmers fear:

*I’m not OK with my data being used by someone else. Because I can see very well what’s going to happen ... You can see that Fenaco is going to show up with a ... they have a project ... [...] This is all just like the business with the Cumulus card!<sup>18</sup> No, seriously! And then afterwards, just by saying that you did such-and-such, [...] they can put you there, they can do things to you ... And then they say you didn’t do this. And then you didn’t do that ... As for me, that’s where I would draw a line. If it’s just so that they can spy on you all the time, I’m not interested. Because we already have enough Gestapo monitoring us in agriculture! So as far as I’m concerned, I’m pretty much against it, because for me digitization has to be useful to me in my work, but it shouldn’t be a way to come and sell me something that I ... a product that I don’t need ... because after all it really is kind of like that! And afterwards, everybody knows what happens with the data, too ... (Interview 11, farmer)<sup>19</sup>*

Fenaco’s access to the data of Barto’s users is still very far removed from what happens in other contexts, such as in US precision farming. Given the small number of users of the services that Barto offers, the current data flow is too limited to maintain the kind of abundance required for big data, which relies on quantity and diversity. And indeed, so far, most of the economic actors who were interviewed have presented their involvement in digitization projects as a desire to “stay up to date” and to position themselves with respect to their competition, including internationally.

<sup>18</sup> Cumulus is a loyalty program run by Migros, one of Switzerland’s two supermarket chain.

<sup>19</sup> “Je ne suis pas d’accord que mes données servent à autrui. Parce que moi ce que je vois bien qui va arriver ... On voit il y a Fenaco qui vient avec un ... ils ont un projet ... [...] Tout ça c’est quand même des histoires comme la carte Cumulus! Non mais c’est vrai! Après pour dire vous avez fait comme ça, [...] on peut vous mettre ci, on peut vous faire ça ... Et là, vous n’avez pas fait ci. Et là, vous n’avez pas fait ça ... Moi, c’est là où moi je mettrais une limite. Si c’est pour avoir de l’espionné tout le temps, moi ça ne m’intéresse pas. Parce qu’on a déjà assez de gestapo dans l’agriculture qui vient nous contrôler ! Alors moi, je suis plutôt contre ça, parce que pour moi la digitalisation doit m’aider dans mon travail, mais ça doit pas être un moyen de pouvoir venir me vendre ce dont j’ai ... un produit dont je n’ai pas besoin ... parce que c’est quand même un peu ça! Et après, on sait tout ce qui se passe avec ces données aussi ...”

### 6.3. Convincing farmers in order to serve other interests?

As we can see, the promises that have been made to farmers about the benefits of digitization are not borne out to any great degree. One could theorize that the farmers’ lack of enthusiasm for the digital tools they have been offered has to do with the fact that they have not really been fooled in this area. The digitization of bureaucracy and the use of smart farming will in no way increase their room for maneuvering, nor their capacity nor sense of control. Talk of how useful these technologies are for farmers thus ends up looking like mere rhetorical gesturing, intended to get farmers to participate while hiding other interests that might be more central in the development of the digital tools.

Indeed, the current governance system is also administratively burdensome for actors such as the federal state or certifying organizations, even though we did not hear much criticism of bureaucratic rationales from these actors. Thus, the promise of the lightning of the administrative burden through digitization does not appear to be aimed at breaking out of the rationales of bureaucratic governance as much as it is intended to facilitate their implementation and reduce their cost. This is what one member of a farm-oversight coordination company implied, saying:

*We have transitioned our administration from paper to IT, but it’s not digitization. Not at all! [...] We made an administrative change in order to make our lives easier, not the farmers’ lives. (Interview 20, agricultural project)<sup>20</sup>*

At the same time, the integration of digital technologies and big data redistributes power within the practices of governance. In this context, the desire to develop a centralized data sharing system at the federal level can thus be understood as a strategy for maintaining the control that the administration wields.

For private actors, the development in Switzerland of an economy of agricultural data in the direction of big data is limited by the data protection laws, which forbid circulating farmers’ data without their explicit consent. In order to build useable databases, therefore, the active participation of the farmers is essential, just as it is for the proper functioning of the data sharing systems, the cornerstone of an emerging informational governance. Thus, hiding behind the discourse of usefulness for farmers, there is a multiplicity of purposes and interests. [Jakku et al. \(2019\)](#) have described this discrepancy in expectations in the Australian context, and they emphasize the consequences for the difficult building of trust relationships, especially on the side of the farmers. The authors recommend a greater integration of the farmers not only as informed users but also as co-creators and as managers of data, within digital systems on a more local scale. This trust deficit shows up in our results as well. The level of control that a farmer can exercise over their data, once it has been entered into data sharing systems, is limited to the acceptance of general conditions and to the choice of the partners with whom they share their data. As for the services that supposedly facilitate the farmers’ administrative work, they continue to be focused on the needs of the governance system, whether as tools of agricultural policy or of the labels, with a low level of direct usefulness for the farmers in their daily practice.

Thus, the early stages of an informational agri-environmental governance in Switzerland are hardly suggestive of a contribution to farmer autonomy. Autonomy in terms of identity continues to be contested by bureaucratic rationales, reinforced by the use of digital technologies. The nature of the data that are produced and collected for the purposes of governance contribute very little to greater autonomy in the day-to-day conduct of agricultural activity. And finally, fears of new dependencies generated by entering into technological systems run

<sup>20</sup> “On a fait une transformation de l’administration de papier à l’IT, mais ce n’est pas de la digitalisation. Pas du tout ! [...] On a fait un changement administratif pour faciliter notre vie, pas la vie du paysan.”

counter to the idea that digitization could generate a more structural autonomy by allowing for a reduction in the pressures that weigh on farmers within the agri-food system.

## 7. Conclusion: data, tools for empowerment or a factor in dependency?

In this article, we have traced the emergence of an informational agri-environmental governance in Switzerland and examined its effects in terms of the empowerment of farmers. As [Kitchin and Lauriault \(2015\)](#) declare, the introduction of digital infrastructures and tools into governance through small data does not in itself create a big data logic. However, it does transform the system, making it more “big data-like,” in other words, it takes on more of the characteristics of big data by becoming “more extensive, relational and interconnected, varied, and flexible.” (470) We have seen that these transformations are particularly evident in the practices of farmer monitoring and oversight, as well as in a new conception of agricultural data in terms of resources to exploit and circulate. Even though these changes are only in a preliminary stage, their potential for development is clear and raises questions, especially with respect to their effects on farmers and their autonomy.

Indeed, the rhetoric that surrounds this transformation of governance, rhetoric produced both by public actors and by the sponsors of private projects, extols the benefits to farmers of this digitization. And yet, a detailed examination through the prism of the possibility for autonomy allows us to take a much more critical look. First of all, the digitization of data and of oversight tools only strengthens the bureaucratic rationales that are already at work, to the detriment of farmers’ ability to make sense of the practices connected with agri-environmental governance and to make them their own. The result is a feeling of monitoring and arbitrariness that contradicts the idea of a greater empowerment in terms of identity. Secondly, the perceived risks of direct dependence on the large companies that control agricultural digitization are apparently not counterbalanced by any prospects that digitization will improve the farmers’ ability to carry out their activities in a way that corresponds to their desires and goals. The small degree to which smart farming tools are made use of in Switzerland would appear to confirm that they are not – at this point – strongly empowering in terms of practical action. And finally, and in spite of the declarations that are made, the digitization of agri-environmental governance is, quite apparently, guided by interests other than those of the farmers: easier implementation for the agents of governance based on agri-environmental monitoring, as well as the development of an agricultural big data economy that requires the participation of the farmers, in particular for the construction of large-scale databases.

By contrast, and as an overture to a different approach, we can identify a few avenues for the development of an informational governance that would also promote farmer empowerment. First of all, in order to counter the rationales of bureaucratization, it is important to build monitoring and oversight tools that make sense for the practitioners, which involves rethinking what kind of data are collected and how they can create more value for the farmers themselves. Following approaches that focus on farmers’ needs and motivations to use digital tools, as for instance [Kenny and Regan \(2021\)](#) do, would be a necessary start. However, the farmers we consulted in the context of this research seemed to have difficulties anticipating the implications of digitization in their everyday life and practices. This could seriously limit the potential of such participatory processes. In a similar vein, an in-depth reflection should take place on the potential of big data to offer a way out of the rationales of bureaucratic simplification that impose rigid categories on ever-more-complex realities. In this process, the risks and the benefits connected with the extraordinary potential of digital surveillance must be carefully weighed against each other. The illusion of the immediacy of the oversight that this kind of surveillance can give must not cause us to forget the room for maneuvering that social actors need in order to manage the contingencies specific to agricultural

activity. In addition, previous research on the emergence of a digital divide in European agricultures (e.g. [Rotz et al., 2019b](#)) should be extended to the analysis of participation to voluntary agri-environmental schemes relying on digitized tools, in order systems to identify potential exclusionary processes related to informational technologies that could undermine the viability of specific farm types. And finally, it seems clear that questions of data protection and of an equitable sharing of access to data and of data usage have so far, in agriculture as in other areas of digitization, received only unsatisfactory answers.

## To the journal for rural studies

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The two above-mentioned authors confirm that they are the only authors of this article and jointly own the copy-right. This article has not been published previously and is not under consideration at any other journal.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

The authors do not have permission to share data.

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