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Trading in the secretive commodity

Susanne Freidberg

Abstract

Over the past century and a half, a handful of transnational corporations have built fortunes trading commodity crops such as corn, soy and wheat. Graded and standardized, these commodities are considered uniform and therefore fungible; information about their origins need not accompany them to market. But in recent years major food brands, as part of broader 'sustainable sourcing' commitments, have begun to ask about the places and practices that produce these crops. Their inquiries have exposed the limits of the commodity traders' supposedly unrivalled market intelligence. They also raise questions about how the advent of agricultural grades and standards made knowledge of crop origins seem unnecessary in certain commodity supply chains, and about how those supply chains might henceforth change, now that lack of such knowledge has become a liability.

Keywords: supply chains; science and technology studies; sustainability; corporations; agnotology.

Introduction

> … Not only knowledge but also ignorance now play a main role in the formation of advanced global capitalism.
> (Roberts & Armitage, 2008)

Corn, soy, wheat: they are some of the most ubiquitous ingredients in the modern industrial food supply, and dominate agricultural landscapes across

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large parts of the industrialized world. And yet these crops are bought, stored, shipped, processed and sold by a small number of corporations unknown to most consumers of their products. Even in an era of heightened popular concern about the harms done by 'Big Food', the commodity-trading companies have attracted little attention relative to the branded manufacturers they supply. When watchdog organizations do turn their sights on the commodity traders, they tend to expose not secrets, but rather the extent of their secrecy (Murphy *et al.*, 2012).

The history and business practices of the biggest commodity-trading firms (Archer-Daniels Midland, Bunge, Cargill and Louis Dreyfus, together known as the ABCD companies) offer a little-explored example of how 'the formation of advanced global capitalism' – and more specifically, its feeding – has depended on ignorance as well as knowledge. Of particular concern here is not so much the public ignorance of where and how these companies operate, nor the relative ignorance of commodity market participants with less access to price information, but rather the ignorance intrinsic to the modern understanding of a commodity crop.

While the word commodity originally described something useful or 'commodious', what defines today's commodity crop is its fungibility. Markets for both physical commodities and the financial products derived from them assume that crops' useful qualities do not depend on where, how or by whom they were cultivated. Even Marx, writing about the commodity when its modern meaning was still taking shape, started from the premise that 'from the taste of wheat, it is not possible to tell who produced it, a Russian serf, French peasant or an English capitalist' (Marx, 1859).

Regardless of their origins, most of today's commodity crops become inputs for processed foods, feed, fibre or biofuels. For the industries that manufacture these products, the most important qualitative information about a commodity is not gustatory or otherwise sensory, but rather classificatory. It is about whether the wheat, for instance, is hard red spring, soft winter or durum, and whether it is graded 'US number 1' or lower. As Cronon (1991) shows, the commodity grades and standards first established in the mid-nineteenth century had monumental commercial and indeed environmental consequences. Besides streamlining trade and encouraging increased production, the classifying of crops by grades and standards enabled the rise of companies specialized in buying, selling and speculating on those crops on a massive scale.

Much of this history is well known. Recent food industry sustainability initiatives, however, have challenged the basic *modus operandi* of large-scale commodity trading. In response to perceived environmental and reputational risks, many of the world's biggest food brands have committed to the 'sustainable sourcing' of their key raw materials. They have also backed initiatives to collect the agricultural data needed to track, promote and report progress towards those goals. These initiatives hinge on the cooperation of the ABCD companies, the intermediaries between farms and brands. Yet despite these companies' size, clout and supposedly unparalleled market intelligence, they

have found it difficult to supply the needed information. These difficulties raise the prospect that food industry sustainability commitments efforts might, inadvertently, pose bigger challenges to conventional commodity crop-sourcing practices than existing efforts to de-commoditize food through 'alternative' provisioning networks. This paper explores the reasons why.

Scholarship in agnotology (the study of ignorance), science and technology studies (STS) and agrarian history together offer guidance for exploring how, at the broadest level, the loss or neglect of certain types of knowledge has shaped the development of the industrialized agro-food system. The history of commodity crop trading, here centred mostly on the United States, shows how a series of specific technological and institutional developments made knowledge about crop origins seem unimportant, while also increasing the value of commodity traders' dependence on access to other kinds of 'on the ground' intelligence. This history, together with results from an ongoing study of food industry sustainability initiatives,[1] points to the limits of not only what the ABCD companies know about their agricultural raw materials but also – short of major changes in commodity supply chain relationships – what they can expect to find out.

Corporations, technology and agricultural ignorance

Corporations have been central to agnotology since Robert Proctor's foundational study of the tobacco industry (Proctor, 1995). Like Oreskes and Conway's more recent research on the private interests behind climate denialism, Proctor examined how the industry used a variety of tools and strategies – misleading advertising, cherry-picked data, buying off credentialled scientists – to 'manufacture' ignorance about its products' harmful effects (Oreskes & Conway, 2010; Proctor & Schiebinger, 2008). With disciplinary roots in the history of science, much agnotology scholarship focuses on how corporations have used their financial and political clout to sway, prevent, discredit or distract from scientific research (Michaels, 2008; Pinto, 2015; Rayner, 2012; Sanabria, 2016). A related body of work examines how social movements and lay experts struggle against this clout to get 'undone science' funded, or their own knowledge legitimated (Frickel *et al.*, 2010; Hess, 2015). Yet another line of inquiry examines the strategic value of ignorance for corporations seeking to avoid liability for financial crises and faulty products (Davies & McGoey, 2012; McGoey, 2012; Mirowski, 2013). Few studies, however, have asked how ignorance has contributed to the consolidation of corporate power in the first place.

Asking this question about agricultural commodity-trading companies first requires appreciating both the historical relationship between ignorance and economic enterprise, and different understandings of ignorance itself (for more detailed reviews of the latter, see Croissant, 2014; Gross, 2007). Roberts and Armitage's analysis (2008) of the contemporary 'ignorance economy'

traces its origins to the division of labour associated with industrialization, which over centuries has created all kinds of specialists who, whether they work in factories or classrooms, do not know how to bake bread, sew clothes or repair the many machines they use daily. That the division of labour drives deskilling – one kind of produced ignorance – is hardly a new observation. Even Adam Smith admitted that somebody 'whose whole life is spent in performing a few simple operations … generally becomes as stupid and ignorant as it is possible for a human creature to become' (*Wealth of nations*, cited in Roberts & Armitage, 2008, p. 346). But of course Smith also celebrated the efficiencies and innovations that specialization enabled. Everyone was better off buying what they no longer knew how to make or do for themselves. While the disappearance of some previously essential skills might be mourned, others, as James Scott observed about the practical knowledge needed to darn stockings or wash clothes in a river, were 'gladly abandoned' (Scott, 1998, p. 335).

Besides supporting markets for goods and services, ignorance *inside* corporations or other organizations can also fuel accumulation, whether by encouraging innovation on the part of inexperienced employees who 'think outside the box' (Roberts, 2015) or, conversely, by keeping certain employees' knowledge work 'black boxed' to prevent its theft (Lange, 2016). Lange's ethnography of a high-frequency trading firm, where filtered computer screens prevent even officemates from seeing each other's algorithms, illustrates the enduring value of both secrecy and the non-knowledge it creates, even as economic activity becomes increasingly knowledge-intensive (Gross, 2012).

Over a century ago, Georg Simmel recognized secrecy's productive value, observing that 'with publicity many sorts of purposes could never arrive at realization' (Simmel, 1906, p. 462). He also noted how the openness expected of modern governments and corporations (at least public ones) did not preclude secrecy in commercial affairs, partly thanks to money's role as a standardizing and mobile medium of exchange. The 'long distance effectiveness' of money (Simmel, 1906, p. 467), in other words, facilitated not only transactions across physical space but also those between actors who needed relatively little information, beyond evidence of monetary worth, about either the goods in question or each other (Simmel, 2004). Like the agricultural grades and standards discussed shortly, money made certain kinds of non-disclosure, and thus 'non-knowledge', acceptable and eventually expected (Gross, 2012, p. 427). What Simmel's history of secrecy did not anticipate is how commercial actors' concerns about transparency and sustainability might make long-unshared information newly valuable.

In recent years such concerns have fuelled corporate demand for environmental knowledge well beyond the food industry (Barry, 2013; Welker, 2014). In other eras, however, some of the industries and livelihoods most dependent on the environment have benefited from not knowing too much about it (Uekötter & Lübken, 2014). The rise of 'science-based agriculture' in early-twentieth-century Germany, for instance, increased both farmer ignorance and, somewhat paradoxically, the advantages it conveyed (Uekötter, 2013,

2014). On one hand, agrichemical companies such as BASF introduced synthetic fertilizers to farmers who knew nothing about them; on the other, the burgeoning field of soil microbiology revealed that the land's fertility depended on more complex and localized ecological processes than previously realized. For their part, farmers cared less about the scientific findings than what they observed in their own fields: namely, that the new fertilizers worked. And as grain supplies exploded and prices fell, few could afford to heed soil scientists' cautionary voices, much less wait for better-informed advice. 'The innovation of industrial-style farming', as Uekötter puts it, 'was to supplant knowledge with resources: rather than reflect on how to perfect the nutrient cycle or learn the precise needs of the plants, farmers embraced the simple notion that "a lot helps a lot" and flooded the fields with fertilizer' (Uekötter, 2014, p. 134).

This notion obviously served the interests of the agrichemical industry. For years, however, it also benefited the German farmers who, like their US counterparts, faced the implicit ultimatum to 'get big or get out'. Also like farmers in the US grain belts, it helped that they tilled soils deep and hardy enough to withstand heavy doses of chemical fertilizer. The point remains that many farmers found that they did not need or even necessarily want to know too much about soil microbiology, since this potentially uncomfortable knowledge (Rayner, 2012) could have made their work harder and its outcomes less certain.

Technology pervades agnotology. To study ignorance almost always requires examining the tools that produce, encourage, justify and work against it. Often it also requires asking where and over what geographic scales they operate (Frickel & Kinchy, 2015). While agrarian studies has traditionally attended more to technologies that directly devalue or replace on-farm skills and experiential knowledge – from the aforementioned chemical fertilizers to hybrid and genetically modified seeds to self-driving combine harvesters (Pearse, 1980; Stone, 2007; Wolf & Wood, 1997) – Kleinman and Suryanarayanan's study of the controversy surrounding honeybee die-offs focuses more on the technologies that effectively limit what counts as scientific knowledge about farm ecosystems (Kleinman & Suryanarayanan, 2012; see also Elliott, 2015). In response to beekeepers' and NGOs' suspicions that neonicotinoid pesticides are at fault, the agrichemical company Bayer does not appear to fall back on the deceptive or corrupt practices used by other industries to 'manufacture doubt', and thereby avoid liability (Proctor & Schiebinger, 2008). Instead, 'Bayer has simply played by the existing rules, stressing the evidentiary norms historically established and widely accepted' by both toxicologists and regulators (Kleinman *et al.*, 2015, p. 184; see also Dedieu *et al.*, 2015).

To defend its products, in other words, the company has relied on the standards, metrics and protocols that guide the conduct and communication of toxicology research. STS scholars have shown how similar tools support the 'knowledge infrastructures' that connect, for example, the world's meteorology observatories or the Centers for Disease Control (Edwards, 2006; Edwards *et al.*, 2013). But by guiding the production of knowledge, standards and

related tools also serve to normalize ignorance. In this case, they assure that certain questions about pesticides go unasked, certain findings get dismissed and certain knowledge (that of beekeepers) gets rejected altogether (Suryanarayanan & Kleinman, 2013).

As a contemporary example of how an agrichemical company has benefited from the ignorance fostered by certain epistemic standards, Kleinman and Suryanarayanan's study also hints at how standards have contributed to the rise of agro-industry more broadly. Most relevant here are those standards intended to assure product uniformity rather than those that differentiate some products as, say, organic or fairly traded (Busch, 2011; Daviron & Vagneron, 2011). Neoclassical accounts of the former emphasize how, alongside advances in transportation, communication and storage infrastructures, they increased the efficiency and geographic scope of commerce, and thereby encouraged greater production (Hill, 1990; Sherman, 1929). All this expansion also fuelled the growth of corporate commodity traders (Rothstein, 1988). Agnotology scholarship encourages us to think about how grades and standards have shaped their practices and fortunes by defining both what needs to be known about the crops they deal in and what does not. It suggests that ignorance forms part of the infrastructure that commodity trading 'runs on' (Star & Lampland, 2009, p. 18) – or at least has, for a long while.

Making grains from nowhere

Commodities came to be defined as indistinguishable crops in a region distinguished by its natural advantages. 'Better land than the prairies of Illinois for cereal crops the world's surface probably cannot show', Anthony Trollope observed in the early 1860s; 'The earth is rich with the vegetation of thousands of years, and the farmer's return is given to him without delay' (Trollope, 1862, p. 148). It was also a region already transformed by technology not only on the farm – companies such as John Deere and McCormick (later International Harvester) got their start here, selling ploughs and reapers (Cronon, 1991, p. 100) – but also between farm and market. Arriving in the early 1850s, railroads drove down the costs of land transport and connected previously remote areas to urban markets, Chicago especially. Then the railroad companies' steam-powered grain elevators replaced the human labour needed to haul sacks of grain from barges and railcars to warehouses. Not long after, the companies dispensed with sacks themselves, allowing shipments to be poured directly into elevator bins. Visiting the Chicago elevators, Trollope marvelled at the grain 'running in rivers from one vessel to another … I saw the corn measured by the forty-bushel measure with as much ease as we measure an ounce of cheese and with greater rapidity' (Trollope, 1862, p. 156).

What Trollope could not see was the Chicago Board of Trade (CBOT)'s efforts to enable such an immense flow of grain. As Cronon shows, a sack not only contained cereal but also identified its owner, typically either the farmer

or the small-town shipper who had bought the farmer's harvest. This was implicitly a geographic as well as legal identity; it attached grain to specific places and people. As long as that specificity mattered, shipments could not be mixed. But segregating shipments in railcars and warehouses grew increasingly cumbersome as the scale of Chicago's grain trade tripled during the mid-1850s (Cronon, 1991, p. 115).

What allowed crops to 'behave more like liquids' (Cronon, 1991, p. 113) was the CBOT's introduction of three official standards for wheat: white winter, red winter and spring. Henceforth, all wheat sold to elevators would be categorized accordingly, and any wheat of the same standard could be mixed. Warehouse receipts would indicate which standard of grain they had delivered, and those receipts could themselves be traded. When it became apparent that this system encouraged farmers not to clean their grain – since dirt added weight and could no longer be blamed on them – the CBOT developed a set of quality grades (from 'No. 1' through 'Reject'), based on indicators such as foreign matter, damage and moisture (Hill, 1990, p. 15). Grades for other cereal crops soon followed.

Together, the CBOT's grades and standards redefined what needed to be known about grain marketed in Chicago. The buyer of 100 bushels of corn required information only about how it had been classified, not whose farm it had come from. Among the far-reaching consequences of this change was the development of speculative markets first in warehouse receipts (for grain already delivered) and then futures contracts (for the delivery of grain that did not necessarily yet exist). In both, the commodity was the changing price of particular grades of grain, not the grain itself (Cronon, 1991, pp. 124–125). From an early date, futures markets drew not only pure speculators, but also farmers and major grain buyers looking to hedge against the risks of price changes. Whatever knowledge about production or processing they brought to these markets mattered less, for trading purposes, than timely information about prices (or events that could affect prices) in all the places where grain was traded on any scale. The telegraph, first used by the CBOT in 1858, provided this information both to Chicago's traders and, increasingly, to commercial actors watching Chicago's prices in cities such as New York and London (Carey, 2009). Creating 'informational bridges' between all these marketplaces, the telegraph also helped create the notion of *the* market as an entity without place, that 'existed all the time and everywhere' (Zaloom, 2006, p. 22) and that allowed commodities – as crops without place – to be traded more efficiently and across greater distances than ever before.

While the CBOT's grades and standards supported this notion of the abstract market, they did not destroy the actual variation in the grain qualities both supplied to and demanded in different marketplaces. Nor did they entirely replace the diverse methods used to assess those qualities. The London Corn Traders Association (LCTA), for example, did not initially recognize Chicago's grain grades, partly because grain quality could deteriorate *en route*, but also because Chicago's elevator owners reputedly adulterated and overgraded their

stocks (Hill, 1990, pp. 24–25; Pinzur, 2016). Only in the 1880s, after years of negotiations, did London's traders agree to accept Chicago's grain shipments without further inspection. Meanwhile, they continued to grade imports from elsewhere – Australia, Argentina, India, continental Europe – according to regionally specific (yet standardized) measures. These measures took account of different export infrastructures, climates, soils and seed varieties as well as the specific qualities needed by industrial millers and other major customers. In effect the Chicago and London traders' associations developed different sets of tools towards the same basic end: ensuring fungibility (Velkar, 2012).

In short, the modern meaning of the commodity crop took shape in the mid to late nineteenth century and depended on the development of a set of interrelated technologies – from railroads, grain elevators and the telegraph to grades and standards – as well as institutions such as traders' associations, the news media and futures markets. Most accounts of these developments have emphasized how they fuelled the expansion of grain trading partly by improving 'information provision' (Cox, 1976; Pirrong, 1995; Rothstein, 1988; Zaloom, 2006). The telegraph allowed for faster and cheaper communication; grades and standards created a common language (Pinzur, 2016); futures markets offered projections; traders' associations and governments regulated the integrity of information transmitted by these different means. More and better information reduced transaction costs and encouraged the planting, purchase and shipping of crops on scales that would have otherwise appeared too risky.

Running through this familiar history of increasingly globalized and well-informed commodity markets is another one of the crops themselves becoming alienated (or 'disentangled') from the places that produced them (MacKenzie, 2007), with less than benign ecological and social consequences (Berry, 2015). What has received less attention is how the technologies that enabled this alienation also fostered increasing ignorance, at least at a certain geographic scale. Grades and standards effectively certified not only that a commodity shipment possessed certain qualities, but also that it came from someplace that could produce those qualities. They allowed market actors not to know specifically where, much less how, such crops were produced and allowed the crops themselves to be blended with those from other places, becoming raw materials for what has since become known as 'food from nowhere' (Campbell, 2009; McMichael, 2002). Commodities thus became mysterious not only in the sense Marx described – by taking on seemingly intrinsic value through the process of capitalist exchange (Marx, 1867) – but also in the more banal sense of becoming untraceable.

Secrets and ties

Mystery also figures in popular portrayals of commodity-trading companies. While private ownership partly explains some of the companies' traditional lack of transparency, accounts such as Morgan's *Merchants of grain* (1980; see also Kneen, 1995) dwell more on how exclusive access to certain kinds of

information has helped build commercial empires. These range from the mid-nineteenth-century 'Grain King of California' Isaac Friedlander's monopoly over the London trade to Louis Dreyfus and Bunge's late nineteenth century conquest of Argentina's wheat exports to Cargill's consolidation during the 1930s, when depressed prices and drought ruined smaller firms (Morgan, 1980; Paul, 1958). But a 'policy of obscurity' (Morgan, 1980, p. 162) can conceal not only what a company knows, but also what it does not.

Today's commodity traders rely on two kinds of market intelligence. Over longer timeframes, they look to supply and demand trends to decide when to expand into new regions and commodities, integrate across their supply chains or, conversely, shed assets. In this they differ little from other corporate enterprises. But because the ABCD companies deal in both physical commodities and commodity futures – and the latter are integral to their trades in the former (Chalmin, 1987) – they also need the more ephemeral information sought after in financial markets: that is, information valuable only when still 'unabsorbed' and unshared (Knorr Cetina, 2010). Key sources include their personnel in far-flung markets and sourcing regions, or what Cargill calls its 'feet on the ground' (Cargill, n.d.). The largest of the commodity traders, it 'owns and operates dozens of offices, plants, warehouses, livestock operations and other ag ventures in 67 countries around the globe. If an event happens that affects the price of grain, Cargill is one of the first to know' (Cargill, n.d.). Knowledge of how to interpret even the most mundane events also helps. Cargill employees in its West Africa cocoa business 'count competitors' trucks at the gates of almost every cocoa warehouse in the port of Abidjan in Ivory Coast', so as to better estimate annual output (van Dijk *et al.*, 2011, p. 4).

Recognizing the enduring value of this kind of on-site intelligence, in 2009 Cargill adjusted its pay structure to reward employees for sharing observations about everything from on-farm pest attacks to the 'shifting demands of fast-food chains' (Davis, 2009). As the company reported that same year, after an especially volatile period in global grain markets, 'the insights gathered from many activities and places enabled our trading teams to avoid being stung by plummeting commodity prices' (Cargill, 2009). Instead Cargill, like some of its competitors, enjoyed record profits (Salerno, 2017).

Unlike stock market insider trading, the use of such 'insights' for commodity futures trading is entirely legal (Salerno, 2017). After all, whatever employees observe about local supply and demand conditions is not confidential; it is just not information readily available to all market participants. But the ABCD companies' 'informational edge' (Wilkes & Onstad, 2012) grew more controversial once they started using it not only to hedge their own risks, but also to speculate on others' behalf. In the wake of the aforementioned 2008 grain price spikes – which caused widespread hunger and unrest (Headey & Fan, 2010) – media and NGO investigations blamed the speculative activities of large banks and fund managers, including commodity trader subsidiaries such as Cargill's Black River Management and ADM Investor Services

(Kaufman, 2010; Worthy, 2011). Some scholarly analyses saw the episode as evidence that food prices were increasingly subject to financial logic, with the ABCD companies among the biggest beneficiaries of increased volatility (Clapp, 2014; Salerno, 2017).

Commodity prices have since fallen, and Cargill, at least, has liquidated its commodity-based hedge funds due to low investor demand (Foxman & Kishan, 2015). Whatever this says about the broader financialization of food (Gibbon, 2014), it points to certain limits in the ABCD companies' 'unrivalled on-the-ground knowledge' (Wilkes & Onstad, 2012). However useful for trading in both commodity crops and their derivatives, this knowledge has not helped them answer the many questions now asked of them about where and how those crops are produced. Understanding why requires some background.

Sustainable sourcing and the inquiring supply chain

Elsewhere in the food industry, 'where and how' questions are nothing new. Since a series of major food scares and government regulatory reforms in the 1990s, corporate supermarkets in Britain and Western Europe have routinely collected information about the origins of certain products. Typically these are products that pose an especially high reputational risk, whether due to a history of bad publicity, a close connection to a company's brand or both. Often supermarkets source them more or less directly from producers, so as to assure timely delivery and brand-specific qualities. And typically supermarkets expect such products to be fully traceable, and in compliance with the food safety and social responsibility standards set by industry organizations such as GlobalGAP (Freidberg, 2004; Fuchs *et al*., 2011; Ouma, 2010). As 'best practice' or process standards, they work differently than physical product standards (Busch, 2011). By requiring that goods come with information certifying they have been produced under certain conditions – that is, in certain types of places – they reduce fungibility (Mutersbaugh, 2005).

Like supermarkets, many major food manufacturers have long had their own supplier standards, at least for high-risk ingredients such as cocoa. More recently, however, they have also set time-bound 'sustainable sourcing' goals that cover both more environmental concerns and more raw materials – including, significantly, ordinary commodities. General Mills, for instance, has committed to 100 per cent sustainable sourcing by 2020 of its 10 'priority ingredients', among them US corn, wheat and sugar beet. For each ingredient, the company has identified 'primary challenges' – i.e. greenhouse gases (GHG) emissions, nutrient utilization and biodiversity for US corn – and reports annually on what percentage of its supply base has either measurably improved or (more commonly) has agreed to track improvement (General Mills, 2016). Coca Cola reports on its progress towards sustainable supplies of sweeteners, coffee, tea and fruits, while PepsiCo has set a 2025 deadline to sustainably source all its 'major agricultural raw materials' (Coca Cola, n.d.; PepsiCo, n.d.).

The proliferation of such goals is due to more than just brand image concerns. At one level they represent individual companies' competitive efforts to drive down costs through improved supply chain eco-efficiencies (Dauvergne & Lister, 2012); at another they reflect the food industry's collective efforts (detailed below) to address both the larger image problem of 'Big Food' and some of its members' concerns about climate change and other environmental risks to their raw material supplies (Freidberg, 2017; Harrabin, 2015; Kowitt, 2015). Some of these risks are due to the input-intensive farming practices that the food industry's demand for cheap commodity ingredients has itself encouraged. Regardless, individual companies now seek to determine whether those risks can be managed in their existing supply regions, or whether they need to find more secure sources of key raw materials. For this, they need data on farming practices and their environmental impacts in those regions.

But most of the food retailers and manufacturers with sustainable sourcing goals do not source their commodity ingredients directly from farmers. While they may know which regions they come from (though 'region' might refer to a few counties in the US corn belt or a large swathe of South America) they typically do not know who exactly produces them, much less how they do so. This ignorance limits not only their sway over producers but also their ability to claim progress towards their sustainable sourcing goals. A number of multi-stakeholder initiatives (MSIs) have formed over the past several years to address this basic problem.

Whereas some of the earliest industry-backed MSIs took the form of commodity 'roundtables' and developed sustainability standards specific to crops such as palm, cotton and soy (Ponte, 2014; Schouten *et al*., 2012), much of the recent multi-stakeholder activity relies instead on metrics for tracking farm-level progress towards widely desired outcomes, such as reduced GHG emissions and water use (for a longer discussion of sustainability standards versus metrics, see Freidberg, 2013, 2014). For example, the US-based MSI Field to Market, discussed shortly, collects data on these outcomes for row crops such as corn, wheat and soy (Konefal, 2015). Related initiatives include the Walmart-backed Sustainability Consortium, the Sustainable Agriculture Initiative (SAI) Platform, the Cool Farm Alliance and the Midwestern Row Crop Collaborative. While varied in size and scope, these MSIs share many of the same corporate and NGO members, as well as expectations of pre-competitive collaboration across sectors and supply chains (Dooley, 2014; Freidberg, 2017).

The scale of this collaborative activity gives the ABCD companies little choice but to participate. Even if they have not traditionally shared their big-brand customers' concerns about brand image or the cost of specific ingredients, they cannot afford to ignore questions about how or where those ingredients are produced. Too many customers are asking them, whether in the form of surveys or simply phone calls to the companies' sustainability managers. One such manager reported getting 30 to 40 calls each month.

It is worth emphasizing how the food industry's sustainability efforts both speak to and part ways with alternative food networks (Goodman *et al*., 2012; Whatmore *et al*., 2003). Whether dealing in organic, local or ethically certified products, these networks aim to decommodify foods by revealing (or 'unveiling') their origins and thereby adding distinction and value (Guthman, 2009). Together with more direct trade relationships, this value is supposed to allow producers to escape the yield-maximizing logic of commodity crop agriculture as well as its reliance on environmentally destructive inputs (Bowen & Mutersbaugh, 2014; Jarosz, 2008).

On one hand, many 'Big Food' companies have capitalized on strong demand for alternatives, whether as retailers that now devote more shelf space to local produce (Tarkan, 2015), manufacturers buying organic brands and shares in vegan start-ups (Strom, 2016) or commodity traders that now source corn and soy certified to be free of genetically modified organisms (GMOs) (Meyer, 2016). Companies' sustainability reports routinely refer to consumers who want to know where their food is coming from. They also feature stories about farmers in their supply regions who are pursuing sustainability by, say, reducing their fertilizer use (Kellogg's, n.d.). While not necessarily typical, these farmers' stories count among the ways that companies market their products as 'food from somewhere' (Campbell, 2009).

On the other hand, even if such companies now own niche organic brands, their sustainable sourcing goals cover raw materials destined mainly for ordinary 'Big Food' products such as breakfast cereals, candy bars and soft drinks. These are not premium goods, and therefore companies do not want to pay premiums for sustainably sourced ingredients. There are exceptions, but, as one NGO employee put it, 'the word "premium" is not in their DNA, not in their vocabulary'. Premiums are the vocabulary – and currency – of the organic, Fair Trade and other alternative food movements. Whether or not they advance a movement's broader goals, premiums attract farmers who must then agree to comply with its standards and audit procedures (Guthman 2014; Jaffee 2014). Without such incentives or the clout of either contractual or regulatory requirements, efforts to enrol commodity crop growers in voluntary disclosure schemes have met with limited enthusiasm. This is one obstacle to companies' knowledge about commodity crops' origins, albeit not the only one. Accounts of individuals at the forefront of those efforts help illustrate some of the broader challenges.

'It will change the heart of trading'

In February 2017, *The New York Times* gave the commodity traders precisely the type of publicity they do not want: a long investigative article linking 'Cargill and other food giants' to surging deforestation in the Amazon (Tabuchi *et al*., 2017). In response to growing global demand, the *Times* reported, Cargill and Bunge were sourcing soy from farmers in remote, recently cleared forest regions in Brazil and Bolivia, despite prior pledges to stop such practices. While the

companies denied that they had 'willfully' violated these pledges, the article also quoted Cargill CEO David MacLennan admitting that his company could have done so inadvertently. 'I don't think I or others appreciated the vast complexity of the task', he said. Cargill deals in soy at many stages of the supply chain, he explained, not just straight off the farm. Could soybean meal purchased from a small town mill come from deforested land? 'I don't know'.

Another ABCD company's sustainability manager agreed that soy was 'tricky' to trace even compared to palm oil, another commodity often linked to deforestation. Whereas fresh palm fruits are typically milled near to source, thousands of growers' soybeans might be aggregated by a cooperative before delivery to one of the company's South American silos, after which they could be shipped to Europe, stored for up to a year, and traded repeatedly on the futures market – all before processing into the ingredients that manufacturers want traceable to a certifiably deforestation-free farm. 'That is just not feasible', said the manager; 'it is not a reasonable expectation. I do not think anybody knew that until we all started digging into it'.

Technically it is feasible to trace soy back to source; it is just not cheap. The ABCD companies already sell fully traceable certified GMO-free Brazilian soy products to European and Japanese customers (Garrett *et al.*, 2013), at a premium of anywhere from a few dollars per ton for certified meal to a $4500/ton premium for certified non-GMO fatty acid (a 10-fold markup over conventional) (Pelaez *et al.*, 2010). Although growers of non-GMO soy receive part of that premium, it also covers the costs of certification and the additional infrastructure required for a segregated supply chain. And although the ABCD companies offer an expanding range of traceable 'chain of custody' ingredients, such as organic feed grains, interviewees emphasized that they remain niche products.

Another ABCD company sustainability manager, however, noted that a growing number of mainstream manufacturers were committing to segregated supply chain palm oil, despite the cost. Even if their primary motive was to avoid the criticism of high-profile NGOs (Greenpeace, 2016), the manager described it as evidence that 'the time to say, "we do not know where it is coming from" is over'. She also anticipated that manufacturers' demand for information about commodity origins would 'change the heart of trading' by reducing the liquidity that traders had long assumed:

> Once you know you cannot switch. Once you say, 'We supply you from these plantations', then you need to make sure … it is adding additional cost in the supply chain because traders like to have options and flexibility. The more flexible we are the better we are able to manage last-minute supply … and get the best price at the best moment. (Pause). I really do not know how it is going to work out. (ABCD company sustainability manager)

An NGO representative who consults for some of the ABCD companies agreed that their customers' sustainability commitments had 'caught them by surprise':

> They are getting calls by all these brands and they want to know, 'we want to buy this but we want to make sure it is clean. What is the due diligence you do on your suppliers?' That is a question that does not give you any quick response because they do not have one. It really has forced them to start thinking about locking up longer term supplies … but also forcing them to have conversations that they are not used to ever having, that never even crossed their radar. (NGO representative)

What about the commodities sourced in the birthplace of the liquid grain market, the US Midwest? Here the crops that manufacturers have committed to source sustainably are produced mostly on large, mechanized family-run farms. They have not traditionally posed the reputational risks associated with tropical commodities such as palm or cocoa. But heavy fertilizer use has contributed to declining soil and water quality, as well as to GHG emissions that account for a large if not dominant part of the total carbon footprint of many foods and beverage products (Eshel *et al.*, 2014; Weber & Matthews, 2008).

Several major manufacturers of those products belong to Field to Market (General Mills, Kellogg's, Coca Cola, PepsiCo), as do ADM, Bunge, Cargill and the British commodity trader Tate & Lyle. In order to get the data needed to show progress towards their sustainable sourcing goals, the manufacturers and their commodity suppliers have co-sponsored 'Fieldprint Projects', typically located near the suppliers' milling facilities. In each project, anywhere from a handful to a few hundred farmers in a company's 'millshed' have agreed to provide data about their yields, soil types, seeds, inputs and management practices, which a project administrator collects and aggregates using Field to Market's online Fieldprint Calculator. Some projects promote specific conservation practices or technologies, but their shared priority is to collect data on as many growers and acres as possible. Importantly, while individual growers receive analyses of their own farms' 'fieldprints', no one else does. Their data are anonymized, and Field to Market does not require on-farm audits. These conditions aim to provide companies with the information they need while acknowledging that US commodity growers' data are private property.

Companies that sponsor Fieldprint Projects can initially only report progress towards their sustainable sourcing goals in terms of the number of farmers and acres involved. They will only be able to claim that those farmers have improved, say, their energy efficiency or soil fertility if they have five years' worth of data, and the data show those improvements over time. As of late 2017, no Fieldprint Project had reached that stage. Meanwhile, even getting the farmers' data has proven difficult, for a number of reasons. First, at least until recently, it was tedious. Responding to the Fieldprint Calculator's 80-some questions for the first time might take several hours, even with help from an ABCD company employee. Providing this help has itself presented a challenge, because these companies did not traditionally need many employees who knew farmers personally. In some projects the task has fallen to the companies' 'ag retailers', whose main job is to sell farmers seeds and other inputs. Although these employees are not necessarily trained to talk about the

environmental problems that the Fieldprint Projects are supposed to address, farmers are at least accustomed to their visits. Even with that familiarity, one ag retailer said that getting clients to use the calculator could be 'like pulling teeth'.

Acknowledging that the Fieldprint Calculator's 'data entry burden' discouraged farmers from using it, Field to Market announced in early 2017 that its metrics would henceforth be integrated into farm management software platforms already in wide use (on similar technologies, see Carolan, 2017). This would both save farmers time and, at least in theory, help them see the bottom line benefits of reducing emissions and resource use (Vogt, 2017). Participants in Field to Market did note, however, that greater convenience alone would probably not sway farmers who were more concerned about how companies might use their data, or who simply did not want to give it away for free. As one ABCD company's sustainability manager put it, 'There is no sales pitch there … that is one of the hurdles that we are trying to work through right now. How do we incentivize the farmer without financial incentives? So far nobody has come up with anything'.

One might ask why companies with so much control over commodity supply chains would worry about 'incentivizing' farmers to share data. After all, food industry concentration allows companies to dictate more than just prices (Howard, 2016; Murphy, 2008). And we have already seen how, in the name of food safety and quality, supermarkets now require all kinds of information from suppliers (Fuchs *et al.*, 2011). ABCD company interviewees, however, emphasized how their one-off transactions with farmers – as opposed to the ongoing contract relations common in fresh produce supply chains – limited what they could know about them. As one put it,

> I have all individual business owners, corn growers, many of whom may sell to me this year but may well sell to the ethanol plant down the road. When I hear a CPG [consumer packaged goods company] say, 'We want to get to know the farmer', 'Great, I will bring you out but I hope he is my supplier next year' … He has a lot more selling freedom than the contract potato grower who ships to McDonald's or ships to Frito-Lay or something like that. (ABCD company sustainability manager)

Another manager agreed that because commodity crop growers are not obligated to sell to a particular company, 'they are going to grow things the way that they see fit. We at [Company X] will compete to buy that from the farmer … that is something that I think people fundamentally need to understand when we start to talk about what the practices are in the field, and the level of visibility that is available now – and is even achievable'.

Conclusion

None of the ABCD companies' sustainability managers thought that greater 'visibility' into their supply chains was technically impossible. But it would

require a much greater shift away from what one called the 'Tons R Us' model that had long governed commodity traders' relations with both customers and farmers. Already their participation in initiatives such as Field to Market marks a significant change in relations with major customers. But what about their relations with farmers? Here it is worth reflecting on who exactly has benefited, and how, from the ignorance that has come to define the commodity crop.

On one side, traditional neoclassical accounts celebrate the efficiencies created by grain grades and standards, and the increased production that followed once farmers could hedge their risks. Except during moments in history when 'irrational' grades and poor enforcement hurt grain quality (Hill, 1988), these accounts see producers, consumers and intermediaries all benefiting from the infrastructural technologies that made commodities fungible and information about their origins unnecessary. On the other, more critical perspectives see these same technologies setting in gear the 'agricultural treadmill' that Cochrane attributed to tractors and farm machinery more generally. Once standardization put all producers of a particular commodity crop into competition with one another, producing more became the only way to earn more – and eventually the only way to survive the 'squeeze' of rising costs and falling prices (Busch, 2011, p. 157; Cochrane, 1958). These perspectives emphasize how input-intensive agriculture has hurt not only resource-poor farmers, but also consumers and the environment.

Yet for those farmers who have so far survived the 'get big or get out' imperative, the supply chain's ignorance of commodity crop origins may now offer an opportunity of sorts. This may seem implausible to those who see *public* ignorance about agriculture more generally contributing to expectations that food be exceedingly cheap. That is a different (if not entirely unrelated) problem. Here the point is that the history of knowledge and non-knowledge in commodity trading – that is, the history of what needs to be known by whom, what should be kept secret or must be disclosed and at what cost – is an ongoing one. Technology continues to drive change but so do political, economic and social forces. Not long ago, the ABCD companies' access to supply and demand information gave them a significant edge in both physical commodity and derivative markets. That edge has since shrunk, as farmers themselves have invested in technologies giving them more market information and options (i.e. Wi-Fi-equipped tractors, more storage to wait out low prices), and as the digitization of commodity trading has put the ABCD companies' insights into competition with high-frequency trading algorithms (Meyer, 2017; Terazono, 2017). Not long ago, the food industry assumed that only high-risk and premium-priced, certified products needed to be traceable. Today many companies want information about how and where even basic commodity ingredients are produced. And some of that information – particularly data about on-farm inputs and practices – only farmers can supply.

How farmers might individually or collectively leverage their possession of this information is hard to predict, partly because it remains legally unclear what, exactly, they possess. Although similar in some ways to intellectual

property, this information is not invented as is property eligible for patent or copyright (Ferrell, 2015). Like the recipes for many branded foods and beverages, however, a farmer's data might qualify as a trade secret: information that owes its economic value to 'not being generally known to, and not being readily ascertainable by' those who might profit from it (Uniform Trade Secrets Act, quoted in Ferrell, 2015). Here Simmel's insights about secrecy seem newly relevant (Simmel, 1906). Although companies have an obvious interest in portraying their own trade secrets as unique (i.e. the recipe for Coca Cola) Simmel observes that secrets may conceal what others have traditionally not cared or even wanted to know about, such as the livelihood skills of the social outsiders he called strangers (Gross, 2012; Karakayali, 2006).[2] A secret's original value, in other words, may lie in hiding banal yet still uncomfortable or inconvenient knowledge (McGoey, 2012; Rayner, 2012). But current corporate sustainability initiatives, like transparency movements elsewhere (Barry, 2013), illustrate how much that value can change. Non-knowledge that once afforded efficiencies now poses risks to companies that have committed to providing evidence of sustainable sourcing. Inside those companies, now the most uncomfortable knowledge may be the prospect that getting information about commodity crop origins could require more time, money and expertise than they anticipated.

Meanwhile, the question of whether companies' pursuit of this information will actually encourage more sustainable production remains unanswered, though certainly worth pursuing. But what should be clear is that the challenges of commodity traceability are not merely technical, and a historical perspective helps to show why. In particular, attention to the ignorance fostered by certain streamlining infrastructural technologies, namely grain grades and standards, shows that while this ignorance has served the interests of commodity trading firms, it has also limited their power *vis-à-vis* the farmers who supply them – and who, it turns out, keep their own cereal secrets.

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Notes

1 Conducted between mid-2015 and early 2017, the research to date has consisted of approximately 35 semi-structured interviews of corporate sustainability managers at major US and European food manufacturers, retailers and commodity trading firms. Other interviewees include staff members at the NGOs and multi-stakeholder initiatives (MSIs) that work with the companies on their sustainable sourcing commitments. The research has also entailed participant observation at several annual MSI summits and regular working group meetings.

2 Although Simmel (1971) said strangers could not be 'owners of the soil', he was writing when agrarian livelihoods were obviously much more common and familiar than in today's predominantly urban societies.

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