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"Unable to Determine": Limits to Metrical Governance in Agricultural Supply chains

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Abstract

Metrics have long served as tools for governing at a distance. In the food industry, major manufacturers have embraced metrics as tools to govern the sustainability of the farms producing their commodity raw materials. This metrical turn has been influenced but also complicated by agricultural datafication, that is, the increasing quantities of data generated on and about farms. Despite the sheer abundance of data that companies might use to measure and drive improvement in on-farm sustainability, they have struggled to collect data suitable for such purposes. Attention to the different kinds of distance and diversity across which metrics are supposed to govern suggests reasons why they may fail to do so, even when wielded by otherwise powerful corporations.

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In 2012, the popular magazine *Scientific American*'s list of ten "world changing ideas" envisioned a world changed for the better by big data. The ideas included wildlife-tracking drones, tattoo sensors, and a data-driven sustainable product rating system. Known as the Sustainability Index, the latter was the brainchild of Walmart and a consortium of major manufacturers, nongovernmental organizations (NGOs), and universities (Dooley 2014). Compared to other ideas on the list, a green product guide hardly seemed novel. But the magazine described the future index as both more comprehensive than other rating systems and more likely to drive positive change. Its transformative potential, the magazine said, lay in Walmart's power to first collect suppliers' "closely held" data on products' hidden environmental and social impacts—this would happen via annual surveys—and then use the index scores to demand improvements (Jabr et al. 2012).

Fast forward to 2017, the second year the Sustainability Consortium reported the results of its Walmart supplier surveys. The good news was that more than 2,000 consumer goods manufacturers had completed them, a 25 percent increase from the year before. They answered questions about products ranging from breakfast cereals to batteries and about emissions, resource use, and other impacts occurring far upstream in product supply chains. The bad news was that they mostly answered, "we are unable to determine at this time" (Sustainability Consortium 2017). Most of the data presumed to be closely held, it turned out, companies did not possess or even know how to get.

The consortium did not entirely shelve its world-changing idea, however. Instead, it has shifted focus from the initial task of metrics development to the ongoing problem of scarce product data. Of particular concern are data about the on-farm production of commodity crops such as soy, corn, and wheat. This concern owes partly to agriculture's outsized contribution to the overall environmental footprint of food manufacturers and retailers including Walmart (Clay 2011; Terazono 2019). But it also reflects an especially high rate of "unable to determine" survey responses for those crops that food manufacturers have traditionally sourced through complex and notoriously untransparent supply chains.

This paper examines the food industry's efforts to collect and make use of data from the farms at the upper reaches of those supply chains. I start

from the premise that the industry's interest in on-farm data reflects both new concerns and the development of new governance tools to address them. In addition to the standards and certifications long used to assure compliance with norms of food safety, quality, and ethics, downstream companies now seek to assess producers against quantitative sustainability metrics, typically developed within multistakeholder initiatives (MSIs). This metrical turn has been encouraged but also complicated by agricultural "datafication," that is, the ever-increasing quantities of data generated on and about farms (Mayer-Schoenberger and Cukier 2013). On the one hand, companies across the agri-food industry tout the value of these data, once algorithmically transformed into legible information, as means to measure and promote agricultural sustainability. On another, they have struggled to collect data suitable for such purposes. Their slow progress suggests that the power of metrics to govern at a distance is by no means given, even when wielded by corporations that otherwise exercise far-reaching clout. Science and technology studies (STS) has long recognized that power of any kind must be explained, not assumed. But so must distance, a concept that has received much less critical attention (Handel 2018). This article shows how the distances that characterize contemporary agri-food supply chains can effectively limit the governing reach of both metric and corporate power.

This article draws on a study of major branded food manufacturers' (henceforth "brands") projects to assess and improve agricultural sustainability, via their own supply chains and as members of MSIs. This research has consisted of more than fifty semistructured interviews as well as participant observation at MSI meetings, summits and other events, and analyses of their data collection tools and related documentation.[1] To begin, I situate the research with reference to relevant scholarship on the tools and contingencies of corporate food supply chain governance, with particular attention to the rise of big data. I then examine how participants in one US-based MSI seek to assess and promote the sustainability of US commodity crop agriculture—as defined by their metrics[2]—and considers the broader significance of the difficulties they have encountered.

Technologies and Contingencies of Supply Chain Governance

At first glance, brands' "unable to determine" responses to Walmart's survey questions seem at odds with much of the scholarship on corporate governance, which suggests an interest in and ability to get better answers (Dauvergne and Lister 2012; Pattberg 2007). This scholarship links

corporations' growing de facto regulatory reach to the neoliberal decline of state governing capacity (Jasanoff 2016; Moore et al. 2011; Schleifer 2012) and, within supply chains, to the rising power of retailers and brands vis-à-vis upstream enterprises (Gereffi and Lee 2012). A sizable subset of this literature focuses on the standards used to govern agri-food supply chains (Burch and Lawrence 2007; Ponte, Gibbon, and Vestergaard 2011). In principle, the standards and related audits imposed on upstream producers help downstream companies manage risks and compete on nonprice factors (Busch 2011; Henson and Reardon 2005; Ponte, Gibbon, and Vestergaard 2011; Daviron and Vagneron 2011) Many studies of agri-food standards regimes, however, find considerable "slippage" (Star and Lampland 2009) between aims and application. Whether because they are loophole-ridden, weakly enforced, or simply cannot be proven to, say, reduce deforestation or smallholder poverty (Dauvergne 2018; Loconto and Demortain 2017; Ouma 2010; Hatanaka 2010; Arora et al. 2013), the many ways standards may *not* govern effectively also pose corporate risks, if they lead to food scares, scandals, or greenwash accusations.

These risks are among the reasons why food retailers and brands, while not abandoning standards, have looked to metrics to demonstrate quantitative proof of their progress toward sustainability. Other reasons include the growing pressures from NGOs (and various "rater and ranker" agencies) to demonstrate transparency (Dauvergne and Lister 2012) and, in some cases, growing concerns about climatic and other environmental risks to raw material supplies (Smith 2013). Not least, metrics appeal to companies that seek to assess risk and prove impact in supply chains where they do not source directly from farmers and therefore cannot easily mandate or audit specific on-farm practices.

Compared to the extensive literature on agri-food standards, the food industry's embrace of sustainability metrics has received little attention (though see Higgins, Dibden, and Cocklin 2015; Henry 2017; Konefal, Hatanaka, and Constance 2019). But it is hardly an isolated phenomenon. Metrics are now supposed to govern many societal institutions and daily life practices (Beer 2016). And while their functions are nothing new (Porter 1996, 2015), the rise of big data—that is, the "capacity to search, aggregate, and cross-reference large data sets" (boyd and Crawford 2012; see also Mayer-Schoenberger and Cukier 2013)—now makes it possible to measure more things more quickly. This capacity, some would argue, has "allowed the creation of a new Digital Taylorism in which everyone from the janitor to the CEO is subject to quantitative audit and evaluation" (Busch 2016, 670).

As with standards, however, ubiquity does not equate to efficacy. Research in and beyond STS documents how metrics intended to stop plagiarism, improve education, or assure global financial stability have failed to do so (Introna 2016; Piattoeva et al. 2018; Farlow 2015). They highlight the diverse ways that measured subjects exploit what Porter (2015, 35) calls "the gap between an imperfect measure and the sometimes shadowy entity it purports to capture." The metrics examined here, similarly, invite the criticism that they do not adequately capture agricultural sustainability since they only quantify resource efficiency goals such as reduced water or energy use per bushel of crop (Konefal, Hatanaka, and Constance 2019).

But whether those metrics govern effectively even on their own narrowly defined terms—that is, whether they drive measurable improvements in agricultural resource efficiency—depends on more than how accurately they quantify those goals. It also requires sufficient data to demonstrate improvement and the willingness and ability of measured subjects (in this case farmers) to pursue it. While perhaps obvious, these latter points are easily ignored in the many instances of metrical governance where the data have grown big for both technological and social reasons—in other words, where subjects are "hard-wired, through devices, into specific material infrastructures" (Poon 2016, 1093) and where many subjects share an interest in what the aggregate data can do for or tell them. Examples abound, from Bitcoin trading to all manner of self-tracking apps (Zook and Blankenship 2018; Lupton 2016). As Callon and Latour (1981) argued long ago (Latour 1983, 1987), such infrastructures and interests hinge on persuasion, as well as knowledge about what particular subjects will likely find persuasive. These are recognized as essential parts of governing at a distance, when "at a distance" simply means indirectly (Miller and Rose 1990).

From their early days, major food brands have recognized the value of the knowledge and media that can help them shape consumers' desires, habits, and ultimately purchases (Belasco and Scranton 2014). By contrast, in supply chains where commodity crops are assumed to be fungible (that is, interchangeable regardless of origin) they have not traditionally needed to know much about the farmers producing those crops—not where or how they farm, much less what they value or worry about. Now brands' sustainability managers do need this knowledge as well as the capacity to respond to it in ways that will effect desired changes in farmers' practices. But commodities' assumed fungibility poses at least two problems. First, expense: brands' cost structures assume that raw materials can be sourced through markets made "efficient" partly by traders' minimal information needs, and the flexibility this allows (Cronon 1991, chap. 4; Freidberg

2017). Companies that want to know and control more about raw material production typically must also pay more. Second and related, the traditionally minimal communication between upstream and downstream actors has fostered "cultural distance" (Princen 1997) even across supply chains that, as in the US Midwest, do not span great physical distances. Princen and others use this term to describe consumers' lack of understanding about the conditions of production—a lack that has allowed "certain powerful actors in commodity chains . . . to externalize or obscure ecological and social costs" (Clapp 2014, 309; see also Dauvergne 2010). But as this article shows, at least some of those ostensibly powerful actors—that is, major brands—are also distanced from producers (and vice versa) in ways that undermine the effectiveness of their governance efforts.

This notion of cultural distance differs from the common STS assumption that "distant" means either indirect and/or physically far away (Law 1984). It does though resemble the diversity that Tsing (2009) sees as essential to supply chain capitalism. Even if some supply chain sites are thoroughly standardized and surveilled (Kanngieser 2013), she argues that companies such as Walmart and Nike also depend on the diverse niches in the global economy where nominally independent suppliers willingly "self-exploit." These niches include not just, say, loosely regulated apparel factories but also sites of primary production and extraction. And while Tsing links supply chain capitalism to neoliberal globalization, North American commodity crop supply chains rely on a niche that family farms have occupied for the past 150 years (Friedmann 1978). Although those farms have grown much fewer and larger over time (Bunge 2017), as family enterprises they still exploit household labor and other familial resources in ways corporations cannot (Friedmann 1978; Mann and Dickenson 1978), according to different logics of risk and accountability and potentially quite different visions of sustainable farming. The point here is not to essentialize such differences (Watts 1994) but rather to appreciate why even farmers who depend entirely on industrial inputs and markets (James, Hendrickson, and Howard 2013)—who, in STS terms, have long been enrolled in the networks that constitute the industrial food system (Latour 2005)—may not share or respond to the industry's measures of sustainable agriculture. More to the point, those measures may not actually govern them.

Sustainability Assessment on the Datafied Farm

Although the metrics in Walmart's Sustainability Index have yet to change the world in the way *Scientific American* envisioned, they have changed the

food industry. The retailer's annual supplier surveys count among the forces pushing brands to seek more information about—and influence over—the farms producing their key raw materials. Not all the desired information is quantitative; as discussed later, some companies use individual farmers' stories as marketing material. But for Walmart's surveys as well as their own sustainability reporting and risk management, they need farm-level data, collected at regular intervals. Farm level matters not because companies need information about specific farmers' emissions or resource use. Rather, the farm is considered not only the most credible scale for collecting such information but also the supply chain site where environmental impacts and risks are greatest (Clay 2011) and therefore improvement most urgent.

Brands' need for farm-level data has in turn fueled the growth of several MSIs devoted to the broad task of agricultural sustainability assessment. While their memberships overlap, they cover different regions and crop types.[3] This article centers on Field to Market: The Alliance for Sustainable Agriculture (FtM), which focuses on US commodity crops. Founded in 2006, it is the largest MSI of its kind. Its 140-plus members include not just major food retailers and brands (General Mills, Unilever, Walmart) and environmental NGOs (Environmental Defense Fund, Nature Conservancy) but also commodity grower organizations, commodity traders (Cargill, Archer Daniels Midland), agricultural technology providers (ATPs; Bayer, Sygenta), and several universities and government agencies.

Much of FtM's work has focused on developing the metrics, tools, and supply chain collaborations required for on-farm sustainability assessment. Its primary tool, the online Fieldprint Platform, scores a farm's fields on eight metrics (greenhouse gas emissions, energy use, land use, irrigation water use, water quality, soil carbon, soil conservation, and biodiversity; FtM, n.d. "Sustainability Metrics"). It generates two kinds of information: individualized analyses for farmers and anonymized, aggregated data for companies. While free for farmers, companies can only use the Platform for assessment purposes if they sponsor and enroll farmers in one or more "Fieldprint Projects." Brands typically cosponsor projects with commodity traders or ATPs, mainly because they have regular contact with farmers and brands do not. Varying in size from a dozen to hundreds of farmers, some projects pursue specific conservation goals, but until very recently,[4] all have aimed to collect at least five years' worth of farmer data—the minimum required before FtM members can make any claims about improved sustainability.

In keeping with its commitment to measurable progress, in 2014, FtM announced that it intended to have fifty million acres enrolled in the Fieldprint Platform (and thus subject to regular assessment) by 2020. The equivalent of 20 percent of US commodity crop farmland, this ambitious goal initially appeared achievable for at least three reasons. First, it had support from not just the food system's biggest corporate actors but also major growers' associations. Second and related, FtM had developed metrics that appeared to favor commodity crop farmers' bottom-line interests. Even farmers unconcerned about climate change could benefit from identifying ways to save on fuel or fertilizer. And unlike many sustainability certification schemes, FtM would not judge them. As one FtM staff member observed, "having a number that is not as low as your neighbor's" would not matter. No one else would even know, since the numbers would be anonymized.

Third, some of the same technologies enabling the industrial scale production of commodity crops also produce immense amounts of data. GPS-guided tractors, sensor-equipped combine harvesters, in-field weather stations, and drones together promote precision agriculture, a farm management approach that uses geolocated information to optimize the accuracy and efficiency of input use (Sonka and Cheng 2015). Although the basic approach dates to the mid-1990s (Wolf and Wood 1997), precision agriculture has evolved in recent years with the introduction of farm management platforms that base their analytics on not only farmers' own data but also big data (Carolan 2016; Carpenter 2017; Pham and Stack 2018). While the broader consequences of booming investment in "digital agriculture" remain uncertain (Bronson and Knezevic 2016), it has highlighted the sheer quantity of data produced on US commodity crop farms. Any question the Fieldprint Platform asked of farmers these data could surely answer—or so it seemed.

"Like Pulling Teeth"

At FtM's annual summit in late 2017, the progress report was mixed. On the up side, membership had grown rapidly, as had the organization's visibility. Actors all across the supply chain knew of FtM's work and wanted to participate. On the down side, the work of enrolling farmers in the Fieldprint Platform had proven more difficult than expected. The count stood at roughly 2,300 farmers and 2.8 million acres—barely 5 percent of the original 2020 goal (FtM 2017). Meanwhile it was unclear when, if ever, brands

would have sufficient data to claim that farms in their sourcing regions were becoming more sustainable.

Why had FtM's assessment efforts gone so slowly? The following analysis identifies three sets of problems—broadly, problems of technology, trust, and value—as well as what participants have done about them. All underscore how different kinds of distance can limit the effectiveness of metrical governance.

Tools That "Don't Seem to Talk to Each Other"

FtM's website describes the Fieldprint Platform as simple to use, requiring only readily available data. Yet ongoing efforts to improve the tool and overall data collection process indicate that neither are simple enough. They certainly do not resemble the precision agriculture industry's ideal of data flow that is "completely automated and passive such that no human interaction is required" (Whitacre, Mark, and Griffin 2014, 5). On the contrary, even on farms where mechanization has minimized human labor inputs, machines' lack of interoperability—the fact that they "don't seem to talk to each other" (Vogt 2017)—means that data management remains an ongoing and possibly neglected task. For the Fieldprint Platform, it means information in various places (file cabinets, checkbook registers, thumb drives "clattering in pickup truck ash trays" [Bunge 2014]) must be found and manually entered. Initially, this might take several hours, even with expert assistance.

Despite claims to user-friendliness, in fact, much of the data collection for Fieldprint Projects has relied on the on-farm assistance of agents sent by participating companies. These agents help farmers interpret the questions, find the necessary records, and negotiate the platform's interface. In rural areas where the Internet is unreliable if not totally unavailable, they bring clipboards or other offline alternatives. They mention older farmers who have "never seen a (computer) mouse" (a third of US farmers are over sixty-five, Economic Research Service 2019), others who have their preteen children enter data into the Fieldprint Platform, and the many farmers who, regardless of age or technical aptitude, simply find the task tedious. Convincing them to complete it, one agent said, was "like pulling teeth sometimes."

Acknowledging that "the data entry burden was a problem," in early 2017, FtM announced a new application program interface (API) and agreements with a handful of software providers that would allow integration of the Fieldprint Platform's metrics into those providers' farm management

tools (Vogt 2017). Farmers with those tools could now use them to assess their economic and environmental performance simultaneously—a convenience that FtM staff predicted would make Fieldprint Project participation much more attractive. APIs and data-sharing partnerships were also the focus of the Sustainability Consortium's two-year long Ag Data Landscape Project. Funded by the Walmart Foundation, it aimed to reduce the food industry's high rate of "unable to determine" responses to the Sustainability Index survey questions (Sustainability Consortium 2019). The industry consortium AgGateway's (n.d.) ADAPT project similarly aims to use APIs and software plug-ins to "simplify communication between growers, their machines and their partners," and thus help "end users . . . extract value from the data." Like FtM's ongoing upgrades to the Fieldprint Platform (now on version 3.0), these projects assume that the barriers to data flow are primarily technical. But when such projects come up for discussion in FtM or other multistakeholder forums, it quickly becomes clear that unresolved questions about off-farm data use pose equally formidable obstacles.

" . . . A Rational Degree of Confusion, Suspicion, Questions"

Like the many ATPs selling farm analytics software, FtM emphasizes that farmers "own their data" and that the Fieldprint Platform is secure and confidential. It also stresses that participating companies receive only anonymized, aggregated information. As one brand's sustainability manager put it, data privacy "is concern number one for growers." This concern is not limited to FtM's work and not identical to the broader public's worries about the safety of their personal data (Jakku et al. 2016). A 2014 American Farm Bureau survey found that more than three quarters of US farmers feared that their data could fall into the hands of either "regulators" or adversarial NGOs. Nearly as many worried that aggregated farm data, to the extent that they provide clues about regional harvests, could be used to speculate on commodity markets (American Farm Bureau 2014; Rasmussen 2016). Certain data could guide investments in agricultural real estate or related financial products, others the pricing of agricultural inputs. Both could potentially drive up farmers' costs (Hancock 2016). Not least, farmers' localized competition for rented land gives them good reason to want neither neighbors nor landlords to know details about their inputs or yields (Stubbs 2016, 12).

Not all these scenarios apply directly to the Fieldprint Platform, which does not collect data nearly as big or "real time" as some precision agriculture platforms. But brands' interest in assessing resource efficiency

raises other concerns, such as whether they could use aggregate data to set de facto standards that some farmers would find hard to meet. Companies could also use this information to justify leaving sourcing regions deemed too risky, whether due to climate change, resource depletion, or high levels of agriculture-related pollution. Although they rarely mention this possibility, brands already make similar risk assessments about overseas sourcing regions known for deforestation or human rights abuses (Rueda, Garrett, and Lambin 2017).

Brands' sustainability managers invariably emphasize that they want to encourage continuous improvement in their sourcing regions, not leave them behind. But farmers may not appreciate this message either. According to a manager at one of the commodity trading companies that cosponsors Fieldprint Projects with brands, farmers view brands' interest in their data

> with a rational degree of confusion, suspicion, questions. They have had an operation in their family for multiple generations, they understand the need for operating efficiently, being stewards of the environment, etc. and now a brand suddenly is engaging with them . . . to say, "What are you doing to grow sustainable crops?" The response at the grower level is, "We have been doing it forever so what is keeping you up at night?"

The manager added that it did not help when brands want farmers to fill out not only the Fieldprint Platform but also their own questionnaires. Some of these, he said, "use words like 'maize' and 'hectares.' That just turns off the American grower because they realize it is a bunch of way-out, Euro crazies who do not know anything about what it is like to raise corn in the US."

Whatever individual brand sustainability managers know about raising corn, they acknowledge that their companies are too far down the supply chain to claim much agricultural expertise, and therefore, they need to work with and through farmers' "trusted advisers." These individuals might be independent agronomists, certified crop consultants, "ag retailers," or government or university-based extension agents (Faleide 2017). They do not necessarily have a "sustainability" background; many ag retailers' main job, for instance, is to sell the agrichemicals that brands would now like to see farmers use more judiciously. But since advisers regularly visit and counsel their clients, often over years, they typically enjoy more access and credibility than brands' sustainability teams. "It's all about the local connection," as one ATP employee said. "If you don't have that, you're going nowhere."

Accordingly, in 2018 FtM stepped up efforts to recruit more farm advisers into its work. Its website's "trusted adviser resources" include manuals, fact sheets, and online courses that aim to help advisers not only conduct on-farm sustainability assessments but also convince their clients that such assessments are valuable. The latter task has arguably proven FtM's greatest challenge. While partly a function of the technical inconveniences and farmer apprehensions discussed so far, the problem of the insufficient "value proposition" reflects additional, perhaps more fundamental, obstacles to companies' efforts to govern on-farm sustainability at a distance.

"We Are Having to Continuously Evolve Our Approach"

To encourage farmers to enroll and stay in Fieldprint Projects, FtM's corporate members offer varied incentives. One of the most common offerings is information, often presented at annual workshops. Bar charts showing how farmers' anonymized Fieldprint Platform scores compare with others in the same locality can be "really powerful," said one company's sustainability manager, especially if they also show a bottom-line benefit to better scores. "It's one way we can get some value back to growers."

Another company's manager, however, noted that farmers' initial curiosity about "how they stack up" would not necessarily keep them entering data into the platform year after year. Given that companies need year-on-year data in order to assess and make public claims about improvement, "we are having to continuously evolve our approach to sustaining grower value," that manager said, and listed possibilities:

> If that is technology, if that is a small incentive per acre, if that is research, if that is the peer benchmarking . . . . If that is appreciation. "Growers, you participate in this program, you get a jacket. It has a logo of this program. You can wear it around proudly in your county . . . ." We are figuring out some of those things . . .

Both FtM itself and member brands also offer farmers different forms of public recognition. FtM sponsors an online Farmer Spotlight series as well as a Farmer of the Year award, given out at its annual summit. For their part, individual brands' websites, social media, and in some cases packaging feature vignettes about farmers in their projects. Beyond recognizing individual farmers, these companies' sustainability managers often say that they need farmers' data so as to better tell the "sustainability stories" of

commodity agriculture more broadly, and thereby help build public trust in its products. Brands of course know about storytelling; their value and identity depend on it. For commodity crop farmers, its benefits are less clear. However much individual farmers may appreciate an award or a spot on a company's website, most sell into commodity markets where such distinctions are lost. Do they, then, value the type of recognition that brands offer? FtM posed a similar question in a 2017 farmer survey. Asked to rank incentives for adopting practices that would "deliver sustainability outcomes," the majority of respondents ranked recognition last and advertising about farmers' conservation practices second to last (Farm Journal Media 2018).

By contrast, nearly 90 percent of respondents ranked a price premium as their top incentive. Paying farmers to use the Fieldprint Platform is not unheard of; Unilever, for instance, did so as part of a Fieldprint Project around sustainable soybean production (Gelles 2015). Brands' sustainability managers, however, typically describe premiums as incentives of last resort. At one level, this is unsurprising, given that the crops they want data about are mostly bound for ordinary products, whether breakfast cereals or candy bars. Retailers such as Walmart have not yet indicated any willingness to pay extra for those products, so brands do not want to pay extra for the ingredients.

But sustainability managers talk about premiums with an ambivalence that suggests more than budgetary concerns. Explaining why premiums were a "worry," one said, "it's monetizing data collection. It's moving away from collaboration." As quoted above, another company's manager mentioned "a small premium per acre" of land enrolled in the Fieldprint Platform. The manager emphasized that this was a token of appreciation, a "little something" rather than payment per se. "We want to try to distance it as much from the commercial discussion as possible . . . we are never going to be able to fully compensate producers for what they are doing."

An FtM white paper suggests several other "value added incentives" to encourage farmers to participate in Fieldprint Projects, such as access to government conservation funds (FtM 2018). But managers' comments about premiums hint at three larger problems beneath the more technical question of incentives. First, one reason brands may not be able to fully compensate farmers is that they are competing with the many companies that want farmers' data for other purposes, such as their own analytics platforms or machine learning–based research and development. Some companies offer substantial incentives; at least one offers to help farmers sell their data as they would their crops (Bunge 2015). This aspect of

agricultural datafication—what Syngenta has called "the race to have the digital relationship with the grower"—merits much more research (Cosgrove 2018; see also Fraser 2018). Already, though, it suggests that growing commercial interest in agricultural data may be at odds with the food industry governance initiatives that treat such data as information to be freely shared.

Second, the above comments about compensation raise the question: what exactly are farmers compensated for, besides their data? Sustainability assessment initiatives such as FtM began with the premise that measurement drives improvement. So far that premise remains unproven. A study of farmers in Unilever's sustainable soy project found, however, that not only did they "overwhelmingly" mention the price premium as the main reason they agreed to share data; they also liked that the program did not require them to do anything except share data. As one farmer put it, "It's very easy . . . pretty much they're giving us the old freedom to farm. You do what you plan to do and then tell them afterwards" (Bentlage et al. 2016). Tellingly, FtM has since acknowledged "that you cannot solely measure your way to sustainability" (FtM 2018, 1)—especially, one might add, if the measured actors have other ideas about what constitutes "sustainable" and are not obliged to act on yours.

This leads to the final problem. Governing at a distance requires "the construction of allied interests," in part through calculation and rhetoric (Miller and Rose 1990, 10; cf. Callon 1984). FtM calls itself an alliance, and its members talk about Fieldprint Projects as collaborations or partnerships. Companies collaborate not only with each other but also with NGOs and, in principle, the farmers in their Fieldprint Projects. The farmers recognized with awards and website stories often use this language. The manager's comment about "monetizing data collection,[as] moving away from collaboration" makes sense in this light. Brands' sustainability managers work hard to construct allied interests in their Fieldprint Projects. Farmers who embrace project objectives—who not only share data but actively pursue and track their improvement—represent successes. But they are exceptional. "They are the rock stars," one manager admitted, and added that even at the meetings to recruit Fieldprint Project participants, "we are not getting the farmers there who don't even know what sustainability is or don't care about it." While those farmers may care about different measures of sustainability than do brands, the point remains that they are not only at a distance but also effectively out of reach.

Conclusions

Can the food industry's sustainability metrics govern commodity agriculture? For now, the answer remains "unable to determine." Undetermined too are the implications of ongoing agricultural datafication for what either companies or farmers know about farming—a question that merits more research. This paper has shown, however, that even in agri-food supply chains long bound by actors' shared interests in the efficiencies afforded by large scale, input-intensive production, downstream companies cannot procure farmers' data nearly as readily as they can their crops. And while advances in "passive" data flow and remote sensing (Sanders and Masri 2016) may eventually improve companies' abilities to measure on-farm sustainability, such advances will not necessarily make their metrics more influential.

To understand the limits to metrical governance in commodity crop supply chains, this paper has drawn attention to the kinds of distance they span, and the diversity they encompass. Farmers and brands are distanced not only physically but also by the fact that they have historically not transacted with or needed to know much about one other. Overcoming that "cultural distance" has proven hard and slow work for brands' sustainability managers. And despite the vast monocultures, the bigness of the brands, and the supposed fungibility of the commodities themselves, these supply chains are diverse in the sense that family-run farms operate under very different social and material conditions than do the corporate brands. That those farms' independence is compromised by other forms of corporate control (i.e., over farm lending, agricultural research, and prices for both inputs and crops; Howard 2016; James, Hendrickson, and Howard 2013) may be all the more reason why many farmers might see intergenerational survival as a more meaningful measure of sustainability than brands' metrics of resource efficiency.

Finally, while this article has focused on the limits to metrical governance in US commodity crop supply chains, the analysis has both drawn on and advanced scholarship on core STS concerns. These concerns include not only the shifts in governance that sustainability MSIs and their metrics represent but also, and more fundamentally, the sociotechnical relationships through which power is built, extended, and sometimes challenged. The food industry's top brands accumulated their market power partly by persuading consumers to buy their products, and they have consolidated that power partly by demanding cheap and standardized raw materials. Contemporary pressures to demonstrate that those raw materials are becoming

measurably more sustainable—pressures coming from retailers such as Walmart, among others—have so far demonstrated mainly the limits of the brands' clout. Their assessment efforts also show that neither the ubiquity and supposed mobility of metrics nor the sheer quantity of things made (in theory) measurable by datafication tell us much about whether specific metrical regimes govern effectively. More attention to the kinds of distance that metrics are supposed to govern across can help us appreciate why, even when wielded by otherwise powerful corporations, they may not prove so world-changing after all.

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Notes

1. The interviews were primarily with corporate sustainability managers, multi-stakeholder initiative (MSI) staff, and representatives of nongovernmental organizations, and other MSI member organizations. A prior research project helped facilitate access to interviewees, as did attending MSI events. Since 2014, I have been allowed to participate as an academic observer in certain nonpublic meetings of the Sustainability Consortium, and since 2017, my institution's status as an "affiliate" (non-voting) member of the MSI Field to Market (FtM) has allowed me to attend its meetings. Most interviews were recorded; all interviewees were promised confidentiality.

2. This paper does not assess the adequacy of these metrics, though I and others have done so elsewhere (Freidberg 2014; Konefal, Hatanaka, and Constance 2019).
3. Others include the Stewardship Index for Specialty Crops, the Sustainable Agriculture Initiative Platform, the Innovation Center for US Dairy, and the Cool Farm Alliance.
4. In 2019, FtM expanded its Fieldprint Project options in order to encourage members to sponsor more of them. They can now choose from three types of projects, one of which requires "engagement" with farmers but not data collection.

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