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Comparing sustainability claims with assurance in organic agriculture standards

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Abstract

Voluntary organic standard-setting organisations (SSOs) depend upon public trust in the truth claims implied by their labels: that the product in question has been produced using organic methods. They create and maintain this trust through assurance frameworks based on third-party verification of compliance with organic standards. It is therefore potentially problematic if an SSO makes additional claims that are not capable of being supported by their assurance frameworks. We investigate the claims made about the sustainability of organic agriculture by three voluntary organic SSOs, compared with assurance provisions within their standards. The analysis covers Australia, which has 53 per cent of the world's certified organic farmland; and is extended internationally by including the IFOAM standard, with which a further 49 organic standards are affiliated worldwide. We find that while these standards generally contain principles and requirements that support sustainability claims, they lack well-specified means of verification in most cases other than the 'core' claims to exclude synthetic chemical inputs and genetically modified organisms. This assurance gap creates the risk of a consumer backlash. We discuss two ways to mitigate this risk: by strengthening verification within standards; and/or by employing new agricultural information and communication technologies to support claims outside the certification process.

Keywords

organic agriculture; standards; sustainability claims; assurance; verification; certification

Introduction

It is widely assumed that organic agriculture (OA) is more sustainable than non-organic or conventional agriculture (Goldberger 2011, Rigby & Cáceres 2001), despite the mixed results of studies comparing the outcomes of organic and conventional farming against a variety of environmental, economic and social indicators (Lorenz & Lal 2016, Tuomisto et al. 2012). In this article, we do not engage in this heated debate about outcomes. Rather, we are interested in the sustainability of OA's *claims* to be more sustainable, specifically when these claims are made by voluntary organic standard-setting organisations (SSOs). It matters *who* makes such claims, because trust is relational and context-dependent (Carolan 2006). Voluntary organic SSOs depend upon public trust in the truth claims implied by their labels: that the product in question has been produced using organic methods. They create and maintain this trust through an assurance framework based on third-party verification of compliance with organic standards. It is therefore potentially problematic if an SSO makes additional claims about OA that are not capable of being supported by their assurance frameworks. In this article we investigate the public claims made about the sustainability of OA by voluntary organic SSOs, compared with assurance provisions that could support these claims within each associated standard.

It is difficult to make global generalisations about OA due to its decentralised historical development, which has led to wide variation in governance arrangements across countries, from regulation at different levels of government to entirely voluntary markets. OA is defined by government regulations in at least 87 countries (FiBL & IFOAM 2017), but by implication, voluntary standards prevail in the remaining 92 countries where OA is known to be practised (FiBL & IFOAM 2017). Voluntary standards are also known to co-exist alongside government regulations in at least 23

OECD countries (Rousset et al. 2015). We consider that voluntary standards are more dependent on maintaining consumer trust in their truth claims via their assurance frameworks because they lack the legal enforceability of regulations; therefore a case study at the ‘extreme voluntary’ end of the spectrum is likely to provide the best illustration of what may be a more widespread problem. Australia has an entirely voluntary domestic market, with no government regulation beyond generic ‘truth in labelling’ provisions within Australian consumer law (Rousset et al. 2015). Furthermore, Australia provides a significant case study because it accounts for 53 per cent of global certified organic farmland by land area (Australian Organic 2017), therefore OA has the potential to affect agricultural land management at a large scale. We therefore include in our analysis the two SSOs which account for the vast majority of organic certification in Australia (Paull 2013), the National Association for Sustainable Agriculture Australia (NASAA) and Australian Organic, and extend the analysis internationally by including the International Federation of Organic Agricultural Movements (IFOAM) standard, with which a further 49 organic standards are affiliated worldwide.[1] Both the Australian Organic and NASAA standards are accredited by IFOAM, therefore the three standards are linked. Their inclusion is intended to provide broad coverage of Australian organic farmland, as opposed to being independent cases.

The degree of congruence between sustainability claims and the assurance framework provided by organic standards has been largely overlooked in the literature on organic food and farming. Nevertheless, several studies have observed that organic standards provide relatively weak or partial support for key indicators of sustainability (Merfield et al. 2015, Seufert et al. 2017, Padel et al. 2009), without explicitly comparing this with the claims made by associated SSOs. Our analysis differs from these in both its primary objective and methods: rather than seeking to compare organic standards with an external benchmark of sustainability such as the FAO's Sustainability in Food and Agricultural Systems (SAFA) Guidelines (as per Merfield et al., 2015), 'values' (as per Padel et al., 2009), or against each other (as per Seufert et al., 2017), we have examined the congruence between the sustainability claims made by specific organic SSOs, and the contents of their own standards. This is important because SSOs have an implicit responsibility – indeed, in some jurisdictions, a legal responsibility under 'truth in claims' legislation – to ensure that they are able to substantiate the claims that they make, and the principal tools available to SSOs are their own standards. The International Social and Environmental Accreditation and Labelling (ISEAL) Alliance of sustainability SSOs (which does not, at present, include any organic SSOs), has recognised this, publishing a good practice guide for SSO sustainability claims which proposes that SSOs should 'Ensure claims are consistent with the assurance model used to assess compliance with the standard' (ISEAL 2015, p.4).

The article is structured as follows: in the next section we briefly introduce key concepts and theoretical considerations. The following section describes our research method. We then present our empirical findings, arranged according to claims made about different aspects of sustainability. The final sections discuss the policy implications of these findings, as well as potential responses to address the risk of a consumer backlash against unsupported sustainability claims, and present our conclusions and recommendations for further research.

Standards and assurance

Standards are ubiquitous in modern life (Loconto & Busch 2010), and have been for a very long time (Perry 1955). Modern product standards emerged during the Industrial Revolution in response to various safety and interoperability crises: by specifying observable parameters conducive to delivering the desired outcomes, standard-setters hoped to avoid a repeat of such disasters. The first national-level standards organisation, the British Standards Institute, was established in 1901, with an initial focus on developing technical standards for products, notably those used in engineering and construction. Following the establishment of similar organisations in other countries, the International Organization for Standardization (ISO) was formed in 1946 to harmonise standards globally (Gale & Haward 2011). Over time, standards have become just one component of a tripartite regime of governance comprising standard-setting, certification and accreditation (Loconto & Busch 2010, Busch 2011, Fouilleux & Loconto 2016). Certification is a process designed to assure an end user that something meets the specifications of a standard, when it is not possible or practicable for the user to establish this themselves, while accreditation is a process designed to ensure that certifiers are competent to provide certification (Loconto & Busch 2010). Certification by an accredited certifying body against an authoritative standard is the key means of assurance that underpins a variety of truth claims between parties in a product supply chain.

The organic movement first turned to product standards in the early 1970s as a potential solution to the problem of fraudulent marketing of organic goods by non-organic producers. A leading figure in the US organic movement, Robert Rodale, noted in 1970 that:

> The phrase “organic food” means different things to different people. When you are growing organic food for yourself, your personal definition is all that counts. But when you represent to the public that a food is organically grown, there must be a standardized meaning so that people know what they are getting. The lack of a standard definition of “organic” and a means to enforce that definition has held back the marketing of [organic] food. (quoted in Haedicke (2016, p.40))

The ISO's output-based product standards approach was not immediately relevant to the organic movement, however, due to the latter's focus on controlling and managing production inputs. National organic movements, federated since 1972 under the IFOAM umbrella, therefore pioneered what are now known as process standards. Unlike product standards that set out technical specifications for the product and leave it to a producer to determine the appropriate combination of materials and other inputs to meet those specifications, process standards specify what producers must do and use (or *not* do and *not* use) at different stages of the production process.

Both types of standards employ similar procedures to ensure credibility. To determine if a producer is meeting a standard, a certifying body like ACO conducts an 'audit' of the operation. An audit is 'a systematic and functionally independent examination, and reporting to a designated review committee, to determine whether activities comply with planned objectives and requirements of relevant Standards' (Australian Organic 2017, p. 5). In the 1990s, an important distinction was drawn between first-, second- and third-party audits based on how independent the auditor was from the entity being audited. However, it quickly became clear that firm-level (first-party) and industry-level (second-party) audits had low credibility and almost all auditing systems today are third-party based, with the auditors themselves being assessed as competent if they meet the requirements of an authoritative accreditation body. IFOAM has developed a detailed standard setting out how this is done in the organic sector, and has accredited the certification bodies associated with both Australian Organic and NASAA.

Standards are deeply implicated in the exercise of power. Invariably, they include certain practices and actors and exclude others; they create new transaction costs while reducing others; and fundamentally they enable the performance of practices such as counting, surveillance, benchmarking and testing that constitute control at a distance (Latour 1987, Busch & Bingen 2006, Ponte 2014). As markets increasingly reward producers making credible claims regarding the sustainability of their goods, the standards underpinning such claims inevitably become more contested, both internally and externally. Externally, corporations and governments have sought to minimise the gap between organic and conventional agricultural standards, leading to allegations of co-optation (Jaffee & Howard 2010, Friedland 2005). Internally, the OA community has long been divided between 'expansionist' and 'transformative' logics (Haedicke 2016) and over the need for reform (Arbenz et al. 2017). With sustainability becoming an important product feature in addition to price, quality and availability, both conventional and organic agricultural standards are under pressure to demonstrate their credibility in this area, potentially generating gaps between claims and practices. This article explores the degree to which this is occurring within OA by examining the consistency between the SSO claims being made with regard to sustainability and the technical components of assurance provided by their own standards.

Methods

The research was conducted using multiple qualitative methods. A broad-based literature review provided the overall context, supported by detailed content analysis of SSO documents and website material, supplemented with a set of 11 semi-structured interviews with key OA stakeholders including international and Australian organic industry bodies (n=2), domestic certification bodies (n=2), consultancies (n=4), producers (n=1) and research organisations (n=2).

A 'bottom up' approach was used to identify SSO's sustainability claims, as opposed to the 'top down' comparison with SAFA indicators used by Merfield et al. (2015). The websites of each SSO were considered to be the most important locations where public claims would be found, as they include not only the website text itself, but also press releases, newsletters and other publications. The entire contents of the websites of each organisation were initially searched (in November 2016) for references to sustainability, using Google's 'search within site' function. The results of these searches were manually reviewed in order to identify those containing an explicit claim. Other key terms associated with these claims were noted, leading to identification of more narrowly defined claims, which were grouped into related clusters (Strauss & Corbin 1998). The process stopped when saturation was reached. Finally, claims associated with economic and social sustainability were excluded, in order to focus the analysis on the environmental dimension of sustainability. Whilst it is acknowledged that sustainability calls for integration rather than dissection of its environmental, economic and social dimensions, our focus on environmental claims is based on the fact that these constitute "the key claim, indeed the *raison d'être*, of organic agriculture" (Allen & Kovach 2000, p.223). Furthermore, a number of authors have observed the relative paucity of social and economic considerations in most organic standards, and likewise excluded this from their analysis (Padel et al. 2009, Merfield et al. 2015, Seufert et al. 2017).

Each organisation's standard (see Table 1) was then analysed to identify textual elements relevant to assurance of each claim.[2] As the selected standards cover a wide range of OA activities, we restricted our analysis to sections having to do with the major agricultural categories of cropping and grazing (excluding activities such as bee-keeping, aquaculture, and food processing). Each element was classified according to whether they were expressed as: (1) high-level aims, goals or *principles*; (2) specific *requirements* or (3) means of *verification*. These categories reflect structural distinctions commonly found in standards designed for assurance purposes, where assurance is taken to mean the process of checking for '[d]emonstrable evidence that specified requirements relating to a product, process, system, person or body are fulfilled' (ISEAL 2018). The categorisation was done on the basis of linguistic cues, including:

(1) Principles: being placed within 'aims', 'goals', 'principles' or 'recommendations' sections; the use of 'should'; or being general assertions that do not place any specific obligation on any party;
(2) Requirements: being placed within 'requirements' sections; the use of 'shall' or 'must'; or otherwise creating specific obligations (e.g. through a list of prohibitions);
(3) Verification: references to evidence, testing, record-keeping, measurement, observation, monitoring, data, verification or related concepts.

In order to reduce the potential for subjective bias, the analysis was done independently by two of the authors. Finally, the interviews were used as a cross-check on the documentary analysis, and also analysed for additional information.

Table 1. Case study organisations and standards.

Organisation	Established	Relevant standard	Logo
National Association for Sustainable Agriculture, Australia (NASAA)	1987	NASAA Organic & Biodynamic Standard 2016	
Australian Organic	1988	Australian Certified Organic Standard (ACOS) 2016	
International Federation of Organic Agriculture Movements (IFOAM)	1972	The IFOAM Standard for Organic Production and Processing Version 2.0 2014	

Findings

All three organisations claim that OA is a sustainable form of agriculture. The first reason on Australian Organic's list of seven reasons to go organic is 'it looks after our environment' and they conclude with: 'Choosing to support certified organic means… doing the right thing for our environment as well as building a sustainable future for all Australians.'[3] NASAA make the claim that 'Organic food production is founded on the principle of producing food in an environmentally sustainable and socially responsible way',[4] and IFOAM has 'promoting sustainability in agriculture' as one of its five strategic goals.[5]

Each organisation's more narrowly defined sustainability claims and associated principles, requirements and verification procedures in the related standards are summarised in Table 2. This shows that while most of the standards incorporate general principles and indeed specific requirements in support of their sustainability claims, verification procedures are strongly specified only in relation to the exclusion of synthetic chemicals and GMOs, and inconsistently, partially or not at all in other areas. In the following sub-sections we analyse each area in more detail.

Table 2. Claims made, principles, requirements and verification procedures, by organisation/standard.

Environmental impact	**Claim made**			**Principles**			**Requirements**			**Verification**		
	N	**A**	**I**	**N**	**A**	**I**	**N**	**A**	**I**	**N**	**A**	**I**
No synthetic chemicals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
No GMOs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
No hormones or antibiotics	✓	✓		✓	✓	✓	✓	✓	✓			
Improved biodiversity	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Lower greenhouse gas emissions	✓	✓	✓		?			?				?
Improved soil health	✓	✓	✓	✓	✓	✓	✓	✓	✓	?	?	
Improved water efficiency and management	✓	✓	✓	✓		✓	✓	✓	✓	?	?	?

Improved animal welfare	✓	✓	✓	✓	✓	✓	✓	✓	✓			

N = NASAA; A = Australian Organic; I = IFOAM; ✓= strong evidence; ? = weak or partial evidence

Exclusion of synthetic chemicals, GMOs, hormones and antibiotics

Claims

Unsurprisingly, all three organisations explicitly claim that OA excludes synthetic chemicals, such as manufactured fertilisers and pesticides, and assert that use of these chemicals harms the environment and/or human health. For example, an IFOAM flyer on pesticides states that in OA ‘no harmful synthetic pesticides are used’, as they ‘have a severe impact on our health as well as on our environment’ and most ‘are not tested adequately for safety.’[6] All three organisations also assert that organic products are free from genetically modified organisms (GMOs). ‘Say no to GMO’ is one of the core advocacy platforms of IFOAM.[7] NASAA and Australian Organic claim that organic produce is free from synthetic growth hormones and antibiotics,[8] but IFOAM did not meet our criteria for making significant claims in this area, possibly as a result of divergent international viewpoints (e.g. between the US approach which bans antibiotics altogether, and the EU approach which allows a limited number of treatments per year, when necessary).

Principles

All three standards contain general principles stating either that synthetic chemicals, GMOs, hormones and antibiotics are not permitted, or that define OA as an approach that does not rely on such inputs. For example, the IFOAM standard states that ‘Organic farming systems apply biological and cultural means to prevent unacceptable losses from pests, diseases and weeds’ (sec. 4.5) and elsewhere includes a general principle that OA ‘should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones' (sec. 2.3), such as genetic modification.

Requirements

All three standards include specific requirements prohibiting the use of synthetic chemicals in agricultural production. Each standard includes appendices listing allowed inputs; all other inputs are prohibited. Likewise all three standards prohibit GMOs, e.g. 'GMOs and their derivatives are prohibited in all aspects of the organic production and consumption chain…' (Australian Organic 2016, sec.4.7.17). All three standards prohibit the use of hormones and growth promotants (NASAA 2016, sec.6.5, Australian Organic 2016, sec.5.2.12, IFOAM 2014a, sec.5.5.5), as well as synthetic veterinary drugs and antibiotics (NASAA 2016, sec.6.6.5, Australian Organic 2016, sec.5.2.14, IFOAM 2014a, sec.5.6.3).

Verification

A farmer's compliance with these requirements could be assessed either on-farm, or by ex-post analysis of products. The Australian Organic and NASAA standards include generic requirements for farmer record-keeping, e.g.: 'Records of production activities… should be kept in a manner that allows tracing of all finished products back to inputs or ingredients, and also a reconciliation of output of organic products against inputs or ingredients used' (Australian Organic 2016, sec.3.4.1). The IFOAM standard does not include any guidance on farmer record-keeping.

Procedures for ex-post verification that prohibited chemicals and GMOs are not present in certified products are provided by all three standards. For example, the NASAA standard specifies that 'Products will be tissue tested for heavy metals and pesticides if there is indication of risk from contamination' and 'Random testing will be conducted for contaminants' (sec. 3.1.13 & 3.1.15). Elsewhere, reference is made to conducting laboratory tests for chemical and heavy metal residues in a NATA (National Association of Testing Authorities) approved laboratory (sec. 6.1.11). The Australian Organic standard requires certifying bodies to conduct 'random and targeted tests of products in the market place or directly from production units' for the presence of prohibited materials (sec. 4.7.27). The IFOAM standard does not specify any testing procedures, but makes it clear elsewhere that 'The certification body shall have documented policies and procedures on sampling and residue and GMO testing…' (IFOAM 2014b, sec.6.5.1). While further details such as the frequency, accuracy or other details of such tests are not specified in any of the standards, the existence of some ex-post verification procedures provides a relatively robust assurance framework to support OA claims to be 'free from' synthetic chemicals and GMOs. By contrast, there is no mention in any of the standards of any ex-post product tests or other specified verification procedures that could verify claims that organic products are completely 'free from' hormones or antibiotics.

From interviews, it became clear that the producer is required to provide certification inspectors with soil samples at the initial inspection of a farm, which are tested for chemical residues if identified as a potential hazard by either the producer or the inspector. Further sampling, whether of soil, plant or animal tissues, is only undertaken in response to an identified risk, or at random:

> …it's only a requirement for producers to start with in their initial inspection… and then following on from that it's just risk based sampling. But we also do a number of random samples that we are required to take throughout the year… that can just be random or also targeted random based on what's coming back from the inspection reports (interviewee 8).

Another OA certification officer stated: '…organic is all about record keeping, just to verify that what they're doing and what they're using complies to the standard' (interviewee 4). However, they admitted that 'On the primary production side of things, their record keeping is usually quite basic, you know, because a lot of them don't employ a lot of staff to do a lot of work.' They also noted that record-keeping practices vary considerably across sectors.

Improved biodiversity

Claims

All three organisations claim that OA has positive implications for biodiversity. Australian Organic state that 'Organic farming practices… focus on biodiversity protection and land regeneration' and 'Farmers also consider their potential impact on native flora and fauna.'[9] NASAA asserts that 'Certified Organic production considers… biodiversity and the revegetation of land for long-term sustainability'[10], while IFOAM defines OA as 'a holistic farming system which… avoids harmful impacts on biodiversity'.[11] Elsewhere, IFOAM claims that: 'By not using harmful pesticides and fertilizers, organic farmers are preserving biodiversity and organic farms provide a home to 30% more species and 46-72% more semi-natural habitats than their conventional counterparts.'[12]

Principles

All three standards include general principles relating to the protection of biodiversity. For example, the Australian Organic standard aims 'To maintain and encourage agricultural and natural biodiversity on the farm and surrounds…' (sec. 1.4). The NASAA standard states that 'Biodiversity… must be a component of an organic farm' (sec. 3.5.5) and the IFOAM standard asserts that 'Organic farming benefits the quality of ecosystems' (sec. 2.1).

Requirements

The NASAA standard requires farmers to set aside from intensive production a minimum of 5% of total farm land, which must include at least perennial grasses and or trees/shrubs (sec. 3.5.1). Furthermore, 'The operator must not take measures that fail to build biodiversity or that needlessly simplify species diversity on an organic farm' and 'Ecologically sensitive or representative areas must at least be retained in part in their natural state' (sec. 3.5.6 & 3.5.9). The Australian Organic standard likewise establishes a 5% set-aside target for 'regionally-appropriate tree, bush and/or native grassland areas so as to enhance on-farm flora and fauna protection and biodiversity' (sec. 4.6.2), while the IFOAM standard requests operators to implement measures to maintain and enhance biodiversity through set-asides, but does not set a quantitative target (sec. 2.1.1). Australian Organic and NASAA prohibit the clearing of primary ecosystems on certified lands (sec. 4.6.9; sec. 3.5.4 respectively), while IFOAM prohibit clearing or destruction of areas recognised as having outstanding and critical importance due to their environmental, socioeconomic, biodiversity or landscape values (sec. 2.1.2).

Verification

Both the Australian Organic and NASAA standards state that the management of biodiversity should be documented in the operator's Organic Management Plan (OMP), which has no direct equivalent in the IFOAM standard. However, there was no evidence either in the standards or from interviews that biodiversity is actively monitored or verified in any way – rather, it is assumed that implementation of measures, such as set-asides and non-use of pesticides and herbicides, would maintain and enhance biodiversity. One interviewee responded to a question about whether biodiversity impacts could be monitored:

> …realistically, no. …practices like green manure cropping, compost, long rotations, they're all proven agricultural practices that build soils and build biodiversity. …generally all the practices that we use build that up (interviewee 3).

Lower greenhouse gas emissions

Claims

All three organisations draw a link between OA and reduced greenhouse gas (GHG) emissions. In their *Insights* magazine, NASAA asks the question 'Does organic farming reduce GHG [emissions]?' then answers, 'Yes, of course it does'.[13] In a publication entitled '20 good reasons to buy organic', Australian Organic include 'Capture CO_2 back into the soil in the form of humus' and 'Reduce greenhouse gas emissions by eliminating synthetic nitrogen fertilisers'.[14] IFOAM assert that 'Given its potential for reducing carbon emissions… Organic Agriculture should form the basis of comprehensive policy tools for… addressing climate change'.[15]

Principles

None of the standards contain an aim or principle to reduce GHG emissions in general. The IFOAM standard does, however, support reduction of GHG emissions through advocating the use of renewable energy and energy efficiency (sec. 4.7). All three standards can only be considered loosely and indirectly to support carbon sequestration in soils, via principles encouraging the maintenance of organic matter, e.g. 'Great emphasis is placed on the levels of organic matter and humus maintained in soils as an indicator of sustainability and of organic status' (NASAA 2016, sec.3.6).

Requirements

The Australian Organic standard includes a requirement that heating and lighting for greenhouses ‘shall achieve best management practice in terms of efficiency, environmental impact, and wherever practicable shall rely upon renewable resources’ (sec. 7.2.11). There are no compulsory requirements with respect to renewable energy or energy efficiency in the IFOAM or NASAA standards. Carbon sequestration in soil is, again, only loosely and indirectly supported by requirements such as ‘Soil organic matter… shall be improved if low and maintained or improved if satisfactory’ (IFOAM 2014a, sec.4.4.1) and ‘The fertility, biological activity and organic matter of the soil must be maintained or increased…’ (Australian Organic 2016, sec.4.1.3). While sequestration of carbon from the atmosphere could result from these actions, it is not the explicit rationale.

Verification

The IFOAM standard includes a requirement to ‘monitor, record and optimize any energy used for artificial light, heating, cooling, ventilation, humidity and other climate control’ (sec. 4.7.2) but does not link this to verification of GHG emissions. The NASAA and Australian Organic standards require soil organic matter to be measured at the time of application (sec. 4.1.8; sec. 3.6.9 respectively), but as the objective is not to monitor carbon sequestration, we do not consider this to be a robust verification measure to support GHG related claims.

Improved soil health

Claims

All three organisations claim that OA improves soil health. IFOAM state that ‘organic farmers continuously give back to the soil, maintaining soil health and fertility for future generations,’[16] while NASAA lists soil regeneration as one of the founding principles of organic food production and states that certification practices include preventing soil erosion and improving soil quality.[17] Australian Organic assert that organic practices 'ensure the long term health of the soil'.[18]

Principles

Only the IFOAM standard defines what it means by soil health: 'the continued capacity of the soil to function as a vital living system, within ecosystem and land use boundaries, to sustain biological productivity, maintain the quality of air and water environments, and promote plant, animal and human health' (sec. 1). Elsewhere, it asserts that 'Soil health and quality are the basis of soil management practices' (sec. 4.3). Similarly, NASAA state that 'The maintenance of soil health by ecologically sound means is at the heart of organic production systems' (sec. 1.4) and Australian Organic assert that 'Pest and disease management should be fundamentally aimed at health management of soils, crops and livestock' (sec. 4.5.1).

Requirements

The IFOAM standard requires that: 'general soil health and fertility shall be improved if low and maintained or improved if satisfactory' (sec. 4.4.1). Elsewhere, it states that: 'Operators shall prevent or remedy soil and water salinization where these pose a problem' (sec. 2.2.5). The Australian Organic standard specifies optimal soil outcomes, including healthy and prolific soil fauna, high organic matter levels, optimal physical structure, and a chemical balance ensuring availability of key nutrients (sec. 4.1.9). The NASAA standard includes various requirements to return nutrients to the soil, minimise and repair erosion damage, and improve or restore soil structure (sec. 3.6.1-3.6.11).

Verification

The IFOAM standard does not provide any guidance on how maintenance or improvement of soil health is to be monitored or verified. The NASAA standard stipulates that each operator must provide an OMP which includes an explanation of how soil management, fertility management, and soil erosion will be addressed and monitored (sec. 2.3.1). The Australian Organic standard requires soil testing of nutrients and organic matter to verify that the farming system is moving towards effective organic function and outcomes, and recommends that 'Ongoing soil or tissue tests, or other effective means of assessing fertility, should be carried out by the operator to ascertain sustainability' (sec. 4.1.8). The NASAA standard only includes a non-binding recommendation that 'Physical, chemical and biological factors affecting soil fertility need to be well understood by certified organic farmers and can be complimented by detailed soil testing at intervals' (sec. 4.4).

While the standards appear to require soil health to be monitored and maintained or improved, interviews suggest that very little active monitoring or verification occurs. An agricultural consultant explained that 'The onus is on the grower to monitor their soil fertility' (interviewee 7) and where soil data is collected it is done so voluntarily, primarily to improve farm performance. Certifiers do check the growers' soil tests (if they have any), otherwise they assess the 'general land health at audit by visual inspection' (interviewee 4). An OA certification officer stated:

> we don't need to know that their soil is improving. As long as it's not being exposed to chemicals, that's what we're certifying… whether or not it's actually improving in quality is really beneficial to them but it doesn't really change the fact that they're organic (interviewee 8).

Improved water efficiency and management

Claims

Australian Organic states that: 'To be certified organic means… the process must be water efficient…'[19] IFOAM argues that 'organic farming impacts positively on soil structure and enhances the water-holding capacity and hence availability of water.'[20] NASAA include water conservation as one of the four main ways in which OA produces food in a sustainable way.[21] All three standards also claim that OA improves water quality due to reducing run-off of synthetic chemicals into watercourses. We regard this as an aspect of the exclusion of synthetic chemicals and therefore do not consider it further in this section.

Principles

The IFOAM standard includes the principle that 'Organic farming methods… use water efficiently and responsibly' (sec. 2.2). The NASAA standard includes the general principle to promote 'wise use' of water, and a more specific principle 'to use water efficiently and responsibly' (sec. 1.4 & 3.9). The Australian Organic standard does not mention water in its general principles, but does include an entire section (sec. 4.4) on water management and ecology.

Verification

The Australian Organic standard includes within a list of possible measures for water management, 'Monitoring using tensiometers, evaporation figures, etc.' (sec. 4.4.1). NASAA stipulates that the OMP should include an explanation of how water management will be addressed and monitored, and both the IFOAM and NASAA standards request operators 'where possible… [to] monitor water extraction' (sec. 2.2.6;

sec. 3.9.1 respectively). However, interviews with certifiers revealed that water monitoring is not expected in practice on organic farms: ‘with the water monitoring… again it’s not something that we require them to do’ (interviewee 8).

Animal welfare

Claims

NASAA include animal welfare as one of the four main ways in which OA produces food in a sustainable way.[22] Australian Organic asserts that ‘It’s the best for animal welfare’[23] and IFOAM state that ‘The organic movement aims to contribute to the health and well-being of farm animals.’[24]

Principles

Section 6 of the NASAA standard relates to animal husbandry, and includes the principle of ‘respect for the physiological and behavioural needs of livestock’ and a recommendation that ‘Producers should maintain conditions that enhance, as much as possible, the animals’ lives, physiological needs and behavioural needs’ (sec. 6.1). These essentially mirror similar provisions in the IFOAM standard. The Australian Organic standard specifies a number of principles of livestock welfare (sec. 5) and makes frequent mention of animal welfare principles as a guide to more specific requirements, for example regarding animal feed, transport or housing space (e.g. sec. 5.1.40 refers to ‘principles of animal welfare and behavioural freedom’ which should guide any variation to default guidelines for space allowed per animal). Elsewhere, the standard states that ‘All husbandry practices shall be oriented towards an ethic of care towards all livestock, ensuring that management practices allow all livestock to perform their natural social functions and physical behaviours, whilst managing their environment to allow for a high standard of animal welfare' (sec. 5.2.25).

Requirements

All three standards include a number of detailed requirements related to animal welfare. The requirements differ and are therefore difficult to compare directly, but in general, the IFOAM standard establishes more general requirements (e.g. that operators should ensure animals have 'sufficient free movement and opportunity to express normal patterns of behavior' (sec. 5.1.3)) whereas the Australian Organic and NASAA standards are more specific (e.g. the NASAA standard contains a table specifying minimum housing densities for housed animals (sec. 6.3.5)).

Verification

The Australian Organic and NASAA standards require livestock health and welfare to be outlined in the OMP (sec. 5.1.1; sec. 2.3.1 respectively). None of the standards specify any further means of verification of animal welfare requirements.

Discussion

Our analysis shows that the selected organic SSOs make a variety of both broadly and more narrowly defined sustainability claims. While they generally back up these claims with principles and requirements in their organic standards, they provide rigorous guidance on verification only for the 'core' claims relating to exclusion of synthetic chemicals and GMOs. Verification procedures related to other claimed benefits are less rigorous, or non-existent. Our interviews confirmed that as a result, OA currently involves very little collection of verifiable data on sustainability outcomes. OMPs are used as a tool to document various management practices, but the effectiveness of these practices will be highly dependent on the knowledge and skills of the farmer. Our interviews showed that the effectiveness of farm practices is primarily assessed by visual inspection during the annual on-site audit, and that little or no other verification is carried out (apart from testing for synthetic chemicals and GMOs).

It is possible that other voluntary organic standards are more rigorous than those we have analysed here. However, our inclusion of the IFOAM standard shows that there is, at very least, a lack of guidance on more rigorous assurance of sustainability from the pre-eminent international organic SSO. Moreover, other studies have come to similar conclusions, despite using different methodologies and examining different standards. For example, Seufert et al. (2017) compare the contents of eight different organic standards and regulations, scoring the degree to which each implements various organic principles, and observe that 'The organic principles associated most with environmental sustainability, i.e. soil, water and biodiversity, are not very prominent' (p. 14). Merfield et al. (2015) compare the requirements in New Zealand's BioGro standard and the IFOAM 2014 standard with key indicators from the FAO's Sustainability in Food and Agricultural Systems (SAFA) Guidelines, finding that these standards cover only 36% of the SAFA sustainability indicators.

In making sustainability claims that go well beyond the exclusion of synthetic chemicals and GMOs, yet without having established equally rigorous monitoring and verification procedures in organic standards that could collate the evidence necessary to support such claims, organic SSOs put themselves at risk of a consumer backlash, as well as potentially certifying operators who are farming contrary to their claims (Stevenson & Burkitt 2010). This is all the more important given the current context in which OA is experiencing double-digit growth in global sales (FiBL & IFOAM 2017), meaning that it is increasingly exposed to the expectations of new, more mainstream, consumers. Australian consumer surveys have consistently found that being ‘environmentally friendly’ is the third most important perceived benefit of organic food, after being chemical- and additive-free (Australian Organic 2017, p.9). Two-thirds of Australian shoppers believe that organic products have general environmental benefits, and this was cited as a motivation for 41% of first organic purchases in 2016 (Australian Organic 2017, pp.35–36). Protecting biodiversity was perceived as a benefit by 33%, and improved animal welfare by 35% of Australian shoppers. The mismatch between these expectations and the lack of verifiable evidence required by organic standards with respect to these expected benefits is striking, particularly when, as we have shown, the standards do contain a number of principles and requirements that aim to produce such outcomes. Greenwashing and questionable claims are generally regarded as external threats to OA’s integrity – yet there is certainly a possibility that an organic SSO’s own sustainability claims, in the absence of strong supporting evidence, could be regarded by critical consumers as a form of greenwashing.

The risk of consumers becoming more critical of OA’s sustainability claims is heightened by the fact that various alternative standards also claim to define more sustainable forms of agriculture, including the Linking Agriculture and Farming (LEAF) Marque; SCS’s Sustainably Grown; Field to Market’s Supply Chain Sustainability Program; the ANSI/Leonardo Academy American National Standard for Sustainable Agriculture (ANSI/LEO-4000) and the Sustainable Agricultural Network/Rainforest Alliance Sustainable Agricultural Standard.[25] These standards are likely to address a more comprehensive range of sustainability outcomes (Rasmussen et al. 2017, Horlings & Marsden 2011) than the limited set of environmental and social issues currently included in organic standards. Further research is needed on whether these alternative standards provide more or less rigorous assurance in relation to their own sustainability claims.

The risk of a consumer backlash is further amplified by the fact that new technologies are now enabling automated collection of data on an ever-increasing range of on-farm parameters, meaning that sustainability outcomes are no longer necessarily too difficult and expensive to monitor – which used to be a valid argument against monitoring sustainability outcomes in the past. Cheaper and more capable sensors, geolocation, imaging, wireless networking and Big Data analytics are combining to create a paradigm shift in farming practices. 'Conventional' agriculture is rapidly adopting these new technical opportunities. Whilst their focus is mostly on improving productivity, they also have significant potential to enable new relationships to be built between agricultural producers and end consumers, based on the unprecedented visibility that new information and communication technologies (ICTs) can provide on what is actually happening on the farm. For example, the Ecoegg farm in New South Wales, Australia, provides consumers with the ability to watch the farm's hens online via a user-controllable 'ChookCam'.[26] The farm evidently trades on its sustainability claims, for example highlighting the use of cartons made from CO_2-neutral and FSC-certified recycled paper, a stocking density of one hen per square metre, and increased levels of Omega 3 fats and vitamins compared to an ordinary egg – all without being certified organic.

In summary, we believe that OA is now at a crossroads. There are two broad options available to OA in response to the problem of currently unsupported sustainability claims: either to rein them in, and focus solely on the 'core' claims that current standards do strongly support – that organic products are 'free from' chemicals and GMOs; or to pursue a set of actions that would result in being able to support such broader claims in future. These actions could include both intra- and extra-certification strategies: on the one hand, evolution of organic standards to include guidance and, where appropriate, requirements related to monitoring and verification of a broader set of outcomes; and on the other, the exploration of alternative approaches to supporting sustainability claims at the farm level, such as exploiting the potential offered by new agricultural ICTs.

An intra-certification strategy would see SSOs pay more attention to verification of sustainability claims, requiring more provision and testing of evidence than is currently the case. For example, organic standards could require certifiers to test a certain percentage of organic meat products for residues of the most commonly used hormones and antibiotics, tests for which are widely available. With regard to soil health, annual testing of soil and composts for key nutrients and other soil health parameters could be required (Stevenson & Burkitt 2010). For animal welfare, the standards could require farmers to maintain more documentation, to be reviewed by auditors. Whilst some such measures would add to the costs of certification, there is also potential for new ICTs to *reduce* the costs of certification. For example, aerial photographs taken by drones, supported with image integrity assurance software,[27] could be used to provide documentary evidence of implementation of set-aside areas, or to prove that primary ecosystems have not been cleared, thus reducing the costs of verification, compared with on-site inspection. Such additional intra-certification requirements could be complemented by an extra-certification strategy featuring the deployment of new ICTs to provide an evidence base for sustainability claims which are more difficult to verify via the traditional audit process. For example, monitoring of biodiversity impacts is extremely challenging and therefore unlikely to be practicable as a certification requirement in the near future, but steps could be taken, outside the certification framework, to explore the utility of options such as motion sensors or acoustic monitoring (Sueur et al. 2014). Ignoring the challenge – and opportunity – of new ICTs will likely see OA face increased competition in ‘sustainable’ product markets from non-organic farmers using new ICTs to provide compelling substantiation of their sustainability claims, potentially direct to consumers, by-passing intermediary standards and certifiers (Gale et al. 2017).

The organic sector is starting to appreciate this potential. In 2016, IFOAM and the Sustainable Organic Agriculture Action Network (SOANN) launched a discussion paper on ways forward for the next phase of organic development (‘Organic 3.0’, distinguished from the pioneers of ‘Organic 1.0’ and the establishment of private standards and public regulations in ‘Organic 2.0’). This envisages, among other things, greater use in future of ‘new high potential technologies of which the organic movement is presently rather sceptical,’ such as robotics, precision farming and ICTs (Arbenz et al. 2016, p.13). The paper recognises that these technologies could be harnessed to support alternative approaches to assurance: for example, ‘process-oriented paperwork might be complemented and reduced by modern authentication, tracing and tracking technologies, which will become widely used as they become more affordable (e.g. remote sensing, highly improved analytics)’ (Arbenz et al. 2016, p.14).

Strengthening the assurance of sustainability in organic standards will require a significant change in attitude within the OA industry, which has historically tended to equate more rigorous verification methods (such as residue testing) with ‘product-based’ assurance that is considered to be at odds with OA’s ‘process-based’ approach (Friedland 2005). As one of our interviewees (9) argued, ‘today there is a solid agreement world-wide that organic certification is based on production methods and principles – e.g. input restrictions, not on actual environmental/sustainability performance or product quality.’ Similarly, the Australian Organic standard states that ‘Testing and test results are… a limited means of verification and are not recognised as the basis for the organic status of products' (sec. 4.7.26). We argue that this is a misperception: checking whether intended outcomes have actually been achieved is not logically restricted to product-based assurance, but can apply equally to processes. In the past, however, it has been challenging to verify the implementation of processes, therefore process-based assurance has tended to focus on verification of higher-level control systems (e.g. having a compliant OMP), rather than underlying realities (e.g. farming actions and impacts). New agricultural ICTs have the potential to change this, making at least some outcomes practical to monitor and verify. OA should take advantage of this opportunity to strengthen its assurance framework, not only to avoid the risk of a consumer backlash, but to strengthen its ability to deliver more sustainable agricultural outcomes into the future.

Further research could extend this inquiry to other countries, other standards (including alternative standards for sustainable agriculture), and governance regimes, for example investigating whether similar issues of discrepancy between sustainability claims and assurance arise under organic governance regimes backed by government legislation. Interdisciplinary collaboration between natural and social scientists is also required to investigate the potential for new agricultural ICTs either to support organic certification, or to provide alternative assurance mechanisms, whilst remaining mindful of the fact that trust is created and sustained within negotiated social relations and not by technologies on their own.

Conclusions

Voluntary organic SSOs are in the business of creating trust: their very existence is predicated on a belief that the apparatus of assurance – including standards, procedures for verification of conformance, and accreditation of certifiers – will enable consumers to trust the claims made by organic producers, and so enable markets for organic products to function and grow. As the upholders of truth claims on behalf of producers, the expectation would be that SSOs apply similar assurance to back their own claims about the sustainability of organic agriculture. However, as our analysis of the three main voluntary organic standards in Australia shows, while these standards generally contain principles and requirements that support sustainability claims, they lack well-specified means of verification in most cases other than the 'core' claims to exclude synthetic chemical inputs and genetically modified organisms. The existence of this assurance gap creates the risk of a consumer backlash, which is heightened by the current context of significant growth in global sales of organic products, competition from alternative standards for sustainable agriculture, and the emergence of new agricultural ICTs, which have the potential to both lower the cost of monitoring sustainability outcomes, and potentially by-pass intermediary standards and certifiers altogether. Organic SSOs can avoid such a backlash either by withdrawing unsupported sustainability claims and focussing solely on the 'core' claims that current standards do strongly support, or by proactively pursuing a set of reforms that would result in being able to support non-core claims in future. These actions could include strengthening verification within standards, and/or employing new agricultural ICTs to support sustainability claims outside the certification process. Embarking on such reforms will require a significant change in the organic sector's perception that verification is at odds with process-based assurance, and that it is still too expensive and difficult to monitor sustainability outcomes.

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[2] We analysed versions of the standards that were in force as of May 2017. At the time of final revisions to this article (September 2019), the NASAA (2016) standard remained in force while the (IFOAM 2014a) standard had been superseded by a June 2017 edited version, which did not include any significant content changes. The Australian Organic (2016) standard was revised in August 2017 and May 2019. Neither of these revisions appear to have introduced substantive changes that materially impact the article's analysis or conclusions.

[3] http://austorganic.com/7-reasons-to-go-certified-organic/

[4] https://www.nasaa.com.au/organic-certification/organic-food-production.html

[5] http://www.ifoam.bio/en/what-we-do-1

[6] http://www.ifoam.bio/sites/default/files/oa_and_pesticides_web.pdf

[7] http://www.ifoam.bio/sites/default/files/ifoam_pr_2015_02_23_letter_from_america.pdf

[8] See for example https://www.nasaa.com.au/documents/publications/organic-insights/archive-1/124-nasaa-organic-insights-2015/file.html and http://austorganic.com/7-reasons-to-go-certified-organic/

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