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Alternative food distribution and plastic devices: Performances, valuations, and experimentations

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ABSTRACT

Studies of how alternative food networks do (or do not) reconfigure consumer–producer relations and encourage revaluation of food and agriculture continue to offer important insights into future agrifood possibilities. Recent agrifood studies have shifted focus from a question of how 'alternative' such initiatives are, to consider how they are constituted and what they, as particular efforts, work to achieve. However, what has received less attention in these studies is the sociotechnical devices that perform as part of these markets' dynamics. Building upon agrifood studies and science and technology studies, this paper connects economies, ethics, and experimentation through detailing how alternative food economies interact with plastics. What work do plastics do? How are plastics valued, and how does this play out? What experiments, if any, are in train to engage with plastics differently? How do alternative food economies negotiate plastics as beneficial but also troubling materials? To address these questions, the paper draws on fieldwork undertaken in Brisbane, Australia with two initiatives – a weekly organic market and a box scheme/wholesaler. It is argued that plastics are fundamental to the constant work of maintaining alternative food distribution, performing as ethical materials and market devices. Further, experimentations prompted by the ambiguous valuations of plastics offer insight not only into how new practices might emerge and other materials enrolled, but also how plastics may trouble such efforts at their exclusion. Taking a device-oriented approach focused on plastics serves to highlight the mundane performances of things in making particular marketplaces, and offers a novel means of analysis that multiplies our understandings of alternative food economies.

1. Introduction

The box was waiting for me on the porch as I arrived home. Carrying it in, I could feel things shifting inside and smiled, anticipating the first delivery from a new food box program. Unpacking revealed layers of fresh fruit and vegetables – from tomatoes and herbs down to potatoes and beets. Once things were put away, I was confronted with the packaging. The emptied cardboard box would be exchanged next delivery, and would be reused. But that left the box liner, a couple of small bags, a clamshell, and the tape that sealed the box. A quick review of the initiative's website showed that others noticed these remainders. A series of critical comments from customers had elicited response: staff were also concerned about minimising waste (especially plastics) and continued to consider packaging options with this in mind. This little pile of plastics from my food box might have been ignored – sliding easily from useful packaging to discarded waste. But instead, these items became provocative, evoking questions about how and why agrifood economies (even 'alternative' ones) become wrapped up with plastics.

This paper aims to take seriously the roles of devices and materials – like plastics – as part of the ongoing work of alternative food economies. In agrifood literature explorations of a whole range of individual, cooperative, and enterprising operations from community-shared agriculture to fair trade networks detail the possibilities and limits of alternative food initiatives (AFIs) (see for examples, Goodman et al., 2012; Stock et al., 2015). In different ways, these studies examine how AFIs reconfigure consumer–producer relations, attempting a kind of 'civilizing of markets' (Callon, 2009) in which economic exchange partners with ethico-political considerations. In this way, agrifood literature facilitates consideration of alternative food initiatives (AFIs) as situated, ethico-political endeavours (Little et al., 2010; Goodman et al., 2010); however, it tends to ignore the ways in which devices inhabit and influence such efforts.

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Using the case of plastics, an argument is made herein for exploring AFIs' practical, ethical, and experimental engagements with involved devices. Drawing upon conceptions of economies as agencements in which sociotechnical devices play key roles (Callon, 2005, 2009; Çalişkan and Callon, 2010), in this article devices become not neutral tools but potentially significant agents with capacities to inform and alter market outcomes and possibilities. The inclusions and exclusions, tinkering and persisting, valuations and affects of devices underlie the performance of economies (Muniesa et al., 2007). Moreover, when devices – like the plastics described in the opening vignette – disrupt familiar activities and arrangements, they provide challenge and opportunity. This kind of material disruption may point to 'a different awareness of the problems and situations that mobilise us' (Stengers, 2005: 994), provoking response. Through this approach, alternative food economies can be understood not only as situated, ethical efforts, as agrifood literature points out, but also, with science and technology studies, as experimental engagements with more-than-human actors, including devices like plastics.

Since the mid-20th century, plastics have developed close and complex relations with agrifood systems, and have become valued in ambivalent ways. Plastics have facilitated the qualification and circulation of products worldwide; they cushion, contain, wrap, carry, advertise, and secure food. Plastics have also engendered new practices, identities, and economies; for instance, plastic bottles transformed water consumption by reworking existing practices in favour of disposability and recycling (Hawkins, 2012). Plastic's material capacities and versatility garner praise ranging from decreasing transport costs and energy because of its lightness and low volume, to limiting food waste through appropriate packaging (PlasticsEurope, 2015). However, plastics are now also recognised as problematic due to their impacts on environments and human health – as suggested by various campaigns to limit plastic bags, bottles, and even particular chemical components (like Bisphenol A). Concerns have been raised about plastics as central to mass consumption (Meikle, 1995), drawing upon nonrenewable resources and enduring through geological timescales (Marriott and Minio-Paluello, 2013), and spreading in surprising ways with polluting effects (Freinkel, 2011; Thompson et al., 2009). Plastics have "become emblematic of economies of abundance *and* ecological destruction" (Gabrys et al., 2013: 3). Plastic – as a material and as a set of devices – remakes the world in its proliferation, persistence, and provocation. Little, however, has been said about plastics' implications in alternative food economies.

Focussing on plastics in alternative food economies attends to the practical negotiations and tensions raised with material devices and their configurations. What work do plastics do in these markets? How are plastics valued, and how does this play out? In responding to these questions, it is argued that ongoing negotiations with plastics are fundamental to the constant work of maintaining alternative food economies. How and why plastics become integrated or excluded in the activities and valuations of AFIs is part of how they become what they are and what they can accomplish. In asking how plastics come to matter in alternative food economies, this paper details the roles and ethical valuations of plastics but also asks how these controversial materials are dealt with in practice. How and why do plastics become integrated or excluded? How do AFIs experiment with constitutive materials and market arrangements to negotiate plastics as beneficial and problematic?

This paper addresses these questions through a detailed examination of two alternative food initiatives in Australia – a food box/wholesale initiative and an organic market. Research with Food Connect and Northey Street Organic Market took place from February 2014 to March 2015. Participant observation during multiple site visits involved a range of activities including packing and delivering boxes, touring facilities and fields, auditing stalls, picking up deliveries from wholesalers, and so on. In addition, online presence was reviewed and 23 interviews were conducted with those involved in distribution (staff, stallholders, suppliers, buyers' clubs). In most cases, interviews occurred at the main point of participants' involvement – their farm, warehouse, home, etc. This arrangement facilitated discussion of plastics' involvements in AFI-related practices, allowing lived experiences with materials to come to the fore (see Hitchings and Jones, 2004; Phillips, 2014).

The paper proceeds by, first, outlining the value of considering devices as part of processes of making and maintaining AFIs. This discussion builds upon the conversations developing between agrifood research and science and technology studies, particularly recent scholarship exploring agrifood economies not as natural entities or linear chains but as heterogeneous assemblages involving multiple differentiations including, but not limited to, the economic (see Buller and Roe, 2014; LeHeron et al., 2016). The subsequent sections explicate how plastics perform within AFIs. The first of these empirical sections explore the ethical framing of alternative food economies, with particular attention to how plastics are valued in these efforts. The next section considers how plastics perform as market devices – facilitating the creation of quality goods and ordering their distributions. Understanding the work plastics do to facilitate alternative food markets in such terms is necessary before exploring how AFIs negotiate the paradox of plastics in practical terms. The last empirical section explores experimentations with, and persistence of, plastics. Throughout the empirical sections, it becomes clear that plastics may serve clear-cut roles as supporters or impeders of AFI accomplishments, but just as often there are tensions among the possibilities offered by plastics that require continued negotiations and evaluations. The conclusion considers how the processes of AFIs coming together as organised, ethical, economic endeavours offering 'good food' depends upon practical experimentation with sociotechnical devices like plastics.

2. Considering the making of AFIs

Much scholarly attention to AFIs orients around the scale and effectiveness of their alternativeness – or the question of how much of a challenge they do (and can) offer to the neoliberalisation of agrifood (see for example, Magdoff et al., 2000). Departing from long-standing disagreements over this significance, some recent analyses of alternative food economies aim to recognise the diverse, complex, and dynamic nature of these initiatives. These analyses suggest that it is only through empirical examination that the methods, spaces, motivations, identities, and resistances – real or possible – articulated through AFIs might be understood (see Goodman et al., 2012; Little et al., 2010; Stock et al., 2015). Taking this position opens analyses to consider these markets beyond the restricted register of how and how well they challenge neoliberalism (or capitalism more broadly).

This move denotes a shift from questioning the alternativeness of AFIs to asking "what makes up alternative food economies?" and "how do they get accomplished?" It is not only the diverse economies (Gibson-Graham, 2008) of AFIs that might be acknowledged through this change of approach, but the diverse elements, purposes, practices, and values that assemble. In this way, agrifood studies is moving to consider "what is made and created outside of the monetary margins of the exchange is a multilayered transaction of ideologies, motivations, and principles" (Little et al., 2010: 1806). STS-inspired analyses of economisation and marketisation do not yet explore these depths and diversities; however it is acknowledged that "[a]t the heart of markets we find debates, issues, feelings, matters of concern, dissatisfaction, regrets, and plans to alter

existing rules, which cannot be internalized once and for all" (Callon, 2009: 541). Markets, in other words, include diverse entities and forces but are also exceeded by them.

In reply to the question: "What are markets made of?," Callon (2009) argues that markets are social and technological constructions – that they are complicated, fragile achievements of human and nonhuman actors. Drawing upon the concept of agencement, Callon (2005: 5) explains the processes involved in making markets:

> The existence of a market implies the circulation of merchandise, that is, the existence of goods transformed into things that can be passed from hand to hand. This circulation is simultaneously a process of production and qualification that transforms products and in so doing qualifies them in such a way that they are attached to users by entering their world and becoming parts of it.

Callon's interest falls not on the market itself, but on processes of production, circulation, valuations, and exchange, and the changes wrought through them. These processes rely upon devices and their ordering. Market devices are "the material and discursive assemblages that intervene in the construction of markets" (Muniesa et al., 2007: 2). Reflecting science and technology studies in active objects, these devices are understood as agentic; they do things – whether in mild or forceful ways.

Frequently applied to calculative, often covert (at least to the consumer) mechanisms like pricing models or trading protocols, the market device concept offers other useful avenues for exploration. Cochoy's (2007) analysis of supermarkets, for instance, highlights how mundane performances of people relate with market devices (such as displays and brands), how devices not only perform but influence how other actors think – as consumers, self-servers, etc., and, how spatial and material relations of market devices, in some cases, are more important than their calculative capacities. These extensions of the market device into everyday experience draw attention to how such devices can be understood as ethico-political materials.

The concepts of economisation and market device have recently been employed in agrifood research on ethically-oriented economies. Case studies have demonstrated, for instance, how agrifood certifications and standards commodify ethics, serve as proxies for ethics, and make new markets for ethically-produced goods (Buller and Roe 2013; Miele and Lever, 2013). These are valuable contributions bringing ethico-political and economic processes together in consideration of markets. However, in addition to becoming commodified, as detailed by these studies, ethical valuations may flow through and around markets, informing them. Such valuations may carry through or die out, exist in tension or in support. It is this kind of ethical entanglement with markets that manifests in AFIs dealing with plastics.

A wide-ranging technical literature considers the potential use of plastics in, for example, creating micro-environments for effective packaging or for increased production (see Lamont, 2005; Piringer & Baner 2000). And, while popular journalistic accounts of plastics may recognise its benefits they tend to emphasise the environmental and health costs of society's reliance on plastic (see Freinkel 2011; Moore and Phillips, 2011). A nascent social sciences literature on plastics has begun to consider the complexities and vitalities of plastics. Bensaude-Vincent (2013), for instance, argues that the exploration of plastics reconfigured chemical and material design practices, as well as understandings of nature and culture. In more mundane terms, Cochoy and Grandclément (2005) suggest that packaging has become so normalised that consumption without it seems impossible. Hawkins' (2009; 2012) cultural studies of waste draw particular attention to the controversies and materialities of plastic through examples of bottles and bags. Drawing on Bennett's (2010) vital materialism, she disputes that plastic bottles and bags are only passive objects or management problems, as much waste literature would have it. Instead, using marketing narratives and activist campaign material, Hawkins (2012) shows how plastic bottles provoke new economies, publics, and practices. She suggests that not only consumption but disposal has been altered to accommodate this material; we have become recyclers as part of our performance of environmental responsibilities. In sympathy with such assertions of the relevance of plastics in our lives but moving beyond focus on consumers and identity formation, this paper details the relations of distributors with a myriad of involved plastics, and how plastics enrolments and affects shape AFI goods, arrangements, and enactments.

Accepting that plastics act as economic and ethico-political devices does not suggest their inhabitations and influences should be understood as staid or settled; instead, they become part of the ongoing experimentation of making and maintaining AFIs. In contrast to more scientific experimentation, the kind of experimenting detailed herein is a less formal, lived experience of trial and error (see Marres, 2012). This is a pragmatic, enactive experimentation. How and why plastics become integrated or excluded in the activities and valuations of AFIs is part of how AFIs take shape and the possibilities they present. In attending to the dynamics of association, the multiplicity of valuations, and the negotiation of these through experimentation this paper opens up ways of understanding alternative food economies, and plastics.

3. Alternative food initiatives and plastic ethics

Food Connect was established as a social enterprise in 2005 in Brisbane to offer an alternative to supermarket food and distribution. The products offered by FC come from family-owned farms within 400 km. Originally designed as community-supported agriculture, FC has shifted to a box-scheme model combined with wholesaling. As an individual consumer, one can go online to order preset boxes (variable with season and availability) as well as 'extras' like dairy, eggs, meat, and larger pre-set amounts of produce (e.g., 1 or 2 kilo bags of apples). Most orders are delivered to neighbourhood hubs (or 'City Cousins') from which individuals pick up on designated days. At the time of research FC was also trialing individual household delivery. In addition, FC sells about half of its produce wholesale to buyers' groups and restaurants, as well as to other box schemes and market stallholders.

FC's primary concerns are to provide good food and build community; however, limiting waste – of food, energy, packaging, even furniture – is part of a set of ethics informing its operation. Rob, FC's founder and chief executive officer, explained his critique applies to mainstream agrifood and to an organic industry he considers to be:

> just replicating the industrial model. Heading down this pathway of huge amounts of plastics, huge amounts of transport, huge amounts of water being shipped around within the food [system], at the cost of a whole bunch of other values that I thought were deeply embedded … it's great to talk about the future we want, but I'm a farmer, and I know it's bloody difficult to transition across to that. So how do we actually start with models that can help not just farmers transition, but also society to transition?

As Rob notes, talking is not enough for transition, altering futures requires oftentimes difficult engagement across sectors and scales and acceptance of incremental change. FC does not see itself as the alternative in the sense of offering a fulsome replacement to mainstream food systems, but it is an attempt, in process, of doing

things differently.

The second case, Northey Street Organic Market (NSOM), is a weekly market operated by Northey Street City Farm (NSCF) – a social enterprise established in 1994 that also includes a permaculture garden, community kitchen, and nursery. Linda, social enterprise and events manager, elaborates:

> [NSCF aims] to be a demonstration of how you can live more sustainably, even in an urban environment. And so, in running the market, as I said, it is income for us, it's important income for the farm. But it's much more than that. It's also about an extension of that mission. So I mean all of those things, the waste management policy, the organics approach, the putting people more in contact with direct producers, is all about a more sustainable approach to urban living.

In this way, NSOM participates economically, practically, and ethically in the vision of NSCF as "a place for learning about sustainable living in the city" (NSCF, 2014). Each Sunday, almost 60 stallholders and the market manager set up temporary stalls on leased municipal land to open the market from 6 to 11 am. Stalls sell certified organic items including produce and dry goods, arts and crafts, hot and cold foods, clothing and accessories, bath and body products.

Both FC and NSOM express motivations to build food provisioning options outside of conventional food networks and demonstrate the will to experiment with purchasing, marketing, distribution, and disposal as part of alternative agrifood practices. Considered as 'diverse economies' these AFIs include multiple ways of producing and distributing surplus, enrolling labour, and engaging in exchanges as well as placing "care of the environment, landscapes, and ways of life at the centre of economic activity" (Gibson-Graham, 2008: 617). Beyond this consideration, however, it is clear that the organisation of these AFIs relies upon a myriad of sociotechnical devices – brands, certifications, packaging. How particular AFIs are constituted with devices such as plastics is a practical issue, but it also involves ethical valuation.

3.1. Valuing plastics

Not that long ago, food needed to be packaged and processed to be considered safe and healthy – and therefore desired (Blay-Palmer, 2007). However, these days anxieties about waste and renewed demands for fresh food have called plastic packaging – and single-use plastics more generally – into question. In fact, plastics have become automatically 'bad' to the degree that Hawkins (2009, 2012; Gabrys et al., 2013) must remind us to suspend moral judgements of plastics to examine how they actually perform in particular situations. It is a reminder consistent with Callon's insistence that we investigate what and how markets become rather than accepting them as natural entities. While we might suspend normative judgements to facilitate academic explorations, entanglements with ethics is inescapable in the praxis of making markets. Through encouraging consumers to include a sense of how agrifood-related decisions affect themselves and wider worlds in ways beyond price-perception and biological need, AFIs transform food not only into a material commodity but into an expression of cumulative moral sentiment (Little et al., 2010). These collective ethics are not, however, restricted to consumers or to food commodities; producers and distributors also engage in such considered action about food, as well as other elements – including plastic.

Dislike of plastics was clear and common, though the levels of dislike varied from animosity to irritation. For example, both Rob and Amanda expressed hate for plastic and its inclusion in their operations. While packing sausages into cryo-vac bags, Amanda, a meat reseller at NSOM, commented "into the dreaded plastic they go" and continued, "I hate it. I do. I wish we didn't have to use it." Rob echoed these sentiments while reflecting upon FC's operation: "We hate seeing all that plastic out there. Particularly with the extras – the extra kilo of this and that – and all that sort of stuff there in plastics. It's a real, personally, it's a real tension. I hate seeing it". Illustrating a less dramatic response to plastic presence, Beecher, a NSOM stallholder, admitted: "It's annoying to dump so much plastic. But that's what it comes to. It's a problem." Regardless of the strength of affective response to plastics, that plastics were problematic was reiterated again and again.

The 'problem' of plastics connected to a variety of issues for people – in their personal lives and in their operations. Allison, a FC wholesale purchaser for a buyers' group, explained:

> So I think the packaging and plastics is a big issue that I think we could improve on as a society. There's this general thing that I've found that I'm anti-food in packets. One, because it's processed and that can often mean less nutrients and vitamins. You can't touch it as easily and smell it. It takes out a lot of the joy. … So yeah, it's something that I spend a lot of time thinking about as my little contribution to our environment and the world.

Plastics, especially as packaging, get in the way of joyful, good food for Allison. She has decided plastics' impacts are worthy of changing her food provisioning for her household and for the buyers' group she runs. For example, she negotiated with one of FC's suppliers to provide wholesale amounts of berries in trays rather than prepacked in large clamshells, guaranteeing sale when the producer expressed serious concerns about such loose transport decreasing quality. Focussing less on sensing and benefiting from food, Sam, NSOM stallholder and FC wholesale customer, had concerns oriented on resource use, toxicity, and waste: "It's [plastic use] not something that sits particularly well with us. Just the impacts on the environment basically. Like petrochemicals, peak oil is going to come soon enough. We don't need to hurry it along anymore than what we're already doing." She continued by explaining the effort put into "reducing our impact, reducing our footprint as much as possible" and trying to "minimize, where possible, contact with plastic". What emphasis fell upon varied with the operation and with the people involved, but in every case the problems of plastic –and efforts to deal with them – were raised as part of how AFIs are shaped in ethical terms.

Like valuations of organic production or farmer livelihoods, plastics feature in AFI ethics, but in ways that involve tensions about the material – its use and exclusion, its benefits and problems. Luke, FC procurement manager, articulated the difficult negotiation:

> Packaging is part of the good, part of good food is the packaging. Yeah. So I mean it is part of the long-term vision of sustainable food and sustainable food systems, but there's only so far you can go with that unfortunately. … it's a very mixed message market place out there in terms of plastics and how we should be using them, and to some extent I think we have a bit of social angst in that. You've got to do the right thing on packaging because it's a very visible thing that everybody sees every day.

While FC sees packaging as part of 'good food' and visions of sustainable food systems, the valuations of food and plastics can be ambiguous or in tension. Luke pointed to conflicting information about plastics as one prompt of anxiety about how to 'do the right thing on packaging'. Choosing between a recycled or bio-plastic clamshell container, for instance, brings in concerns about waste streams and resource use, but also production practices: bio-plastic had "no guarantee it doesn't come from GMO corn or very badly

grown conventional corn" and this tipped Luke's purchasing toward recycled and recyclable plastics. In this negotiation, we can see how even different types of plastic lead to varied valuations and possibilities. Moreover, like many of the examples offered by participants, this was not a final or an uncontested decision. Plastics may be 'the best solution', but only in some situations, for some foods, for now.

This section has considered the ethical valuations of plastics expressed by those involved in alternative food economies. Plastics affected people, eliciting feeling of hate and anxiety as well as provoking changed practices to deal with these matters. Plastics were understood as problematic materials, but refused easy exclusion – they persist within and beyond AFIs, continuing to trouble these markets. These ethical considerations of plastics inform the making of AFIs, revealing ways in which ethics become materialised in situated, practical terms. How multiple valuations and tensions among them are negotiated and experimented with in practice is the subject of the final empirical section, but first it is useful to understand how plastics perform in more logistical, economic ways as market devices.

4. Plastics as market devices: quality and circulation

How foods, microbes, plastics, and so on, participate in markets has much to do with materialities. As Callon (2015: 333) observes, "the characteristics of the goods that are likely to become members of the collective do matter". This is not to say, however, that such characteristics are essential. The industrial production of plastic does enable particular properties to be 'built in', but which capacities materialise relies upon interactions. How plastics and foods relate in particular ways gives rise to decisions about plastics' potential use (or not); however, whether such possibilities become realised in AFIs also depends on distribution practices and places. Çalişkan and Callon (2010) make this point in relation to markets, arguing that it is not only the set of entities but also their dynamic arrangements that support economic activities of constituting, producing, and circulating goods for exchange. What matters, therefore, is not only the capacities of devices, but how they join and change AFI configurations. In considering how plastics perform as part of alternative food economies as market devices, therefore, this section first asks how plastics relate with foods – aiding or inhibiting transformations into quality goods – and then attends to how plastics perform in relation to ordering the distributions undertaken.

4.1. Making quality goods

How foods relate with plastic – each with their own capacities – offers both possibilities and limits for AFIs distributing quality goods in ways that must be acknowledged and negotiated. Differences made by packaging for knowing products as well as for protecting quality were revealed, for instance, during collecting a shipment from the transport depot. Aron, FC warehouse manager, pointed out that in one shipment juicing carrots arrived in bulk plastic bags while first grade carrots came in boxes, and that anti-bruising trays allowed one producer's apples to arrive in excellent condition while another's (without trays) changed from first grade to juicing quality or too bruised to use. The type of packaging, therefore, not only helps identify quality (juicing vs. eating) but mediates it as foods travel from place to place. Concern about ensuring quality goods also connected to transport companies' policies, as Luke indicated: "when producers send in produce they're told by the transport companies it's a requirement that they have to tape it up so it doesn't shift during transport. So that's actually a surprising amount of plastic. It's quite incredible how much is used". Here, consideration for ensuring products travel well combines with outside interests about occupational health and safety such that both quality food and people's bodies depend upon plastics – resulting in 'surprising' and 'incredible' amounts.

Taking care of foods during travel and between exchanges was decisive for these economies, even with their short chains, and in this plastics were crucial. Fragility of things like berries and cherry tomatoes, vulnerability to or need for moisture (especially for grains and greens), potential contamination from things like dirt or leaking meat, and limiting ethylene's influence on ripening between bananas and other products, were each raised as reasons for use of plastics. Darren, a FC producer, indicated concern with quality as motivating his recent switch to packing kale in plastic sleeves:

> We used to just use rubber bands, but they keep better in that [plastic sleeve] – longer. And they pack better in the box and everything. In general, they look better in the box. … Everything's sold by what it looks like so you've got to keep your quality and the looks up.

Plastic sleeves' protection of kale's quality prompted the shift, but it also produced other benefits – logistical (easier packing) and aesthetic (better presentation) – that aided economic viability. Similarly, Kate, an NSOM stallholder, explained how anything less than being wrapped up in a strong barrier would risk the economic and nutritional value of her gluten-free bread; plastic maintained quality (keeping it moist), protected integrity, and assured safety.

Plastic packaging not only serves to maintain quality by protecting select goods, but also helps contain contingencies by adapting well to possible situations. Ben, delivery staff for FC, noted some of the challenges of indetermination as he considered FC's trial of paper rather than plastic box liners:

> If people were dedicated enough to show up at the delivery time and pick up their box – so it's only been there for a short time – it'd [using paper] be no problem. Go home and put it in the fridge. But if your box is delivered at 11 and you don't get there until 4 in the afternoon, I think your lettuce is going to be better off in a plastic liner. Especially in summer.

Here, greens are not intrinsically but contingently better off working with plastics; it depends on weather and on timing – of distributors and customers. The risk of wilting is better mediated by plastic, as is the variability of timing – plastic better assures quality in cool or warm weather. Plastic is more adaptable than paper in these conditions. Similarly, Sam explained:

> Because the apples are chilled – like they come out of the cold room before we come down – with the heat in Brisbane and the humidity down there, they're wet – because all the condensation forms on the apples. You put wet apples into a paper bag and within two seconds the paper bag explodes everywhere. Paper bags and moisture just don't go together.

Again, practices to keep quality (through cooling) combine with weather and products in ways that seem to demand particular materials. Sam has compromised by making customers opt either for heavier paper bags (that come with a verbal caution) or plastic bags (that require no such caution). Of course, customers can skip the stall's bags altogether if they bring their own or don't mind wet apples mixing with other goods, but that is not something Sam feels she can expect.

How do plastics become enrolled in the praxis of AFIs offering quality goods? In the above examples, plastic wrap/tape, trays, bags, and liners serve as market devices that separate, protect, and qualify commodities. They also work to minimise the risk of losing

quality given the messy and contingent channels these quality goods travel in AFIs. In this way, plastics not only facilitate quality but contain anxiety, reassuring those involved that products will arrive in good condition. These relations of plastics and foods draw attention to the multiple and dynamic roles of devices in assuring quality goods and market success.

4.2. Ordering distribution

How devices become part of the arrangements of alternative food economies is the second way in which plastics are considered here as market devices. Ways of ordering and distributing are not neutral. Adopted organisation and returning customers allowed both NSOM stallholders and FC to include options of reuse/reduction that otherwise might not be possible. Boxes, bottles, containers, even bags were accepted for reuse or for recycling, continuing the lives and flows of plastic in these networks in ways other arrangements would not allow. The situation, however, was not always so supportive of such efforts. Amanda explained: "That's the only way I'm going to avoid it [plastics]. So I'd have to have a shop, like a butcher's shop, which, I'm not qualified to do that and I'd definitely go broke. It's the market that's working for me." The place of Amanda's operation, her skills, food safety regulations requiring meats be sealed, and previous success inform the ways in which plastics might (or cannot) join in her operation. Amanda felt it was only if she ran a different kind of operation – if she excluded herself from NSOM – that she could avoid plastics. Amanda gives a clear sense of the value of plastics for her market stall: it could not survive without them.

Responses were not so extreme in most cases but different packing practices held sway everywhere. Several FC staff, for example, indicated that different distribution methods corresponded with varied plastic–food relations. Most of FC's customers order a preset box and an extra item or two, like a litre of milk or a kilo of apples. With distribution of boxes to collective drop-offs it was considered more efficient to combine orders – to pack "by product not by customer" (Kelly). Lorelei, FC's extras manager, explained: "I think a lot of the pre-packing is just to facilitate people being able to come and just easily identify the item and its weight and be able to just take that home easily." In this arrangement, plastics ease packing and transport for customers and FC. Trials of other options – like scales at each drop-off and personalised boxes – have so far failed (in ways other than reducing plastics). With FC's new customised boxes delivered to individual households and with wholesaling, however, this kind of packing becomes less necessary, decreasing FC's reliance upon single-use plastics. In like fashion, Thor, a stallholder at NSOM, described how packing materials and space coconstitute his operation's organisation: "The market stall we have isn't quite large enough just to have everything in sacks, which is what we would ideally have". Instead, he offered goods prepacked into biofilm-lined paper bags, leaving bulk product stored elsewhere in plastic drums (with spouts for easy dispensing). The prepacked bags and spouted drums accommodated the smaller space and Thor's desired range of goods. Reduction of plastics remained a goal in Amanda's, FC's, and Thor's praxis, but it was a goal negotiated with other concerns such as efficient packing, food safety, stall and storage space, benefits of shared drop-offs (limited transport, social interaction), and so forth.

Reselling was part of almost every operation, whether this was part of supplementing a stall's offerings or the primary activity. In some situations, goods to be resold came packaged and, rather than totally repackaging, operations left it that way. Luke provided an example: 'there's milk bottles, so milk comes in plastic. Milk's our biggest selling product, so that's a bit of a bummer'. More flexible and lighter plastic bottles benefit transport for both FC and its milk suppliers, as well as allowing suppliers to use the same packing process and materials for each distribution point. Luke understands these benefits clearly, but still regrets plastic presence. Milk might be provided another way. It might, for example, come in glass and provide discount for returned bottles – as another beverage supplier for FC does. FC has negotiated with producers to alter some of their practices in other cases, and might consider doing so here. Or, though unlikely, FC could expand its infrastructure to receive unpackaged milk, and bottle it onsite before distribution. At this point though, milk comes in plastic bottles and are sold on that way, an arrangement that makes the most sense in the shared situation of FC and its suppliers.

Polystyrene boxes provide another compelling example of negotiating the benefits and costs of plastic inclusion. These boxes were used to keep products cool, to allow ice to travel with goods, to limit weight for efficient transport. Echoing others. Luke said they'd "love to get away from styros", but that "it's an amasingly effective material. … to get rid of that we'd have to change fairly fundamentally what we do". Instead, FC has committed to reusing styros (primarily for extras packing). But this has presented its own challenges. Aron described:

> One of them, the corners are round, the other corners are square. And the lids don't match – some of the lids are a little bit thicker than the others. So, there's three or four different types of lids. And with one of them, you can fit a bottle of milk easily so that the lid just comes on and it closes properly. But not the other ones. [laughs]

On the line, people were careful to make sure the right boxes and lids travelled together, and that they matched with whether milk bottles would be included. Using the 'right' styros also affected transport, as different heights of boxes made loading other deliveries difficult. Polystyrene box forms, bottled milk requirements, and ideals of reuse altered packing protocols and affected changes in FC's distribution.

Plastics clearly intervene and participate in alternative food economies as market devices. They have been shown to facilitate quality goods and to influence modes of ordering. AFIs rely on plastics to facilitate particular arrangements – accommodating particular places, enabling circulation, protecting and containing goods, and so on. However, these performances are complicated by the ethical valuations of plastics discussed in the previous section. Leading to another kind of interaction in which AFIs rearrange themselves to accommodate plastic possibilities, particularly of reuse. The particular arrangements and relations with plastic detailed in this section illustrate what Bennett (2010) calls distributed agency and emergent causality; the alternative food economies here depend upon collective and contingent coming together that depends, in part, on the material capacities and arrangements of plastics performing as market devices. The efforts of alternative food economies to negotiate ethical and practical considerations relating to plastics is the subject of the next section, in which plastic experimentations and persistences are detailed.

5. Experimenting with futures

Recognition of plastics as promising and problematic evokes not only ethical concern, but experimentation as practical response. Experimenting is considered here not in the usual sense of testing a set hypothesis in lab conditions but rather as a more experiential, more everyday practice in which something is tried to see if it works (or not) and then amended for retrial. The attempts to change materials and routines detailed in this section reflect what Marres (2012) calls sustainable living experiments – a form of experimentation with the purpose of bettering society in social and

environmental terms. Examples she offers include individuals making one 'green' change a day and institutions introducing sustainable homes. Similarly, Callon (2009) suggests that (re)making markets as material and ethico-political places is part of 'civilizing markets'. AFIs undertake comparable experiments with plastics. Unlike the ethical markets examined by Callon or the material artefacts detailed by Marres, however, plastics in AFIs feature in ambivalent ways. Becoming, for instance, positively valued for their abilities to assure quality and circulation but negatively valued for their environmental implications. The exclusion – or at least minimising – of plastics this was only one of several concerns expressed by those involved with AFIs, and was not always a simple choice to make or enact. This section details two approaches to such experimentation: minimisation, primarily through reuse but also other practices of distribution, and exclusion, mainly achieved through substitution.

The most common method of minimising plastics articulated was reuse. Reuse did not exclude all plastics; however, it limited the introduction of new plastics for a time. Every operation included reuse in some fashion, demonstrating creative practice and reliance on plastic's durability for such practice. Sam, for instance, explained that their "styros get reused and reused and reused. Until they die. And then they get used for something else. … And then, once they get completely degraded, then they're binned". Reuse of this kind – until object 'death' – was common, at least for those who were not prevented from doing so through particular quality assurance schemes. Wade, FC producer and wholesale buyer, offered another example. Plastic liners, which mediated the drying effects of refrigeration, were produced for single-use but Wade altered his operation for reuse:

> Then they all get shaken out at the end of each use and they get hung up in the back of the cold room, back in the back of the truck. Then they dry out and then we reuse them. So as long as they're clean and we try to look after them, we get multiple uses out of that.

This revised procedure requires more time and effort, but with it liners become reused 4–5 times, something Wade values in environmental and economic terms. Reuse of a device coincident with its intended purpose was most often cited, but as Sam and Wade hint above, things were also repurposed – styros were broken down to serve as packing dividers, rinsed milk bottles stored goods or acted as ice packs for transport, liners covered as well as lined boxes for transport.

As Wade's example suggests, attempting to deal with plastics confronted habits. The difficulties in thinking and enacting new relations was also pointed to by Darren. One of the things he produced for FC is broccoli, which was packed in polystyrene boxes with ice and cooled overnight before being delivered in the morning. When asked why he packed broccoli this way, Darren replied: "That's just what everyone's always done. Just to make the shelf-life longer on the broccoli. Just keep them as cold as possible, pretty much. Stop them from going off." In addition to citing the quality benefits, Darren noted the relevance of habit: it was 'just what everyone's always done'. While Darren was not experimenting with this particular arrangement, he excluded plastics in other ways. He was happy, for instance, to have moved out of mushroom production to other fresh produce in part because it "just cut down on plastic waste" which he "never liked". Smaller alterations within existing operations were also cited as ways to make plastics less present – things like shifting from automatically placing lids on coffee cups to just making them available for customers or hiding plastic bags below counters and providing them only upon request.

The multiple manifestations of plastics within AFIs' practices demonstrate the selective and partial application of ethically-mandated exclusions, and the difficulty of thinking and acting in ways that challenge established effective practices of distribution. A significant rethinking was required of Amanda, who explained that though she cannot avoid plastic, she had experimented with options. One success she shared involved changing sausage quantities: "if they were in half kilo packs, which I used to do, people would buy two. Well, ok, that's just double the packaging and double the processing, and wearing out my equipment. Stupid." Amanda's observations of buyers allowed her to trial, and eventually adopt, kilo packs that help minimise plastic (and effort). Lorelei shared a similar example, describing changes she instituted to the extras line after observations of prepacking. Although it seemed counter-intuitive for limiting plastics, Lorelei expanded the range of bags. She explained: "we'd be packing like 100 g of ginger and all the bags were just way too big. So it got really wasteful." Use of multiple bags for prepacking decreased plastic use, as well as improving aesthetics, saving space, and limiting packing effort. The examples provided by Amanda and Lorelei regarding rethinking quantities and practices show how the challenge of rethinking and redoing plastics in AFIs is not a simple task of elimination, but one that in some instances prompts more creative approaches to minimisation.

Experiments most dedicated to excluding plastics involved replacing materials, with commensurate adjustments in AFI configurations. Paper, glass, and steel were each cited as alternatives that had been tried with varying degrees of success in particular situations. Two of these exclusion experiments were particularly interesting. The first was a relatively straightforward material replacement but required material and skills not always available. FC has tried several ways to package small, delicate fruits like berries without plastic clamshells with little success; however, using cabbage leaves to wrap the berries proved very effective. Several staff mentioned this practice as preferable in ethical, aesthetic, and economic terms. But cabbages of the right size and packers able to manipulate the leaves well and in timely fashion are not often available. This successful experiment can be applied only occasionally and with great care.

The second compelling example of exclusion through material substitution was described by Sarah, NSOM stallholder and FC supplier, who explained:

> One of our commitments is to reuse and recycle our bottles. So anyone at a market can bring back their bottles to us. And we get thousands and thousands of them every week. And so we had to find a way to sterilise them. … we had to create a bottle that was glass. It is one of those things that's imported for us. No one in Australia would make it.

Prompted by ethical commitment to avoid plastics in their production, multiple experiments and replacements have been involved in achieving the glass bottling that Sarah's operation now performs regularly – trialing different glass, bottles, sterilisation set-ups, brewing containers, suppliers, and so on. Experiments in how to maintain the practice of reuse has also resulted in the decision to provide a rebate for returned bottles as incentive and recognition of customers' participation. Each of these experiments draw attention to the complexity and dedication involved in ridding plastics from AFIs. As part of the ongoing effort of AFIs, habits and quantities were questioned, ethical and economic valuations related, and plastics tinkered with, adjusted, and reorganised. This section also illustrates that materials, skills, meanings, and organising co-constitute plastic presence (and absence) in AFIs. Experimentation opens up questions of AFIs forms of ordering and material inclusions, remaking their markets and the implications of them.

5.1. Plastic persistence

It should not be assumed that these experiments were (or are) easy or simple things; they can be difficult, costly, frustrated affairs and there are always trade-offs in getting things to work well. Sarah expressed this sentiment clearly when she said: "It was very hard to start a business without plastics because it's so cheap and easy. It's so cheap and easy to access, and yet philosophically, theoretically, ethically it wasn't our commitment to have that. And so we had to do a lot of workarounds". The economic savings and convenience of plastic were not enough to entice Sarah, but finding ways forward without plastics required a lot of continuing effort.

The economic costs of going plastic-free are uncertain; in some situations, excluding plastics benefits the bottom line but other times it presents economic costs. Wade's comments at different points in our conversation demonstrate this ambiguity. Reflecting on why he had put much effort into omitting plastics, he said: "We try to minimise it both from just an environmental side of things but also just efficiency as well." But later, he gave a contrasting example:

> Our salad and baby spinach, we have that loose in the tub. And the idea of that is people pick up a paper bag provided or bring their own bag and they help themselves. But we worked out if something is in a punnet we'll sell 10 times as much. So it's that compromise.

Wade continued to resist prepacking and consider ways of achieving higher sales, but this conflict was a common concern, with loose-leaf greens especially. The costs of not using plastics become clear here, not just in shaping a commodity for easy exchange, but in how much and how quickly it is sold.

Regulations for food safety also interfered in efforts to exclude plastics. Several NSOM stallholders were required, for example, to use disposable plastic gloves. Even with this regulatory imposition, however, many found methods to limit plastics. Stallholders transformed disposable gloves into reuseables by wearing them on one hand, restricting contamination by receiving funds with their other hand and limiting glove breakage through practice. Such creativity did not rest solely with AFIs. Amanda explained that to sell meat "legally, every product that I take, every meat product that I take has to be sealed." However, she enlists other people to achieve minimisation. She explained using the example of chicken, which come to her already packaged from the farmer/processor. She negotiated to have chicken parts packed with cryo-vac rather than polystyrene trays wrapped with plastic, which she feels is better; however, she thinks it unlikely anything will change regarding whole chickens, which are packed in soft plastic sealed with tape – which often leak, prompting requests for additional plastic bags. To address this, she encouraged customers interested in limiting plastics to adjust their market practices by bringing their own bags or, ideally, "Bring your own esky[1] and just hose it out when you get home. It's really easy!" She added that customers with their own eskies would have the added benefit of keeping the meat cool until stored at home. Food safety regulations and selling at NSOM make plastic a necessary part of Amanda's operation, but the particular manifestations remain undetermined. As this example illustrates, the capacities of each plastic allow for particular performances at NSOM, which become enacted and normalised (or not), through negotiation among multiple humans and nonhumans – in this example, chickens, liquids, car seats, disgust, plastic bags, producer processing choices, safety protocols.

In some circumstances, plastics simply did things for foods other materials could not. Kate, an NSOM stallholder, resells bread and explained that though all her bread (with the exception of the gluten-free) was sold in paper bags, she was "sure that most people would put it into plastic when they get home. So, in a way, it's a false look. It stores better in plastic. You can wrap it in a tea towel, some people do that. But it doesn't last as well". When asked at the market about proper storage Kate mentioned other options but recommended plastic. Plastics may be limited at her stall but their absence presents a tension – though desired for aesthetic and economic reasons, plastic's absence actually threatens the qualities of the primary good. Sarah reiterated the productive role of plastic when she revealed:

> We can't avoid it all. We'd like to. We use glass bottles, but the caps are plastic. … We've tried different kinds of lids and stuff. And plastic is one of those things that is, with a fermented living product [kombucha], that will kind of slightly expand. So, it's an expansion thing. So if it gets overly fermented, it will expand a lot. Whereas something like a stainless steel cap, it will just crack the whole bottle.

Plastic caps perform what other caps cannot: they expand, accommodating kombucha's fermentation and a glass bottle's breakability. This plastic also produces frustration in Sarah as she is unable to achieve a plastic-free operation despite all her efforts. As a persistent material then, plastics achieve functional results and evoke affective responses. Despite the desire to exclude plastics expressed, and the many experiments undertaken to achieve this end, plastics persist. How and why this is the case is significant in understanding how AFIs work and what they achieve.

6. Conclusion

Adopting a device-oriented analysis offers a novel means of understanding and analysing alternative food economies. Building on evolving conversations between agrifood research and science and technology studies, this paper posed the question: what might devices and their relations tell us about agrifood economies? The point has not been to reduce alternative food economies, whether to their environmental ethics, their potential to challenge neoliberalisation, or some other evaluative criteria; instead, by considering a wider array of actors and engagements, this approach multiplies the ways in which we might understand alternative food economies.

AFIs, it turns out, involve much more than food. Like other markets, AFIs collect diverse agents – including devices – in complex and dynamic arrangements. Paying attention to technologies such as plastics as operating in economies draws attention to their roles as market devices and ethical materials, the coincidence and tension among these roles, and the situated practices of re/making markets with differentially valued materials. Considerations of plastics influenced and disrupted the operation of AFIs. They challenged how things were arranged, what was expected, and they insisted upon response. What could be achieved without plastics? With fewer plastics? What could not be done without them? And, beyond the material itself, what practices needed to alter? How should ambivalent valuations become accommodated?

In her examination of plastic bottles, Hawkins (2012: 72) argues that "while the market enactment of the package is to frame and facilitate the delivery of the product its imminent afterlife as waste has to be vigorously suppressed". However, as revealed, AFIs negotiate tensions between plastics' benefits in distribution and their problems of resource extraction and disposal. The pre- and after-lives of plastics are not so much suppressed as folded in, as a constant (if not primary) matter of concern. Plastic's absence (or at least minimisation) was valued as part of 'good food'. And yet, this

[1] 'Esky' commonly refers to a portable cooler.

good food often needed to be wrapped up, contained, protected, and distributed with plastics. Plastics were intimately attached to definitions and distributions. This makes plastics a key, if negotiated and experimented with, part of the processes, spaces, and praxis of alternative food provisioning.

Drawing attention to particular relations with devices has shown how materials other than foods are fundamental to agrifood economies. In this case, plastics have been demonstrated to operate in transforming foods into commodities – for instance by separating them into saleable units, managing hygiene concerns, or making it 'easy' and 'convenient' to select through self-service. They also facilitate circulation and distribution; as storing, transporting, protective devices plastics move and keep goods, enabling exchange. Polystyrene boxes, plastic bottles, ice packs, liners, among other manifestations, engage in co-constituting AFIs. We have seen how plastics help enact distributions of single goods – coffee being consumed as you wander through the market – and of collectives – a box of produce and extras delivered to the community hub. Plastics, it turns out, provide not only packaging but a kind of dynamic infrastructure for alternative food economies.

In experimentations with devices, new entities join and/or raise new concerns – bio-plastics potentially using genetically modified crops as source material provided one example. Particular devices lives are extended to achieve minimisation, as in the reuse of polystyrene boxes. Other attempts target exclusion, such as the trials to replace plastic liners with paper or prohibitions of single-use plastics. Consumers can become enrolled in new ways – bring your esky, please! – while suppliers may be limited in their options – no styrofoam trays allowed. In addition to accessibility restricting options, these different materialities alter ongoing arrangements.

Moreover, attention to ongoing experimentation highlights objects, functions, practices, and settings that once may have escaped attention. Polystyrene boxes as light and temperature controlling but sometimes quirky transporting devices; recirculations of plastics that never make it into consumers' sights; expanding plastic caps that save glass bottles from fermenting liquids; modifications of packaging quantities to suit consumer need as well as environmental ethics; and so on. These experiments show ongoing negotiations with a troubling material, revealing habits, material capacities, relations of multiple valuations, and creative responses. In this way, experimentation can be understood as a process of figuring out what devices can be done without, what other materials can do, how configurations can be adjusted, and whether such moves are worth it.

Attending to such everyday experimentation also yields insight into how new practices and understandings emerge; however, it also suggests that sometimes devices evade attempts at exclusion. Sometimes plastics are just too useful, too cheap or profitable, too convenient, too pervasive to avoid – at least for the time being. Whether new relations emerge or old ones persist, this examination points to ways in which devices affect other market actors – changing practices and modes of thinking.

The experimenting to inhibit plastics also attaches to overall aims to remake agrifood by "retuning our bodies, practice, and knowledges" to open possibilities and make mainstream agrifood less acceptable (Carolan, 2015: 137). As has been shown, devices may enable but also trouble this pursuit. By continually experimenting with ways to reorder themselves to challenge plastics' persistences, AFIs point to futures in which plastics may not associate quite so often or so closely with our foods. Taking a device-oriented approach here has provided insights into the practical, ethical, and experimental engagements involved in making markets, and agrifood futures.

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