



# When farmers are pulled in too many directions: comparing institutional drivers of food safety and environmental sustainability in California agriculture

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## Abstract

Aspirations to farm ‘better’ may fall short in practice due to constraints outside of farmers’ control. Yet farmers face proliferating pressures to adopt practices that align with various societal visions of better agriculture. What happens when the accumulation of external pressures overwhelms farm management capacity? Or, worse, when different visions of better agriculture pull farmers toward conflicting management paradigms? This article addresses these questions by comparing the institutional manifestations of two distinct societal obligations placed on California fruit and vegetable farmers: to practice sustainable agriculture and to ensure food safety. Drawing on the concept of constrained choice, I define and utilize a framework for comparison comprising five types of institutions that shape farm management decisions: rules and standards, market and supply chain forces, legal liability, social networks and norms, and scientific knowledge and available technologies. Several insights emerge. One, farmers are expected to meet multiple societal obligations concurrently; when facing a “right-versus-right” choice, farmers are likely to favor the more feasible course within structural constraints. Second, many institutions are designed to pursue narrow or siloed objectives; policy interventions that aim to shift farming practice should thus anticipate and address potential conflicts among institutions with diverging aspirations. Third, farms operating at different scales may face distinct institutional drivers in some cases, but not others, due to differential preferences for universal versus place-specific policies. These insights suggest that policy interventions should engage not just farmers, but also the intersecting institutions that drive or constrain their farm management choices. As my framework demonstrates, complementing the concept of constrained choice with insights from institutional theory can more precisely reveal the dimensions and mechanisms that bound farmer agency and shape farm management paradigms. Improved understanding of these structures, I suggest, may lead to novel opportunities to transform agriculture through institutional designs that empower, rather than constrain, farmer choice.

**Keywords** California · Institutions · Constrained choice · Farm management · Food safety · Sustainability

## Abbreviations

CDC	US Centers for Disease Control
CDFA	California Department of Food and Agriculture
FDA	US Food and Drug Administration
FSMA	US Food Safety Modernization Act
LGMA	Leafy Greens Marketing Agreement
USDA	US Department of Agriculture

## Introduction

A 2018 article in *Western FarmPress*, a daily news source for farmers, asserted, “[T]he vast majority of farmers... know healthy soil keeps them in business, but more importantly they are committed soil conservationists. They take their land stewardship responsibilities seriously” (Hart 2018). Despite that strong commitment, the article nonetheless proposed: “New idea in soil health: Pay farmers for their actions.” Although farmers value soil conservation, the financial costs of implementation may preclude healthy soil practices such as cover cropping or diversifying crop rotations. Even financial concerns represent just one of many considerations that determine whether and how farmers may act on their values (Selinske et al. 2017). California farmers,

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for instance, have limited options for crops to rotate with baby greens (e.g. spring mix) because mechanical harvesters for baby greens also pick up any detritus left in the field by crops like broccoli or berries, which are otherwise common in the region. This brief example illustrates the concept of constrained choice, a theoretical lens through which farmer values and beliefs are understood as only partly predictive of farming practices (Hendrickson and James 2005; Stuart and Schewe 2016). Many forces beyond the farm level shape what is or is not possible on the farm. In the midst of widespread calls for global agricultural transformation (e.g. Anderson et al. 2019; Oteros-Rozas et al. 2019; Willett et al. 2019), there is a pressing need to better understand precisely how those forces intersect to constrain the extent to which farmers can actually make the farm-level changes that will precipitate such transformation.

Models of agricultural land-use practices often focus on the farmer decision-making space—comprising attitudes, beliefs, and values—and its relation to biophysical and social constraints (Ahnrström et al. 2009; Price and Leviston 2014). A practical application of such models has been to increase adoption of socially desirable practices (Reimer et al. 2012a, b) and predict the conditions under which farmers will cooperate with, rather than resist, policy interventions intended to shift farm management (Kaine et al. 2017). Despite relatively sophisticated conceptualization of the mechanisms through which farmers adopt, hold to, and shift attitudes, beliefs, and values (Prokopy et al. 2008; Baumgart-Getz et al. 2012), models of farmer behavior tend to collapse the diverse institutions that shape, constrain, and drive farmer decision-making into simply the ‘policy context’.<sup>1</sup> This simplification is especially limiting in the context of proliferating societal visions of better agriculture, in which farmers face accumulating pressure to be more sustainable, safe, healthy, just, efficient, resilient, and so on. Too frequently unaddressed is the question of what happens when the weight of accumulated expectations overwhelms farmers’ decision-making and implementation capacity? Worse yet, what happens when different visions of better agriculture pull farmers toward conflicting management paradigms? To encompass these questions, models of farmer behavior and management decisions would benefit from clearer conceptualization of the ways in which cross-scalar cultural, market, legal, and regulatory forces shape and constrain farmers’ land-use choices (Reimer et al. 2014).

<sup>1</sup> An illustrative example is provided by Liu et al.’s (2018) review on adoption of Best Management Practices. Out of 121 peer reviewed papers, the authors identified only 7 that addressed “macro factors”, including just 2 that directly evaluated the “roles of policies, markets, business, or agencies,” and concluded that such factors are “rarely investigated.”

Toward this end, I conduct an institutional case comparison. I first categorize five types of institutions that constrain (or drive) farmer ‘choice’: rules and standards; markets and supply chain forces; legal liability; social networks and norms; and scientific knowledge and available technologies. I then use this framework to compare the institutional manifestations of two distinct societal obligations placed on California fruit and vegetable farmers: to practice sustainable agriculture and to ensure food safety. Agricultural sustainability pressures encourage farmers to conserve the farm’s natural resource base and preserve its ecological matrix (Perfecto et al. 2019). In general, researchers have found that many California farmers feel they should conserve soil and water, and to a more limited extent protect downstream environmental quality and ambient biodiversity (Stuart 2009; Baur et al. 2016, 2017; Garbach and Long 2017; Kross et al. 2018). Produce farmers also feel they should ensure that the food they grow will not make the people who eat it sick (Stuart 2009; Baur et al. 2016, 2017). On the farm, food safety pressures encourage farmers to minimize potential environmental sources of pathogenic contamination.

In practice, sustainability and food safety diverge (Beretti and Stuart 2008; Stuart 2008, 2009; Karp et al. 2015a, b; Olimpi et al. 2019). In an attempt to reconcile the resulting tension, multi-stakeholder efforts have emerged to promote “co-management” of safety and sustainability (Crohn and Bianchi 2008; Lowell et al. 2010; Wild Farm Alliance 2016). However, such efforts concentrate on how to change farmers’ minds (i.e. their attitudes, beliefs, and values) through information transfer, education, ethical appeals, and raising awareness. These efforts fail to address the complex web of legal, regulatory, market, cultural, and agronomic contexts within which California farmers grow vegetables, fruits, and nuts. Various institutions bound the range of possible management options. In other words, explanations and interventions to date have not sufficiently delineated the limits to farmer choice, eliding the discontinuity between aspirations to farm in a socially desirable way and how farmers actually farm. This paper aims to fill that gap by leveraging the contrast between food safety and sustainability obligations as an opportunity to compare the impact of multiple interacting institutions on farmer ‘choice’.

The paper proceeds with a review of constrained choice, how institutional theory provides insights into the nature and mechanism of those constraints, and explanation of five types of institutions that shape, constrain, and drive farmer decisions. I then provide background on food safety and agricultural sustainability in California, the national leader in produce farming, before presenting my comparative analysis of these systems. I conclude with applied and theoretical insights drawn from this institutional comparison that can

advance understanding of why farmers might, or might not, shift their land management practices to align with multiple, overlapping societal aspirations for agriculture.

## Dimensions of constrained choice

In their seminal article on constrained choice, Hendrickson and James (2005) argue that the economic and technological consolidation of industrialized agriculture limits the management options available to farmers, for example by reducing the range of possible plants and animals they can use. Over time, the authors warn, these constraints may reduce farmer agency, including their ability to make ethical determinations. Not only might chronic exposure to constrained choice normalize farm practices formerly deemed “unethical”, but it might also leave farmers without the knowledge, experience, or strength of moral identity necessary to navigate more complex “right versus right” problems.<sup>2</sup> Several empirical studies have found that farmers’ ethical fortitude appears to decline as economic pressures mount (James and Hendrickson 2008; Stuart 2009). In later work, Hendrickson and James (2016) use network exchange theory to define constraints on farmer choice according to the power dynamic created through dependency relationships in agricultural markets—in essence formalizing the degree to which farmers must accept decisions made for them by others to whom they are economically beholden. Such dependencies limit a variety of farmer freedoms, including the “freedom to make ethical decisions” (Hendrickson and James 2016). Constrained choice thus poses a major impediment to policy interventions that hinge on cultivating new farming ethics, for example educational campaigns to encourage farmers to commit to on-farm climate change mitigation and adaptation strategies (Stuart and Schewe 2016).

While this body of literature makes a compelling argument for the *implications* of constrained choice, the theory would benefit from further specification of the dimensions and mechanisms of constrained choice: precisely what kinds of factors impose constraints and create dependencies, and how do they do so? A clear and structured answer to this question would better connect the insights provided by constrained choice theory to the literature on agricultural policies intended to shift farm management practices.

Within that literature, the subject of why farmers do or do not adopt particular management practices that seem socially desirable is the subject of much debate. Warren

et al. (2016) observe, “A disconnection between policy aspirations and the effective delivery of policies at ‘ground level’ has been a leitmotif of the agrienvironmental policy sphere since the 1980s.” Interest in environmentally sustainable agriculture has driven research on adoption of conservation strategies such as erosion control (Knowler and Bradshaw 2007) or biodiversity conservation (Moon and Cocklin 2011), but researchers have also evaluated farmer responses to other social objectives including fair labor practices (Brown and Getz 2008; Harrison and Getz 2015) or animal welfare (Mench 2008; Veissier et al. 2008). However, when translating insights from adoption studies into policy contexts, the disconnect between aspiration and practice is often framed narrowly as a result of insufficient incentives (Barnes et al. 2013) or information/knowledge deficits among farmers (Parker et al. 2016; Calo 2018). Fixation with such perceived absences—i.e. what farmers lack—seems especially misguided given a nagging suspicion that neither researchers nor policymakers fully understand “what it is that makes farmers want to behave in a certain way” (Battershill and Gilg 1997). Other scholars identify political economic constraints that impede farmers who may want to farm in more sustainable or equitable ways (Bacon et al. 2012; Stuart and Gillon 2013; Carlisle et al. 2019a). As Guthman (2016) succinctly observes, “growers are not operating in an entirely voluntary context... in which non-business values might have more salience.” When farmers consider adopting conservation or sustainability practices, they “face different financial, agronomic, and environmental contexts” (Reimer et al. 2012a, b), implying that policy interventions must adapt to local conditions in balancing farmer needs against the desire for broader societal benefits (Knowler et al. 2014; Mills et al. 2017).

To more systematically and comprehensively organize this wide-ranging debate, I propose complementing the concept of constrained choice with insights from institutional theory. In the context of this paper, an institution refers broadly to “the humanly devised constraints that shape human interaction” and create stable patterns in social behavior (North 1990). Institutional theory generally divides these patterning forces into regulatory, normative, and cultural-cognitive facets (Scott 2013, pp. 59–74). Regulatory facets of institutions comprise the highly-visible social processes of making rules, monitoring behavior, and implementing incentive structures to encourage compliance; the pressures exerted tend to be coercive. Normative facets of institutions, in contrast, exert ‘soft’ pressure through social obligation, peer expectations, or standards of appropriate behavior. Lastly, cultural-cognitive facets of institutions are the least visible forces that pattern behavior, as they operate at a “taken-for-granted” level by shaping shared understanding of how the world works and how collective meaning is produced. Whereas transgressing regulatory institutions

<sup>2</sup> On the types of ethical problems that may occur in agriculture, see James (2003).

results in punishment (or loss of reward) and transgressing normative institutions results in shame, loss of standing, or social exclusion, transgressing cultural-cognitive constraints results simply in confusion or disorientation. All three institutional facets should be considered when analyzing the pressures that shape farm management.

These three facets of institutions may align in different configurations, conveyed by both symbolic and material “carriers” that span the private–public continuum, operate at different levels (e.g. individual to societal), and are formally organized or emergent from uncoordinated market or social interactions (Scott 2013, pp. 95–107). These configurations can be described as distinct institutional logics (Thornton et al. 2012). As Higgins et al. (2016) warn in their analysis of how responsibility for biosecurity is distributed in the beef industry, “Multiple logics can also cause confusion for individuals who are required to manage competing and possibly misunderstood priorities.” In principle, recourse to alternative institutional logics can enhance individual agency to break from dominant logics (Battilana 2006; Battilana and Dorado 2010), for example by equipping practitioners with tools of resistance or resilience. However, when multiple institutional logics become too confused, the resulting muddle can overwhelm farmers and exacerbate their mistrust of expert advice and incentive programs. That mistrust can in turn undercut efforts to align farm management practices with societal goals (Higgins et al. 2016) and may cause farmers to miss out on otherwise beneficial opportunities (Mercado et al. 2018).

Given these conceptual tools, I argue that the structures which constrain farmer choice can be usefully characterized according to their institutional “carriers,” which operate along regulatory, normative, and cultural-cognitive dimensions. Moreover, viewing “right versus right” problems (Hendrickson and James 2005) as corresponding to competing institutional logics (Higgins et al. 2016) suggests that constraints do not operate within a single overarching configuration. Rather, references to ‘ethical’ and ‘unethical’ behavior overlook the possibility that each choice belongs to complete, but divergent, institutional logics, each with its own set of constitutive institutional carriers. The task then becomes how to classify those carriers so as to best enable comparison of their relative power over farm management.

Toward that end, I define five types of institutional carrier that strike a balance between encompassing the many factors known to shape farm management and maintaining conceptual simplicity: rules and standards, market and supply chain forces, legal liability, social networks and norms, and scientific knowledge and available technologies. To develop this taxonomy, I have drawn upon insights from my previous research in California specialty crop agriculture (documented in Karp et al. 2015a, b; Baur et al. 2016; Baur et al. 2017; Olimpi et al. 2019) and

further developed and refined these grounded insights through a focused literature review. I searched for relevant, well-cited papers that addressed drivers of food safety or environmental sustainability in produce agriculture through diverse disciplinary lenses, prioritizing studies conducted in California or the United States. I followed up by cross-referencing these papers with an interdisciplinary sample of other leading papers that they cite. In the rest of this section, I summarize each institutional carrier separately, but recognize their fundamental interdependence in the comparative analysis that follows.

## Rules and standards

Rules, set and enforced by government agencies, may mandate or prohibit the use of certain practices. Standards, set and monitored by public or private entities, likewise limit land use practices to those which will meet desired thresholds or criteria. Comprising a continuum from mandates—including prescriptive ‘musts’ and prohibitive ‘must-nots’—to voluntary metrics, rules and standards influence farming practices by setting benchmarks against which regulators, customers, contracted third-parties, or other actors in a position of authority can measure farm or farmer performance.<sup>3</sup> Though their enforcement methods differ, rules and standards form a hybrid regulatory institutional influence on farm management, increasingly operating across the public–private divide in complementary or mutually-reinforcing relationships (Higgins et al. 2008a, b; Garcia Martinez et al. 2013; Verbruggen and Havinga 2017). Farmers are more likely to comply if they believe that rules and standards do not overly impinge upon their sense of control over their farm (Moon and Cocklin 2011; Price and Leviston 2014). At the same time, farmers more readily accede to rules and standards imposed by powerful social actors whom they believe are beyond their ability to influence (Feola et al. 2015). Together, these findings suggest that multi-level, interlocked systems of rules and standards not only place stronger pressure on farmers to cooperate—especially when backed by enforcement mechanisms such as loss of market access, monetary fines,

<sup>3</sup> The literature on the role of standards—and the various systems through which compliance with standards is monitored and approved—in shaping food systems and value chains is both deeper and more wide-ranging than can be fully addressed here. For the purposes of this framework, I focus on standards through a regulatory lens. However, it should be noted that standards may also operate at normative and cultural-cognitive levels, inasmuch as they “reflect much more fundamental social/technical relations that are essential to the establishment and regulation of social and ethical behavior in capitalist markets” (Busch 2000). See also Busch (2020), Hatanaka and Busch (2008), Hatanaka et al. (2012), and Verbruggen and Havinga (2017).

or criminal charges—but are also less likely to be met with attitudes of indifference or defiance (Bartel and Barclay 2011).

### Legal liability

The risk that a particular farming practice might generate legal liability can likewise encourage or discourage certain practices. In contrast to the preventive intent of rules and standards, liability represents a reactive regulatory institution that discourages socially undesirable behavior by punishing those responsible after the fact. Farmers may face civil suits or criminal charges brought by government agents if they break a statutory law (Buzby et al. 2001). They may also be liable under common (or tort) law, meaning they could face lawsuits, if their operation harms someone, either through consumption of their farm products (Buzby and Frenzen 1999) or as a result of externalities associated with farming (Bergstrom and Centner 1989). Farmers also experience this risk indirectly through market forces (see above) that are leveraged against farmers by their large, well-recognized customers (e.g. supermarkets) who are more exposed to consumer lawsuits. The level of legal liability risk depends on whether a particular farming practice contravenes existing laws or whether that practice could cause a harm clearly and readily traceable to farmers.

### Market and supply chain forces

Certain forms of land use are promoted or limited through the economics of production costs and product prices, as well as through politics of market access and exclusion at play in the supply chain. These market forces are themselves a product of various institutions that give shape and stability to the social interactions that markets comprise. New market incentives may normalize different management paradigms. For example, the promise of a higher price or a competitive advantage to offset additional time, effort, and cost incurred can incentivize farmers to adopt new practices, as has been seen with conversion to organic agriculture (Klonsky and Greene 2005; Uematsu and Mishra 2012). Conversely, market forces can incentivize farmers to abandon practices deemed undesirable by consumers, such as ceasing to use genetically modified seed in order to access expanding markets for non-GMO food (Castellari et al. 2018) or adopting pollinator-friendly agrichemical use patterns (Wollaeger et al. 2015). Other institutional aspects also shape market forces. Labels or certifications are a common form of communicating product attributes—including the farm practices used to grow food—to customers, who may then take that information into account when considering whether to buy the product and at what price (Czarnecki et al. 2018). In this way, labels and certifications operate normatively

by defining what is appropriate or acceptable; however, they also embed shared meanings of what constitutes food and its relevant attributes, and so carry a cultural-cognitive force as well (Busch 2020). On the supply side, production contracts between farmers and their buyers act as regulatory institutions that condition market access. These contracts detail, in legally-binding language, the precise planting, cultivation, and harvesting processes farmers must follow to grow a crop for a buyer (Kelley 1994; Guthman 2017; Rehber 2018). Market and supply chain forces may thus bundle together related institutional constraints or drivers that might otherwise be difficult to parse.

### Social networks and norms

Social networks are the primary normative institution through which appeals to farmer values, attitudes, and beliefs attempt to intervene in farm management, and it is critical to recognize that norms emerge, persist, and adapt through webs of interpersonal relationships (Raymond et al. 2016; Duff et al. 2017). Social networks, often diffuse or polycentric and including a range of civic actors such as non-governmental organizations or advocacy groups, regulate information and resource flows to farmers, subtly circumscribing “farmers’ opportunity space” (Feola et al. 2015). Peer group norms about acceptable and appropriate farm management emerge from networks (Bacon et al. 2012) and peer relationships (Bartel and Barclay 2011). Moreover, norms shape farmer interpretation of and response to other institutions, and are heavily influenced by information networks, i.e. the sources farmers trust to advise them (Schewe and Stuart 2017). Policies which “nudge” farmers to change their practices in a way that respects existing information networks and social group norms are more effective than policies which try to “budge” farmers out of their familiar relationships of trust and realms of experience (Barnes et al. 2013; Mills et al. 2017).

### Scientific knowledge and available technologies

Scientific knowledge and available technologies play a fundamental role in determining which farming practices are considered possible in the first place (and which are unimaginable), setting the cultural-cognitive institutional boundaries for farmer ‘choice’. An example can be seen in the context of agroecology, a farming system based on harnessing the benefits of ecological diversity and which is often framed in normative terms (see Altieri 2009; Rosset and Altieri 2017). In discussing the potential for agroecological practices to spread, Montenegro de Wit and Iles (2016) argued that, compared to conventional industrial agriculture, agroecology lacks “thick legitimacy”, or the “authority that is woven into the knowledge-making of scientific and political institutions,

and embedded in widely practiced social conventions.” Farmers are more likely to adopt new farming practices when expert or knowledge-making institutions speak to both the societal importance and feasibility of adoption. Perceptions of uncertainty, conflict, or fraudulence in the underlying institutions that produce scientific knowledge weaken expert authority to guide or regulate farmers’ behavior. Doremus (2003) emphasizes the importance of the practical capacity to act, which overlaps with the concept of perceived behavioral control (or perceived available resources) frequently used in social psychological models of farmer behavior (Reimer et al. 2012a, b; Price and Leviston 2014). Moreover, farmers respond positively when they can personally experience the ‘success’ of a new practice, suggesting that capacity to directly measure desired outcomes is a critical complement to expert assertions (Moon and Cocklin 2011; Price and Leviston 2014). Finally, the degree to which a proposed practice must shift the “momentum” (Hughes 1987) of farm systems matters; farmers are likely to view practices that complicate operations or challenge their “technological beliefs” as impractical (Davies and Hodge 2006).

### Factors not included

Beyond these five institutional types, other macro factors also influence farmer ‘choice’ (Liu et al. 2018). Biophysical aspects of land and climate influence soil fertility and health, pest pressures, cropping decisions, and pathogen loading, setting environmental constraints on what is possible. Property rights, land values, and farm loan conditions impact who owns and has access to farmland; these factors indirectly mediate the relationship between an aspiration to farm ‘better’ and an actual farming practice through operational characteristics such as land ownership, land tenure, and farm size (Calo and De Master 2016; Calo 2018). Of final note, many farms comprise multiple people acting in decision-making roles, which belies the notion that an individual ‘farmer’ chooses how to farm. Large-scale farms spread decision-making across many individuals, and even family farms often delegate farm roles and responsibilities among family members. The institutional factors described above likely influence different roles unequally, and the influence of intra-farm dynamics on farm management decisions deserves more in-depth discussion and analysis than is possible here.

### Background: safety vs. sustainability in California

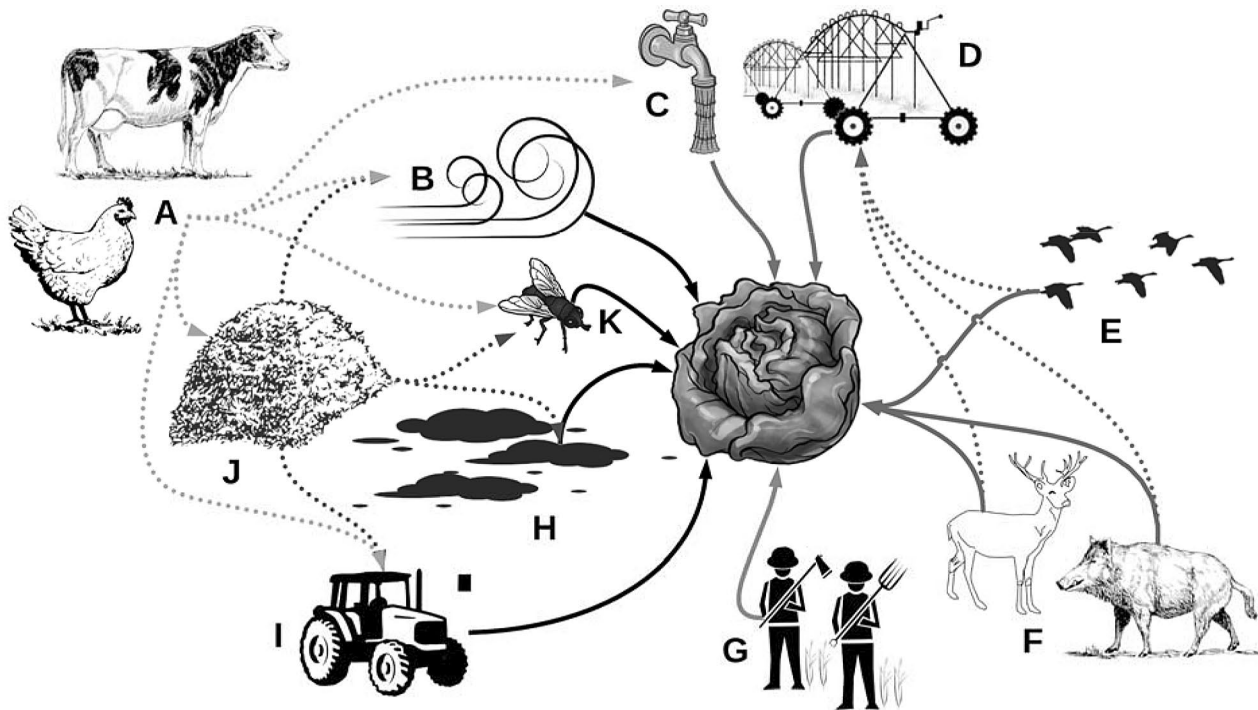
Food safety and agricultural sustainability at the farm level parallel societal desires for food that is both safe to eat and sustainably grown. Various economic, cultural, and

regulatory forces have emerged to better align agricultural practice with these broad aspirations. However, such forces operate in relative isolation, akin to ‘policy silos’, which has led to conflict (Broad Leib and Pollans 2019).

Tensions between food safety and sustainability spiked following a deadly 2006 outbreak of *E. coli* O157:H7 linked to spinach grown in California’s central coast. Investigators found the outbreak strain in both livestock and wild pigs near the implicated farm field (CDC 2006), catalyzing widespread concern that the farm environment itself might pose a substantial health risk by spreading dangerous pathogens onto growing crops. Fear of human pathogens in the farm environment was renewed after another deadly outbreak of *E. coli* O157:H7 in strawberries was traced back to wild deer (FDA 2011); the same year, an outbreak of listeriosis linked to a cantaloupe farm killed 33 people (CDC 2012). In an effort to prevent such outbreaks at the source, both government officials and produce industry groups developed rules and standards detailing how growers should manage food safety, including provisions to control waterborne, soil-borne, and animal-borne routes of contamination. These policies pressure farmers to suppress potential sources of pathogens in the farm environment, in particular wild animals and their habitat (Olimpi et al. 2019).

Animals can harbor pathogenic strains of *E. coli* and *Salmonella* and spread these pathogens through their feces (Langholz and Jay-Russell 2013). Other potentially pathogenic bacteria, such as *Listeria monocytogenes*, are native to soil (Vivant et al. 2013). Moreover, many enteric pathogens can survive outside of their host environment for extended periods of time, only to be reactivated once they come into contact with a new host (Gutierrez-Rodriguez and Adhikari 2018). Such pathogens pose a high risk of cross-contamination in the open environment of farms: flowing water, wind, other animals, workers, and equipment can move pathogens to new locations and surfaces (Fig. 1).

A survey of growers in California’s central coast following the 2006 outbreak revealed that many growers felt pressured by their buyers to remove non-crop vegetation around fields and step-up efforts to trap, poison, or fence-out wild animals (Beretti and Stuart 2008). “Growers are being put in the unfair position,” warned the authors, “of choosing between being able to sell their crops or protecting the environment” (p. 72). An aerial-imagery study found that 13% of the riparian habitat in the Salinas Valley was degraded or destroyed in the 5-year period following the 2006 outbreak (Gennet et al. 2013). A follow-up survey in 2014 found that many California produce growers continue to remove habitat around fields, poison and trap wild animals, and install wildlife-deterrent fences due to food safety concerns (Baur et al. 2016). Today, the latest evidence from California indicates that food safety concerns continue



**Fig. 1** Example routes of pathogenic contamination in the farm environment. Human pathogens originating in animal fecal matter—from livestock (a), terrestrial animals (f), birds (e) or humans (g)—may contaminate crops directly (solid lines) or indirectly by cross-contaminating (dashed lines) irrigation water (d), wash water (c), or

flood water that has been cross-contaminated. Pathogens may also persist in soils (h) and soil amendments such as compost and manure (j), spreading from there onto crops. Insects (k), windborne aerosols (dust) (b), and farm equipment (i) can carry pathogens from livestock pens or manure piles onto crops

to pose a barrier to environmentally sustainable agriculture (Olimpi et al. 2019).

Such attempts to prevent pathogenic contamination carry an environmental cost. Removing habitat decreases biodiversity, exacerbates erosion, and lessens water quality (Crohn and Bianchi 2008; Lowell et al. 2010; Stuart 2010). Field-edge habitat, such as hedgerows, provides important ecosystem services to farm fields (Long et al. 2017); removing field-edge vegetation not only foregoes these benefits, but also has little to no demonstrated effect on the risk of pathogen contamination (Sellers et al. 2018). Habitat removal may actually increase the risk of pathogen transfer into fields by removing physical barriers to contaminated surface water and increasing the relative abundance of animals known to vector human pathogens (Karp et al. 2015a, b). Food safety pressures have also led some growers to abandon organic soil amendments, in particular compost, in favor of ostensibly ‘safer’ synthetic or heat-treated, pelletized fertilizers that do not promote ecosystem services such as natural pest predation (Karp et al. 2016; Olimpi et al. 2019). The cumulative effects of these practices has the potential to impact a wide range of ecosystem services in agricultural landscapes across the United States (Karp et al. 2015a, b). Although preventing foodborne illness and

sustaining agroecosystems both represent clear societal obligations, in actual farming practice they often work at cross-purposes.

### Analysis: comparing constrained choices

To better understand this tension, I qualitatively compare the institutions constraining or driving food safety and environmental sustainability in California agriculture across the five dimensions of constrained choice defined above. I focus on three primary areas of overlap between safety and sustainability: wildlife/habitat conservation, water conservation/quality, and soil conservation.

### Agricultural sustainability

#### Rules and Standards

Agricultural sustainability comprises agricultural conservation and environmental protection. Agricultural conservation dates to New Deal-era promotion of productivity-enhancing “on-farm benefits”, e.g. reducing soil erosion. Rising environmental awareness pushed

federal policy, beginning in the 1980s, to pivot toward environmental protection, “managing the ‘off-farm’ environmental effects of agriculture such as clean water, clean air, biodiversity, and... other ecological goods and services” (Cox 2007). However, the voluntary incentive for farmers to expend their own resources to prevent impacts to other people in other places (i.e. externalities) is low (Knowler and Bradshaw 2007), particularly as “food production environmental externalities are underregulated” (Broad Leib and Pollans 2019). Moreover, US environmental law has largely exempted farms from most environmental regulations (Browne 1988; Ruhl 2000), reflecting a strong cultural commitment to the “liberty of private property” that underpins many limitations on government regulatory authority in the United States (Opie 1987, p. 19). One exception is the Endangered Species Act, which is interpreted to allow direct restrictions on the use of private property in order to protect the habitat of a listed species (Doremus 2010). The Federal Insecticide, Fungicide, and Rodenticide Act also indirectly intervenes by requiring farmers to apply pesticides according to label instructions (Ruhl 2000).

Exempting farmers from command-and-control style regulation extends to state law as well, although California imposes more environmental regulations on its farmers than most states (Pollans 2015, p. 422). The California Water Code, for example, authorizes regional boards to regulate pollutants including nitrates, sediments, and pesticides that farms discharge into surface and ground water. While not every water board uses this authority, the Central Coast Water Board requires growers to use best management practices including vegetated buffers to filter farm runoff; however, the board has limited direct oversight at the farm level (Dowd et al. 2008; Drevno 2016) and generally suffers an antagonistic relationship with growers in the region (Drevno 2018). Since US growers face few regulatory consequences for farming unsustainably, sustainability hinges on ‘soft’ policy tools, including information gathering, technology transfer, direct payments, cost-sharing, and market-based incentive programs (Heimlich and Claassen 1998; Claassen et al. 2008; Batie 2009; Reimer et al. 2018). An example is the California Healthy Soils Program, which provides state funding for both farmer incentives to improve soil health and demonstrations of best soil practices (CDFA 2020).

### Legal liability

In principle, off-farm environmental impacts could pose a legal liability risk to farmers. A downstream party suffering damages from a farm activity, such as pesticide or fertilizer runoff, could bring suit against a polluting farm. However, agricultural externalities generate little true liability (Pollans

2015; Broad Leib and Pollans 2019), especially in cases where state-level “right-to-farm” laws sharply delimit farmer liability (Ruhl 2000). California adopted its Right to Farm Act in 1981 (California Civil Code § 3482.5), and many counties and cities have passed right-to-farm ordinances to protect farmers from nuisance suits brought by neighbors (Wacker et al. 2001). These statutes may also protect farmers from lawsuits brought by other farmers. For example, an organic farmer may not be able to sue a neighboring conventional farm for spill-over damages from pesticide drift (McElwain 2015). Although outside California, a recent legal battle between the city of Des Moines and Iowa farmers over agricultural nitrate pollution underscores the point (Pollans 2016). Although the Des Moines Water Works utility sought to claim damages from upstream agricultural polluters, represented by regional drainage districts, the intervention failed to effect any change—the Iowa Supreme Court dismissed the city’s lawsuit on the grounds that “drainage districts are immune from claims for damages or injunctive relief,” in effect absolving farmers of responsibility for water pollution from agricultural runoff (Tidgren 2017).

### Market and supply chain forces

Economic cost is a primary constraint for sustainable farming, as agricultural conservation and environmental protection take money, time, and often land removed from production. Farms of all types operate on narrow financial margins, and resist unnecessary costs. Moreover, there are few mainstream market incentives for sustainable farming other than the cost of water and fertilizer, which can incentivize growers to conserve these resources (Pollans 2015). While the organic label confers a price premium to certified farmers in exchange for avoiding many pesticides and synthetic fertilizers, the incentive increasingly leads farmers toward an input-substitution approach dubbed “organic lite” that permits certified farms to replicate many of the ecologically-unsustainable aspects of conventional agriculture (Guthman 2004). Competing retailer-driven labels, such as Whole Foods’ now-discontinued “Responsibly Grown” program, suffer the same problem, but also lack transparency and legitimacy (Woods and Tropp 2015). Finally, high rates of leased farmland mean that long-term investments to protect a farm’s natural resource base offer only a weak incentive for many growers (Lambert et al. 2007; Bigelow et al. 2016; Macaulay and Butsic 2017).

### Social networks and norms

Shared cultural norms of land stewardship support agricultural conservation, and to a lesser extent environmental protection from externalities caused by



agriculture. In a 2014 survey among California produce growers, over 93% of respondents agreed that they have a responsibility to protect water quality and the environment on their farms (Baur et al. 2016). However, stewardship, conservation, and environmental protection take many forms (Raymond et al. 2016), and farmers are more likely to adopt those that yield direct on-farm benefits, such as soil conservation, than they are to adopt practices that yield “distant” off-farm benefits to society, such as climate change mitigation (Niles et al. 2013, 2015). “Although environmental stewardship is a factor influencing many farmers’ decisions,” observe Robertson et al. (2014), “sustained profitability is usually the overriding concern.” Pragmatic, business-oriented farmers—a dominant group in California’s agribusiness-oriented rural economies (Walker 2004; Henke 2008)—are more likely to try agroecological approaches when the resulting tangible benefits to the farm are foregrounded (Warner 2008). Yet California growers espouse widely mixed perspectives on conservation, wildlife, and non-crop vegetation (Brodt et al. 2006). One study among Central Valley growers found an even split in field-edge vegetation management: some farmers preferred “‘clean’ (weed-free or vegetation-free) edges” while others expressed “esthetic enjoyment in seeing plants and associated vertebrate wildlife... [that] led some to retain naturally occurring trees” (Brodt et al. 2009).

### Scientific knowledge and available technologies

Overall, norms in California agriculture may be shifting toward broader emphasis on actively conserving water and building soil health, while attitudes toward wildlife and biodiversity remain mixed. This shift aligns with the increasing legitimacy of scientific evidence pointing to direct on-farm benefits of soil and water conservation practices, evidence which has been matched with experience through cost-sharing, demonstration, and pilot programs provided by conservation extension agencies such as the USDA Natural Resources Conservation Service and the University of California Division of Agriculture and Natural Resources. Many California vegetable growers now use cover crops and practice crop rotation to promote soil health and weed control (Brennan and Smith 2005, 2017; Baur et al. 2016). Likewise for water conservation, many have switched to high-efficiency drip tape and micro-irrigation (Ayars et al. 2015), which Taylor and Zilberman (2017) attribute to effective local cooperative extension advisors who were able to effectively facilitate coevolution of drip irrigation technology with changes in cultivation practices that farmers had to adopt. With the exception of cover crops, which require off-season upkeep and can interfere with tightly-packed planting schedules, these shifts represent relatively

simple technological substitutions that require only limited adjustments to the farm operation.

Although most growers support the principle of environmental protection, many resist specific practices that could reduce agricultural externalities because they are seen as unnecessary or impractical. Growers may discount scientific findings that agriculture pollutes water and air or threatens biodiversity (Lubell and Fulton 2007, 2008). High land prices make setting aside field acreage for non-crop vegetation—hedgerows, filter strips, native habitat, riparian buffers—financially burdensome for farmers, especially given the extra costs of upkeep (trimming, irrigating, fencing) and the potential to harbor pests or pathogen vectors (Olimpi et al. 2019). Likewise, farmers may perceive few economically viable alternatives to pesticides for managing insects, fungi, and weeds, especially those who farm conventionally and do not receive organic price premiums. Perceptions that such practices are impractical stem in part from the long-term commitment among California’s agricultural research and cooperative extension institutions to facilitating productivity-maximizing industrial agriculture (Henke 2008). Among the casualties of this commitment was the state’s biological control programs, which were dismantled in favor of agrichemical and biotechnology research and extension (but see also Altieri et al. 1997; Altieri 2018). The dominance of industrial agriculture practices that largely accept as given high environmental externalities is exacerbated by consistently low investment in research on ecologically-based farming techniques (Miles et al. 2017). The cumulative result is low scientific legitimacy of environmentally sustainable farming practices and limited access to scale-appropriate technologies to facilitate those practices (Montenegro de Wit and Iles 2016).

## Food safety

### Rules and Standards

Food safety represents the desire to keep people from getting sick due to produce that is contaminated with human pathogens. From a regulatory standpoint, food safety comprises a robust set of policy mechanisms that combine government “meta”-regulation with industry self-regulation (Coglianese and Lazer 2003), forming a hybrid public–private system (Garcia Martinez et al. 2007; Garcia Martinez et al. 2013). Food safety reform in the produce sector began with industry-led voluntary standards for good agricultural practices; examples include the state-level California Leafy Greens Marketing Agreement (LGMA) and the privately maintained GlobalGAP and PrimusGFS metrics. The necessity of complying with voluntary standards is now reinforced by mandatory, nationwide “science-based minimum standards” for growing and

handling fresh produce authorized by the US Food Safety Modernization Act of 2011 (FSMA). Compliance with this program is enforced by government inspectors employed by the California Department of Food and Agriculture.

### Legal liability

Market pressures are reinforced by the specter of bankruptcy-inducing lawsuits or even criminal charges, as food producers are subject to strict liability in the case of food poisoning (Broad Leib and Pollans 2019). This legal risk forms a potent pressure on operators across the supply chain to lower their food safety liability through any means possible (Baur et al. 2017). Specialized law firms litigate on behalf of foodborne illness victims; the most prominent, Marler Clark, advertises its “food poisoning lawyers” following each outbreak. Moreover, farmers such as the Jensen brothers, whose cantaloupe operation caused the deadly 2011 *Listeria* outbreak, have been jailed following outbreaks (Elliot 2013).

### Market and supply chain forces

Powerful retail and foodservice firms, with strong interest in protecting their brand reputations (Havinga 2006; Bain et al. 2013), also push food safety through supply chain management mechanisms (Busch 2007), such as production contracts or third-party audits. In a food economy dominated by a small number of corporate buyers (Howard 2016; IPES-Food 2017), vegetable and fruit farmers—who often have to sell their crops quickly before they rot—have little leverage to resist buyer demands (Baur et al. 2017). Moreover, growers generally default to the strictest food safety requirements to minimize management complexity and satisfy the widest range of customers (Olimpi et al. 2019), suggesting that further long-term erosion of farmer agency may be underway, as previously noted by Stuart (2009).

### Social networks and norms

Together, regulations, standards, and liability risks threaten farmers with lost sales, failed audits, regulatory citations, damaged reputations, lawsuits, expensive product recalls, or criminal charges. The combined pressure to act is high, and the industry has worked diligently to spread “food safety culture” to every farm and farm worker (Baur et al. 2017). Several normative institutional mechanisms are in place to facilitate the spread of food safety culture through educational campaigns and networks of food safety professionals. FSMA rules require that every farm covered by the law designate one employee to take an annual agency-approved training on food safety (80 FR 74353), and private standards require that each farm maintain a detailed food

safety plan. Organizations such as the Produce Safety Alliance, based at Cornell University, have been granted authority by FDA to conduct training and outreach on food safety to farmers. The FDA’s deputy commissioner for food policy and response, Frank Yiannas, has previously published a book on food safety culture (Yiannas 2009), and in 2014, when he served as Wal-Mart’s vice president of safety and health, he publicly stated that food safety culture means “getting to the path of food safety as a social norm” (quoted in Baur et al. 2017). Moreover, food safety auditing and consulting have grown into independent industries, strengthening the normative pressure on farmers to put food safety first as a matter of principle.

### Scientific knowledge and available technologies

The scientific basis for food safety practices also appreciates strong legitimacy, with widespread consensus among academic, industry, and government scientists that pathogens such as *E. coli*, *Salmonella*, and *Listeria* can and do contaminate crops pre-harvest, posing a serious threat to public health (Painter et al. 2013; Gubernot et al. 2016; Gutierrez-Rodriguez and Adhikari 2018). This legitimacy is underwritten by public health organizations including the US Centers for Disease Control and the World Health Organization, and is lent credibility by mass foodborne disease surveillance data gathered and analyzed by national and global networks of laboratories, medical professionals, and public health agencies (Henao et al. 2015; Wang et al. 2016). Food safety professionals and regulators routinely invoke science as a legitimizing strategy when presenting standards, rules, and best practices. FSMA explicitly calls for “science-based” rules, while LGMA advertises its “rigorous science-based food safety system.”

Food safety practices entail monitoring and preventing pathogenic contamination. While farmers may complain of the added paperwork associated with pre-harvest field inspections and monthly water tests (Olimpi et al. 2019), monitoring is a familiar responsibility. Most farmers are used to taking soil samples for laboratory testing; collecting water samples represents more of the same. Likewise, farmers and their irrigation contractors, pest control advisors, ranch, and harvest managers are in and out of their fields almost continuously during the growing season to check on soil conditions, monitor crop health, or watch for pest activity; a field inspection to check for animal tracks, feces, or other signs of potential contamination slots neatly into the list of potential problems to monitor.

Preventing contamination entails isolating fields from animals (wild or domestic) and non-crop vegetation that could harbor those animals (Baur et al. 2017; Olimpi et al. 2019). This task is familiar. Farmers have long battled against weeds and pests: “In the history of progressive

agriculture, wild creatures had never counted for much. They failed to conform to the farmer's productive purposes and so were seen as useless when not seen as a threat" (Worster 1994, 268). A decade of intensifying pressure to produce the safest food possible has expanded the customary definition of "pests" to encompass any animal with the potential to contaminate crops. The US Food and Drug Administration, which oversees food safety on produce farms, defines "pest" in its good manufacturing practices as "any objectionable animals or insects including, but not limited to, birds, rodents, flies, and larvae" (21 CFR §110.3.j). By extension, in the context of farming, any non-crop vegetation that may harbor a pest also poses a threat, and in effect becomes a "weed". Although California farmers generally ethically oppose "sterilizing the growing environment" (Stuart 2008, 2009), in practice removing animals and non-crop vegetation fits an accustomed behavioral and cognitive pattern. Food safety professionals reinforce this pattern in grower training workshops: "We're kind of moving into [wild animals'] space," one trainer explained at a workshop on animal intrusion for Oxnard Plain growers in 2017. "And we want them out... But we're doing it for a good reason, to keep people from getting sick." The workshop—part of the FDA-approved Produce Safety Alliance curriculum—advocated removing any water, food, or shelter that will help animals survive near fields, framing preventive action as a simple process of pest and weed removal. In summary, food safety monitoring and prevention require little to no change in dominant farming conventions.

## Discussion

Aspirations to farm responsibly, i.e. in ways consistent with socially desirable visions for agriculture, are filtered through institutions that shape, constrain, and drive how farmers act (or do not) in practice, a process I examined by comparing food safety and agricultural sustainability as different systems of constrained choice for California produce growers. Analyzing this space of tension through my institutional framework yields several insights into this case.

### Choosing between two "right" ways

Farmers feel multiple, concurrent obligations to farm responsibly. When these obligations conflict, farmers may face a "'right vs. right' dilemma" (Hendrickson and James 2005; Stuart 2009). My analysis suggests that farmers defer to the course of action they perceive as most feasible within the bounds imposed by their institutional environment; in comparing these two cases, food safety aligns more consistently with multiple institutional drivers than does

environmental sustainability. While food safety finds broad support in comprehensive rules, standards, and market mechanisms, sustainability is often implicitly discouraged by market mechanisms and receives only disjointed support from fragmentary rules and standards. As Broad Leib and Pollans (2019, p. 139) observe, "The contrast between prescriptive regulations [for microbial food safety] on the one hand and education or voluntary standards incentives [for reducing environmental externalities of agriculture] on the other, reflects a serious mismatch between the nature and severity of each problem and the solutions brought to bear." Thus, when food safety and sustainability obligations diverge, the former tends to override the latter, especially when farmers incorporate their exposure to legal liability risk (Pollans 2015). Moreover, applied produce safety research frequently assumes tradeoffs between safety and sustainability, with limited research into potential synergies, suggesting the presence of a cultural-cognitive constraint. The cumulative effect sends the message to farmers that food safety is a necessity and environmental sustainability is an option.

Viewed as an institutional logic, food safety also encapsulates a concise, concrete imperative: keep dangerous microbes out of food. Sustainability, in contrast, notoriously defies precise definition; even for my brief analysis, I had to divide sustainability into on-farm (agricultural conservation) and off-farm (environmental protection) obligations to make sense of a wide-ranging constellation of aspirations, practices, incentives, and constraints. The narrow scope of food safety focuses assessment on clearly measurable outcomes, enables explicit designations of responsibility and accountability, and facilitates shared understanding across jurisdictions and supply chains. The nebulous scope of sustainability, however, covers outcomes spread across time and space in a way that resists simple metrics. Who is responsible to whom for what remains ambiguous, leading to contested meanings and fragmentation (see Worrell and Appleby 2000). Food safety glides smoothly through the web of complicating contexts that bog down aspirations to farm sustainably, and is therefore "easier and more politically palatable to regulate" (Broad Leib and Pollans 2019).

### Coordinating across structural constraints

Interventions based in "policy silos" not only miss heterogeneity in on-the-ground challenges (Cumming et al. 2006), but can also miss macro-scale conflicts among diverging institutional logics. Advocates for more socially desirable farming—whether more sustainable, safe, secure, or just—should therefore identify and address potential friction among structural constraints faced by land-users and seek coordination across policy spheres. Balancing food safety and agricultural sustainability will require systemic

reform across legal, market, and knowledge-production institutions in addition to educating farmers and raising awareness (Broad Leib and Pollans 2019). Without greater protection from food poisoning lawsuits, farmers will likely continue to prioritize food safety over sustainability. Given that the risk of pathogenic contamination is never zero (De Keuckelaere et al. 2015), it may be reasonable to limit farmers' liability for food safety (Olimpi et al. 2019); increased access to liability insurance could also mitigate farmers' legal risk (Armstrong 2014). Greater parity in market incentives for safety and sustainability is also needed. Farmers may feel empowered to equally co-manage safety and sustainability if (1) the market price covers the extra costs of more complex farm management or (2) buyers prioritize sustainable farming practices. These incentives hinge on measurability: robust standards for sustainable farming are likely also needed. Moreover, the apparent success of food safety reform in shifting farm management behavior demonstrates the powerful synergy in pairing 'carrots' with 'sticks', suggesting the need for stronger sustainability enforcement mechanisms—e.g. audits, inspections, and/or mandatory reporting—comparable to those for food safety. Lastly, to facilitate truly holistic co-management of sustainability and safety will require "thicker" scientific legitimacy for agroecological approaches, to shift the cultural-cognitive focus from safety-sustainability tradeoffs toward synergies.

### Uneven constraints and scale-dependency

The above analysis tacitly assumes that these institutions shape management decisions independent of farm-level differences. The reality is more complex—different farms may operate in entirely different systems of constrained choice depending on the scale of their operation. Agriculture in the United States seems to be bifurcating into distinct scalar systems: large-scale corporate industrial farms selling through vertically-integrated supply chains and small-scale, diversified farms selling directly to local markets (Lyson et al. 2008, p. xi). Policy interventions can, perversely, exacerbate bifurcation, as observed following establishment of national organic standards (Guthman 2004; Constance et al. 2008; Constance 2009). Farmers in "the middle" increasingly feel pressure to either scale up and "conventionalize" (Buck et al. 1997) or shrink to a level where they can claim artisanal, niche markets as part of the ongoing "quality turn" (Goodman 2003). Recent developments with social network innovations such as food hubs add a further variable to the milieu.

The consequences of bifurcation for aspirations to farm in a more socially responsible manner are mixed. Goldberger (2011), for example, found that conventionalization suppresses environmental stewardship among organic

farmers, whereas other scholars find that adopting conservation practices is easier for larger farms (Knowler and Bradshaw 2007). These seemingly contrasting findings result from the differential impact of various institutions on farmer choice. For example, large farms must maximize yield and crop consistency to access the corporate supply chains capable of handling the volume of product they grow, whereas small farms may have greater marketing, and thus managerial, flexibility. However, heavily-capitalized large farms have more resources and may have greater access to the latest conservation research and technologies, making it easier for them to adopt sustainable 'upgrades' such as water-saving micro-irrigation systems.

The effect of farm scale on food safety is hotly contested. Some scholars argue that small-scale producers face food safety challenges "of a distinctly different nature" than those faced by large, conventional producers (DeLind and Howard 2008), thus necessitating scaled interventions (Hassanein 2011) rather than universal food safety standards "developed for productivist and industrial scale agriculture" (McMahon 2013). For this reason, family farm advocates secured a partial exemption for small farms in the FSMA, which drew backlash from consumer advocacy groups concerned that small farms would be allowed to operate unsafely (Strauss 2011). Thus, other scholars advocate that "all food producers should be held to the same food safety standards" (Thomas 2014, p. xiv), based on the argument that "pathogens don't know what size operation they're on," as the lead scientist at one prominent fresh produce trade association phrased it (personal communication, 2014). Consumer response to foodborne illness outbreaks also fails to distinguish by farm scale; in the two largest *E. coli* outbreaks related to produce—from spinach in 2006 and romaine lettuce in 2018—the market price of the affected vegetable plummeted across the board, regardless of farm source (Calvin 2007; Newman and Haddon 2018). Bifurcation is thus insufficient to explain the complex ways in which distinct regulatory, economic, legal, cultural, and technological institutions intersect with farm scale. The effects on farmer 'choice' are both mixed and dynamic, the result of competing pressures to standardize across scales and adapt to scale-specific needs.

### Conclusion

Aspirations to farm 'better' fall short in practice due to constraints outside of farmers' control. In both sustainability and food safety, farmers are implored to do the 'right' thing and steward their land and their crop responsibly, for future generations on the one hand, and for downstream consumers on the other. These are powerful societal obligations. Yet farmers face proliferating pressures to adopt practices that

align with various societal aspirations for ‘better’ agriculture that is more sustainable, safe, healthy, just, efficient, resilient, and so on. In this paper, I raise two critical yet understudied questions: What happens when the accumulation of external pressures overwhelm farm management capacity? Or, worse, when different visions of better agriculture pull farmers toward conflicting management paradigms?

As a first step toward addressing these questions, I compared the institutional manifestation of two distinct societal obligations placed on California fruit and vegetable farmers: to practice sustainable agriculture and to ensure food safety. Through this institutional case comparison, my concern has been to assess the practical implications of and limits to interventions that appeal to farmers’ sense of responsibility in the context of multiple, sometimes competing institutional logics. Focusing on farm-level choice—including attitudes, values, and beliefs—in isolation, no matter how sophisticated the model, misses the critical influence of institutional constraints and drivers that shape farmer ‘choice.’ Failure to address divergent institutional logics among multiple societal aspirations for agriculture can lead to impossible situations pitting “right” against “right.” Such zero-sum contests not only waste farmers’ energy and resources, but also inhibit investment in synergies or creative alternatives that might escape false binaries. I suggest that both researchers and agricultural reform advocates can benefit from systematically considering the positionality of their appeals—both to agricultural communities and to the policy networks that govern them—within broader legal, political, market, and techno-scientific institutional systems.

To do this, I proposed applying tools from institutional theory to the literature on constrained choice. As my framework demonstrates, combining these literatures more precisely reveals the dimensions and mechanisms that bound farmer agency and shape farm management paradigms, in turn facilitating comparison across multiple social objectives for farms. Ample opportunities exist to expand this analysis to cover other types of objectives in other places, as well as to deepen and extend the framework through targeted empirical inquiry. For example, efforts to farm agroecologically may contrast with efforts to promote more fair and safe conditions for agricultural labor (Dumont and Baret 2017), while growing calls to reduce meat consumption and increase plant-based diets may create friction with growing interest in the use of integrated crop-livestock systems to promote sustainable nutrient cycling (Kronberg and Ryschawy 2019). Such tensions also operate across multiple social levels and across regulatory, normative, and cultural-cognitive aspects of institutions.

Improved understanding of the ways in which institutional logics overlap or diverge may lead to novel opportunities for promoting food system transformation in response to

global threats including climate change, biodiversity, and food inequity (Anderson et al. 2019; Willett et al. 2019). With growing scholarly and policy interest in promoting multifunctional agriculture (van Huylenbroeck et al. 2007; Huttunen 2019), social-ecological agrifood outcomes (Oteros-Rozas et al. 2019), and diversified farming systems (Kremen et al. 2012; IPES-Food 2016) as routes toward greater sustainability, health, and equity, there is also a growing need to consider the intersecting institutional dimensions of these envisioned transitions. Moving forward, more attention is needed on evaluating options to mitigate the cumulative detrimental effects of multiplying societal obligations placed on farmers. In particular, interventions should focus on how to distribute responsibility for juggling multiple functional goals more equitably throughout the food system; currently, too much of the burden is placed on farmers, without the requisite resources or freedoms (per Hendrickson and James 2016) to fulfill those responsibilities.

Considering constrained choice as the result of a combination of institutional drivers reveals a conceptual pitfall—a focus only on structures that constrain farmer agency misses the corollary role that structures may play in also enabling farmer choice. Viewing both structural roles through the lens of institutional logics shows how a given institution may both enable one form of farmer behavior while constraining others. In essence, this insight builds intuitively upon Hendrickson and James’ (2005) concern that exposure to structural constraints over extended periods of time might erode farmer agency, especially in terms of tacit knowledge and the capacity to navigate multi-faceted ethical decisions. If institutional design has the power to erode farmer agency, then logically it should also be possible to reconfigure institutions to work in the reverse—to *empower* farmer agency. In other words, interventions aimed at reforming constraining institutions should recognize that the task is not to simply remove barriers, but to also provide handholds.

Farmer empowerment is a critical challenge for the future of agriculture and food systems. Transformation hinges on the capacity of people who farm to actually make the necessary farm-level changes. As Carlisle et al. (2019a, b) argue, the farms of a more sustainable and just future will be knowledge-intensive. The corollary to this prediction is that such knowledge-intensive farms will be supported by an institutional environment that facilitates the flexible application of practitioner knowledge, including for the purpose of navigating ethical questions related to social responsibility and societal obligation. Much literature has been devoted to envisioning better institutional configurations—e.g. multi-level, polycentric, multifunctional, participatory, democratic, continually-learning—to empower communities, social movements, and peer networks to shift toward more sustainable,

healthful, and equitable food systems (Kloppenborg et al. 2000; Sayer et al. 2013; Carlisle 2014; IPES-Food 2016; Anderson 2019). However, the gap between vision and reality is wide.

My framework can serve as a stepping stone to better understand this gap between institutions that might promote active practitioner agency and the institutions that currently exist. By providing an example roadmap for systematic examination of the various and at times competing logics that farmers must navigate, the framework can be used to incorporate a more precisely delineated set of “macro factors” (Liu et al. 2018) into models that connect structures (e.g. markets, policies) to farmer decisions and to outcomes. It also helps pose further empirical questions, such as, under what conditions might overlapping institutional logics allow farmers to break away from constraints and pioneer new farming modalities (following Battilana 2006), as opposed to withdrawing from active participation? If competing institutional drivers do indeed undermine farmer confidence in expert advice and incentive programs (Higgins et al. 2016; Mercado et al. 2018), through what specific institutional reforms can that confidence be re-gained? The overarching contribution, I argue, is that systematically attending to competing institutional logics and the complex and fluid configurations through which they confront farmers helps re-center analysis on the active agency that farmers exhibit on a daily basis as they continuously assess how and when to engage with, acquiesce to, or embrace institutions, as well as how and when to disengage from, avoid, or resist them. The institutions which ostensibly govern agriculture have much to learn from farmers’ experiences multi-tasking, translating, and negotiating among diverse aspirations for agriculture.

Though the precise form of analysis may vary, when considering what it takes to transition toward ‘better’ agriculture, I contend that it is always worth explicitly posing three overarching questions in tandem: To whom does society expect farmers to bear responsibility? In what tangible forms do these responsibilities manifest on the farm? And to what extent do farmers actually have the capacity and power to fulfill all of those responsibilities in practice? Appeals to farmers’ sense of social obligation can help align farm management with societal aspirations for sustainable, healthy, and productive landscapes, but such appeals must recognize and work within (or on) the existing context of institutional drivers and constraints. It may be that the ‘choices’ which most need to change are located beyond the farm.

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