The Social Life of British Organic Biodynamic Wheat: Biopolitics, Biopower & Governance

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Abstract

This thesis unpacks the social life of an alternative food "thing". It is empirically grounded in an intensive ethnography and draws on the conceptual resources of Actor-Network Theory (ANT) to narrate alterity as it is manifest in an alternative food network (AFN). Following and tracing British Organic Biodynamic (BOB) wheat, the research weaves through the seed (from breeding to certification), the grain crop's cultivation, harvest and milling, and the final transformations from flour to real bread and its consumption. The storying of the BOB wheat's social life, its social relations and subsequent transformations reveals a persistent blurring of formal distinctions separating 'nature' and 'culture', humans and nonhumans, and production and consumption. Most importantly, it disrupts the traditional categorization of food networks as either 'conventional' or 'alternative'. The analysis of the BOB wheat's social life betrays the imagined purity of alterity of this supposed alternative food network, unveiling a heterogeneous web of hybrid actants and multiple performances of wheats. The analysis reveals a conflict within the BOB wheat network, by demonstrating how performances that are presented as deeply incommensurable are nevertheless inextricably and intimately connected. Consequently, 'conventional', and some 'more-than-conventional', performances threaten to undermine the BOB wheat networks' legitimacy as an AFN. Further, they intimate an ontological impurity that threatens the very possibility of alterity. Accordingly, my analysis narrates the BOB wheat network's efforts to stabilize alterity and expand the collective, through the purification of these incommensurable versions of the wheat. Ultimately, this process of purification works to persistently reconstitute modern ontological binaries, specifically the alternative-convention bifurcations of food networks. To conclude I suggest that this purification, the making and manifesting of alterity, is woven through the contemporary biopolitical dispositive - persistently circulating and remaking, Modern ontological framings of reality as well as the moral and ethical values therein.

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An Introduction to the Field

'I spend my life here, in this never-ending flow of passengers, communications, conveyors, messengers, announcers and agents, because my work is at this intersecting point of a multitude of networks all connected to the universe...'

(Serres, 1993, p. 9)

Wheat bread has been at the heart of human social and biological life for thousands of years. It is a salient feature of everyday life and deeply symbolic, simultaneously natural, social, cultural, political and economic, its form changing across time and space (Burnett & Ray, 2012). Moreover, it enacts changes with the cultivation and transformation of wheat grain being thought to underpin the development of civilization from the earliest days of empire to contemporary urbanized life (Laudan, 2014; 2013). The staff of life, expressive of 'broad ideas about culture, society, and national identity' (Trentmann, 2008, p. 88), has historically been a central figure in socio-cultural, economic and political life (the French Revolution, British Free Trade and most recently the Egypt Revolution). In contemporary Britain 'real' bread is very much *en vogue*, a fundamental agent in a multitude of 'alternative' food movements such as Slow Food and the Real Bread Campaign (Griggs, 2014). The North West's adoration with 'real' bread is apparent across the region reflected in the rise of micro-bakeries. Manchester's urbanites can find 'real'

bread across the city in small independent bakeries the likes of Levenshulme's Troves, Chorlton's Barbakan, hipster cafes and restaurants such as Fig & Sparrow, Teacup, Bakerie and Wood as well as in the organic cooperatives and the emerging 'local producers' markets.

In recent years there has been an increasing presence of 'local', 'traditionally stoneground' and organic flours for home baking, alongside classes and campaigns for real bread as well as artisanal bakeries and breads (Mesure, 2013; Goldhill, 2014; Pigott, 2015). Whilst, since 2013 there has been a dramatic decline in UK sales of conventional supermarket sliced bread (Daneshkhu, 2013; Bamford, 2015; Heighton, 2016; Fletcher, 2016). The rising trend towards 'real' bread dovetails an apparent increase in the popularity of home baking or at the very least the idea of it, *The Great British Bake Off* being one of the most watched British TV programmes of 2015 (Colan, 2015; Plunkett, 2015). Most interestingly, the production and consumption of these traditional flours and (often home baked) 'real' bread is almost ubiquitously equated with both alterity and notions of 'quality' (Sage, 2003; Renting, et al., 2003; Murdoch, et al., 2000; Wiskerke, 2003; Maye & Kirwan, 2010). This close alignment of alterity, oppositional socio-political movements, together with the socio-material construction of quality in terms of food things 'purity' and 'wholesomeness' inspired this study.

This thesis is the story of British Organic Biodynamic (BOB) wheat, which is traditionally stone ground into flour before being transformed into 'real' bread and consumed. It is a story of a self-defined alternative food network (AFN). One that sets alive whilst blurring the duality of food networks and the purity of alterity. Originally conceptualized as a critical sociological exploration, the research sought to question the alterity of supposed alternative producers-consumers and food things. Central was the assumption that alterity in food production-consumption networks equates to anti-capitalist values, 'green' practices and politics (Goodman, et al., 2012) and 'quality' produce. But perhaps more importantly, the deep bifurcation of food networks and the concomitant moralizing and ethical discourses. Those narrating a strong demarcation between 'conventional' and 'alternative', 'industrial' and 'natural', 'standard' and 'quality', the morally virtuous and the apathetic or irresponsible.

However, this critical stance should not be taken to mean a lack of sympathy for the apparently explicit objectives of such networks, as oppositional to pernicious, avaricious and exploitative food production-consumption. Certainly, I have long been interested in environmental politics, food and health. Prior to the research I made conscious efforts to

conserve natural resources, to avoid unnecessary emissions and general waste in my domestic routines, I recycled, never dropped litter and read the Guardian. More importantly though, I sort to consume, where possible, 'wholesome' organic foods and thus I was entirely empathetic with 'alternative' food movements. However, as a critical sociologist I was concerned that, that which we were presented, the virtuosity of the AFN, was the entire truth of the matter. To some extent, then, the research emerges from a desire to 'play devil's advocate', as opposed to unveiling AFNs as fakes or charlatans. The objective has been to seek their true essence and true value without the façade that is required to carry such weighty moral and ethical values.

The principal objective of the research was (and remained to be) to develop social science understandings of the constituent elements of AFNs and their assemblages. As well as key processes of (re)construction, that was, to explore the complex interconnections of so-called alternative food production-consumption. Grounded in a ten month ethnography of the BOB wheat that traced the wheat through the (re)production of the seed, the cultivation, harvest and milling of the grain before its transformation and consumption as 'real' bread. The study and story that follows sit firmly in contemporary agri-food studies, specifically the AFN literature. Specifically as the research took seriously the drive towards relational-materiality in the AFN literature (Lockie & Kitto, 2000; Goodman, 2002) and more broadly the challenge to the asymmetrical approach of traditional agri-studies that Actor-Network Theory (ANT) empirically and conceptually offers. However, before delving any further, it is important for the sake of clarity and context, at this juncture to attend to the key concepts the weave in and around this study, those being the notion of alterity and related concepts of organic, local and, of course Biodynamic agriculture.

Alterity

The idea of 'alternative' food production-consumption is normative in the UK, the conventional-alternative dichotomy is a defining characteristic of British food production-consumption networks. The notion of alterity is ubiquitous in food and in everyday encounters of food and food networks, discussed across food studies, the media but in particular in popular discourses concerned with environmentalism, various politics and health. The whole study presented here sets out from the idea of the alternative, the AFN, the key objective being to critically explore the supposed alterity of such networks. Certainly, what 'alternative' means when applied to food production-consumption and what constitutes an AFN is conceptualised similarly both normatively and academically.

Indeed, all forms of production-consumption regarded as un/non-conventional fall under this rubric of 'alternative': Farmers Markets, Box Delivery Schemes, Community Supported Agriculture, Fair Trade, as well as Organic, Traditional and Artisanal production/cultivation (Goodman, et al., 2012). Primarily, alterity is ascribed to production-consumption that adheres to organic methods of cultivation and/or the particular spatial distributions of production and acquisition (Hinrichs, 2000). A close second to organic cultivation and proximity would be the socially just and non-corporate character of the production/producer. Yet, any newly emerging network that hints towards a shift away from conventional, industrial, agri-business food production-consumption is, somewhat contentiously (Sonnino & Marsden, 2006) defined (by themselves and/others) as 'alternative'. Accordingly, AFNs have become a particularly broad, diverse, dynamic, and indeed contested embracing 'newly emerging networks of producers, consumers, and other actors that embody alternatives to the more standardised industrial mode of food supply' (Renting, et al., 2003; Murdoch, et al., 2000).

Importantly, so-called AFNs are variously and loosely associated with notions of 'quality' (artisan, traditional, slow, natural, whole) (Murdoch, et al., 2000) and 'transparency' (ethical, traceable, clean) (Sonnino & Marsden, 2006, p. 181). Aligning the food things, the producers and consumers with a web of moral and ethical discourses organised around health, the environment and social justice. Moreover, these production-consumption assemblages are invariably assumed to be a form of prefigurative politics, or granted the character of a socio-political movement (Goodman, et al., 2012; Foden, 2012). Alterity is then made inseparable from the politicisation connoting opposition and activism, with 'oppositional and alternative' being constructed as indicative of a cultural struggle in the spaces of everyday life against hegemony (Allen, et al., 2003; Winter, 2004; Sassatelli & Davolio, 2010). Subsequently, AFNs are understood as seeking to manifest alternatives to the construction and reproduction of the hegemony of supposed conventional food production-consumption (Kirwan, 2004). Resulting in the notion of alterity grounding these networks in particular moral and ethical value frameworks, centred around just social relations and equality, sustainability and ecology as well as animal welfare (Guthman, 2002; 2014; Buller & Roe, 2014).

However, there are numerous critiques that may be levelled at the notion of an alternative food network, as will be discussed in the following chapter and articulated across the thesis. As Keen (1993) suggests, whilst such networks may offer a valuable alternative to the 'monoculture market economy' (p. 196) they are not a challenge to the fundamental

commodification of food. Yet, Goodman et al (2012) 'do not see alternative food and fair trade movements as 'oppositional' in the sense that their aim is mass mobilisation to seize the state or overthrow the hegemonic capitalist system' (p. 4). Suggesting that their alterity comes from the development of new ways of doing things that coexist with this powerful system, and attempt to change it from within. While others suggest that AFNs and the 'turn towards local eating is embedded in and reinforcing' Neoliberal forms of governance (Blue, 2010; Guthman, 2008). With such claims it is important to scrutinise the notion of alterity, the claims to alterity and the allied social (and economic) values. But perhaps more vital is the need to explore to what extent alterity has power, certainly it seems that what is most problematic here is that the notion of alternative as forming one part of a binary, a product of modern logic and thereby potentially a means by which to manipulate, enrol and control others.

The nature of the notion of alterity in food networks has meant both utilising its normative use and then working to unpack the term, the relations and process that lie within. In order to explore alterity it was necessary to start with food networks self-characterised, or normatively conceptualised, as alternative (and suspending my disbelief regarding the depth of truth regarding the statement). Initially, then the concept is broad and accepting, moreover it was given over to the actors, potential participants. However, throughout the fieldwork the notion of alterity presents itself as a recursive actor. An actor functioning as an identifying marker contributing to the semiotic (re)construction and expansion of the network. Whilst the BOB wheat network contributes to the perpetuation of the validity of the notion of alterity in food networks. Alterity itself, the semiotics of alterity, then are key actants within these food production-consumption networks (as a sign it shapes and acts on other entities within the network). In the latter the notion of alterity is broken down, picked a part and examined in terms of its persistent (re)construction, and yet it is also grounded. Grounded so as the degree to which BOB wheat, or any AFN more broadly, forms a true alternative to conventional, industrial food production-consumption may be assessed.

Alterity in food networks has broad application, the AFN as already mentioned is a readily applied to any hint of 'non conventionalism', but specifically in the case of local and organic. Not merely captured under the rubric of 'alternative' but recursively constituting it, the local and organic food networks dominate the 'alternative' foodscape. Organic cultivation and 're -localisation' are often perceived as concomitant phenomena explicitly

challenging globalised industrial, that is to say 'conventional', food production-consumption systems (Seyfang, 2006; Reed, 2001). As such this

Local

The notion of the 'local' is salient across AFNs, both out there and in academia, and is ubiquitously framed as the antidote to the global as well as resolution to other various social injustices (Weatherell, et al., 2003). It is contended that (re-)localised food production-consumption is a manifestation of 'oppositional and alternative desires' and affords the 'opportunity for directly personal relationships between producers and consumers' (Allen, et al., 2003, p. 63; Hinrichs, 2000; Murdoch & Miele, 1999). Significantly, the notion of the local and processes of re-localisation are deeply rooted in the concept of embeddedness (Murdoch, et al., 2000; Ilbery, et al., 2006), subsequently bifurcating food networks into either dis-embedded or embedded. The dis-embedded being the 'placeless foodscape' (Ilbery & Kneafsey, 2000, p. 319) of the globalized assemblages of the UK and the USA. Whilst embedded (localized) food networks are presented as being firmly rooted in a particular place, characteristically conceptualised as European, but specifically French or Italian (Miele & Murdoch, 2002).

The notion of the local, then, has inherent spatial characteristics which are projected as a fundamental aspect of alterity. Yet, the conceptualisation of the local and localism are broadly ill-defined in food studies, often relying on normative understandings as oppose to attempting to define and critique (Weatherell, et al., 2003). This is an important weakness as there is a distinction to be made between localised and short food supply chains. Whilst local demands a geographical boundary limitation, short food chains may be national or even international food production-consumption networks (Ilbery & Maye, 2005; Tregear, 2011). Moreover, the socio-cultural construction of the local is something more than geographical space (Hinrichs, 2003). Undoubtedly, socially embedded food things are often characterised as local in spite of less/more than local production-consumption trajectories. Furthermore, whilst studies indicate that consumers in the UK understand 'local' as being that within a 30 mile radius or of the same county, localisation is most commonly conceptualised as being about consuming the food things as close to point of origin as possible (Seyfang, 2006, p. 386).

Most importantly, the central idea is that local food equals local freedom (Allen, et al., 2003). Thereby delineating the alterity of the local as being primarily established on close, proximal, spatial relations, as opposed to the distal global capitalist food networks. However, as Murdoch et al., (2000) contend, conventional 'food chains are not dis-

embedded...for they are still rooted – partly by the resilience of nature – in local and regional contexts' (p. 110). Thus the abstraction of globalised networks, framing them as dis-embedded, here is presented as a discursive construction. Certainly, all food networks are always embedded in local and regional contexts, intractable from this 'we should expect to find diverse sets of social relations and cultural practices, lending further variation' to the agri-food sector (*ibid*). Yet, this abstraction demonstrates the symbolic value of the 'local' or 'embedded' food network.

The symbolic weight of articulating a food network, or food thing as local, deems the concept worthy of critical exploration. What is local? How do we define local? How do we ground the concept to assess whether a food network, or thing, is actually local and not merely a commodification? The need to critically assess the 'localness' of food production-consumption networks and define in relatively certain terms the notion of the 'local' is taken seriously here. However, the interrogation of the local is not the concern of the thesis, it is allied to many of the points made and was key in the initial approach, specifically in defining and identifying appropriate food things to follow/trace. As such the concept of the local was grounded by delimiting it to (UK) county boundaries, with food production-consumption networks defining their localness against that. More important in the research, was that the term 'local', and organic, in food production-consumption has in recent years become a powerful semiotic tool, tapping into various ethical and moral discourses (Hinrichs, 2003; Larssæther, 2011). The apparent localness of food networks is a concept repeatedly associated with ideas of reciprocal and trusting relationships (Hinrichs, 2000, p. 296; Winter, 2003; Sage, 2003) as well as authentic and quality food produce (Murdoch, 2001; Holloway & Kneafsey, 2000).

Organic

In recent years organic food production-consumption has developed from a niche market into a mainstream global commodity network (Guthman, 2014; Raynolds, 2004). Organic cultivation is presented to the world as that which 'does not use artificial chemical fertilisers and pesticides' and in terms of animals, 'reared in more natural conditions, without the routine use of drugs, antibiotics and wormers common in intensive livestock farming' (Seyfang, 2006, p. 384). However, being organic is not simply a matter of organic cultivation/production. To be 'Organic', food production systems wherein food commodities egress must be certified as organic, merely claiming organic agricultural practices is not sufficient. Within the UK there are nine Government approved organic 'control bodies' (Department for Envrionment, Food and Rural Affairs, 2015), including

Demeter (Biodynamic certification body) and The Soil Association. In addition, presiding over the UK certification schemes stands the European Commission's organic certification, setting intra-national standards for organic produces across member states of the European Union. Most prominent of these in the UK is The Soil Association, which defines organic as meaning 'higher levels of animal welfare, lower levels of pesticides, no manufactured herbicides or artificial fertilisers and more environmentally sustainable management of the land and natural environment' (Soil Association, 2016).

Within this study food networks, and food things, are recognised as Organic if they are certified by a recognised body as such. This is not an endorsement of the governmental and administrative system being implemented. Furthermore, whilst it is recognised that by adhering to such formalisation, potentially numerous alternative food networks, perhaps truer alternatives, may be marginalised. It should be born in mind that the organic movement 'must appear to most shoppers as something new' (Conrad, 2001, p. 15) and yet, organic cultivation it may be argued was the norm prior to the industrialisation, mechanisation and rationalisation of farming practices (Griggs, 1966/2009). Subsequently, the organic movement could only emerge as such 'once an alternative to them existed' (Conrad, 2001, p. 17). However, it is important to explore that which is recognised as, and thereby legitimately, organic and thus as an 'alternative'.

Biodynamic Agriculture

Now whilst organic foods and the methods of their cultivation are well understood in the UK, Biodynamic agriculture is little known of and even less understood (despite Demeter being a recognised organic certifying body). Biodynamic cultivation, often referred to as *organic plus*, is described as 'a holistic, ecological and ethical approach to farming, gardening, food and nutrition' (Biodynamics, 2016). Yet, the Biodynamic farm is not merely an ethical or moral project, nor is it simply a system of agriculture that goes beyond the standards set by organic accreditations. These agricultural knowledge-practices are deeply embedded in the discrete belief system (cosmology and spiritual philosophy) of Anthroposophy (Anthroposophical Society, 2016).

Anthroposophy is a deeply humanist spiritual philosophy which proposes a spiritual understanding of the world. Most importantly, in the context of the research, agricultural practices are encompassed in this spiritual understanding as seen as a striving 'to work in cooperation with the subtle influences of the wider cosmos on soil, plant and animal health' (Biodynamics, 2016). Specifically, Biodynamic farming practices are the result of, and remain organised today by, two major works Rudolf Steiner's Anthroposophy Agricultural

Lectures (Steiner, 1924/2007) and Maria Thun's Biodynamic Calendar (Thun, 2013). Steiner's lectures outline an entire cosmology, including specific rituals performed to draw the vital energies of the cosmos into the earth's soil, vitalising seeds and the plants that spring forth. These rituals are concerned with the provisioning of eight 'preparations' and their application to the land and plant life. 'Preparations' that work to counteract the 'steadily declining forces of the earth', restoring and harmonizing the vital life forces of the farm as well as enhancing the nutrition, quality and flavour of the food being raised. Whilst, on a more encompassing level, Biodynamic farmers strive to create a diversified, balanced farm ecosystem that generates health and fertility as much as possible from within the farm itself (Biodynamics, 2016; Osthaus, 2004/2010).

Steiner's cosmology and inventory of rituals is made intelligible by Thun's Biodynamic calendar (a lunar calendar designating appropriate times to sow, tender, treat, harvest as well as prepare and perform the rituals so as to best harness the energies of the universe). However, it is the intent in cultivation practices that is articulated as being of the up most importance. As such it is more than merely 'natural' cultivation, it is about cultivating good energies, imbuing that which is cultivated and consumed with higher qualities. Significantly, (particularly as it was Julie Guthman that stated this) 'although Biodynamic farming is ridiculed for being over mystical with its attention to 'teas' and 'brews'… growers working with Demeter farm(ed) the most closely to the agro-ecological ideal' (Guthman, 2014, p. 170). Importantly, Biodynamic agriculture is not exempt from formalisation and is governed by the certifying body of Demeter. Most certainly, the Biodynamic farms and the Watermill underwent Demeter inspections during in the course of the fieldwork.

To Come: The Social Life of British Organic Biodynamic Wheat

What is presented here then is a tracing of the BOB wheat's social life and a story that reveals a persistent blurring of formal distinctions separating 'nature' and 'culture', humans and nonhumans, production and consumption as well as the traditional categorization of food networks as either 'conventional' or 'alternative'. More than that, we discover a heterogeneous web of hybrid actants and multiple related, dependent performances of wheats. Yet, the following exposes an immediate conflict within the BOB wheat network, as some of these performances threaten to undermine the 'alternative' identity of the network. Not only because these performances are 'conventional', some are 'more than conventional', but because others manifest an ontological impurity. Subsequently, this unveiling throws the BOB wheat network's efforts to purify these

incommensurable versions into sharp relief. The analysis reveals a conflict within the BOB wheat network, by demonstrating how performances that are presented as deeply incommensurable are nevertheless inextricably and intimately connected. Consequently, 'conventional', and some 'more-than-conventional', performances threaten to undermine the BOB wheat networks' legitimacy as an AFN. Further, they intimate an ontological impurity that threatens the very possibility of alterity. The analysis narrates the BOB wheat network's efforts to stabilize alterity and expand the collective, through the purification of these incommensurable versions of the wheat. Ultimately, it is contended that this process of purification works to persistently reconstitute modern ontological binaries, specifically the alternative-convention bifurcations of food networks. Finally this storying concludes, that this purification, the making and manifesting of alterity, is woven through the contemporary biopolitical dispositive - persistently circulating and remaking, Modern ontological framings of reality as well as the moral and ethical values therein.

Before setting out on the narration of the fieldwork and the social life of BOB wheat in Chapter 3 the first chapter works to situate the research in the academic field. Moving through from the broader agri-food studies to discussions of more specific works concerned with AFNs, biopolitics and the application of ANT, the central ideas and debates of the field are narrated. Demonstrating how contemporary food studies are limited in the binary approach to food production-consumption, and how in order to understand 'alternative' food production-consumption more deeply there is a need to move beyond this modern approach. Furthermore, how relational approaches are potential means by which to overcome the limitations of current studies and provide windows on the flows and constructions (of power) there in.

Chapter 2 unpacks the logic underpinning the ethnographic following-tracing of the BOB wheat before moving on to storying the research design, recruitment and the reality of the fieldwork and its trajectory. The ethnographic descriptions of Chapters 3, 4, 5 & 6 then draw on the multi-sited ethnography and explore the 'hazy relations between commodity producers, consumers, and those in between' (Cook et al., 2006) that constitute the social life of BOB wheat. These narratives are interrupted with analytical reflection through an ANT lens tracing (BOB) wheat. Working to translate the circulations of BOB wheat through the seed (from breeding to certification), the grain crop's cultivation, harvest and milling, and the final transformations from flour to real bread and its consumption. These refractions reveal an 'actor-network story' that speaks of heterogeneous networks wherein actants 'of all kinds, social, technical and natural are made and play out their lives' (Law,

1997, p. 3). Sketching out the ‘big picture’ of the BOB wheat network these ethnographic writings and analytical refractions provide the foundations for the analysis of the final three chapters.

In the narration of the social life of the BOB wheat a multiplicity of wheats emerges, and it is this that is the topic of Chapter 7. Here, it is shown how various socio-material practices and settings enact multiple wheats, whilst working to demonstrate the connectedness and continuity across these performances. Furthermore, how these how these enactments spring from one another and as such these translations underpin the BOB wheats’ trajectory. Yet, enactments are simultaneously made utterly incommensurable, and here in lies the crux of the problem, on account of the BOB wheat network’s construction of its own alterity. Accordingly, Chapter 8 turns to explore the manifestation of both this incommensurability and its subsequent purification, that is, how alterity is made to be. Furthermore, how these conflictual forms are made entirely absent, deleted from the BOB wheat network, as an alternative food network and social world. Having highlighted the fractures and incoherence in the various performances of BOB wheat in here next we explore how these discordant versions of wheat are punctualized, veiled through simplifications and centering’s. That is the means and ways that the connectivity, across these versions and social worlds, are purified. Purified in an effort to maintain their truths, their social world, and thereby stabilize the network and its alterity. Finally concluding, that this purification, the making and manifesting of alterity, is woven through the contemporary biopolitical dispositive persistently circulating and remaking, Modern ontological framings of reality as well as the moral and ethical values therein.

Chapter 1: Situating the Study of the Social Life of BOB Wheat

Introduction

The social life of BOB wheat is situated within a broad sociological framework, drawing inspiration from food studies and consumption literatures in addition to contemporary social theories of biopolitics, biopower and governance (as pertaining to food and eating, health and nutrition as well as environmental degradation and climate change). The overarching aim of the research from the outset was to explore alterity in food networks and investigate the complex interconnections of so-called alternative food production-consumption. Subsequently, the research and narrative that follows finds itself firmly situated in agri-food studies broadly, and the work on AFNs to be more specific. Moreover, in aiming to explore production-consumption in all its breadth and complexity, the research has drawn heavily on multi-sited ethnographic followings and tracings as well as the symmetry of the ANT approach.

The aim of this chapter is to locate the research in terms of agri-food studies and the existing AFN cannon. The literature review that follows works to both narrate the central ideas and debates, demonstrating how traditional agri-food studies are limited by the binary nature of their approach and an orientation towards production (Goodman, 1999; Goodman & DuPuis, 2002). Moreover, how these approaches work to (re)produce modern distinctions, of nature/culture, structure/agency, conventional/alternative, production/consumption, that serve to limit their capacity to attend to holistic understandings of production-consumption. Furthermore, how the defetishization thesis (Gunderson, 2014), that cuts through both agri-food studies and AFN literatures, serves to map a prefigurative politics on to AFNs (Fonte, 2013; Mair, et al., 2008). Yet, few agri-food and AFN studies attend to biopolitics, the contemporary dispositif (Mayes, 2016), despite their persistent talk through it as well as around it.

There are however, keen challenges to these traditional approaches and their ingrained fissures, literatures that attempt to integrate production-consumption more extensively (Lockie, 2002; Raynolds, 2002; Guthman, 2002; Miele & Pinducciu, 2001). Central to which is the application of ANT, of a flat relational ontological approach, to food production-consumption (Whatmore & Thorne, 1997; Marsden, 1997; Marsden, et al., 1999). The application of ANT is contested in the literature, perceived as depoliticizing as ANT, it is argued, fails to deal with power, politics and ideology (Fine, 2004; Murdoch, 2001; Whittle & Spicer, 2008). Bringing us to a key issue, how to attend to production-consumption in its breadth whilst speaking to issues of power and politics. Subsequently,

it is suggested that, in order to account for the complex interconnections traversing alternative production-consumption, a relational approach is imperative. Moreover, that ANT is best placed to draw out the entities, relations and processes (re)producing food production-consumption networks. But more than that, it is suggested here that ANT, as a lens through which we may understand the construction of the social world, affords the opportunity to understand the processes and performances of (bio)politics, (bio)power and governance.

The Broader Context: Agri-Food and AFN Studies

Contemporary agri-food and AFN studies are rooted in the rural studies, emerging in the nineteenth century seeking to address the 'agrarian question' (Buck, et al., 1997) and develop understandings of modern agrarian structures (Griffin, 1979; Buttle & Goodman, 1989). Fundamentally, the objective was to establish a theoretical picture of how capitalist agriculture was advancing, or being resisted, across the globe (Jussaume & Kondoh, 2008; Vandergeest, 1988). These formative studies have left a deep legacy, an economic/cultural fissure (Whatmore, 2002) shaping contemporary agri-food studies. Subsequently, agri-food studies have been characterised by a 'division of labour' (Tovey, 1997), with a concern to address either the macro political economic or the micro socio-cultural. The first focusing on production and the critical examination of the macro processes of globalisation, industrialisation and standardisation (Hart, 1997; Boyd & Watts, 1997). Specifically, concerned to highlight issues of power, politics as well as patterns of capital accumulation (Goodman, et al., 1987; Murdoch, et al., 2000; Dixon, 2003). Often concluding that technological industrial innovation is driven by a desire to 'outflank nature' (Murdoch, et al., 2000, p. 109) in the name of capital gain. The second, focuses on the exploration of the socio-cultural aspects of food and its consumption (Murcott, 1982; Mennell, et al., 1992; Douglas & Gross, 1981; Beardsworth & Keil, 1997; De Certeau & Giard, 2008). Working to analyse the social relationships, semiotics and symbolism as well as practices, knowledges and discourses therein (Mol, 2012; Warde, 1994; 2005; Rousseau, 2013).

This fundamental division between the economic and the cultural has worked to simultaneously reproduce ideas of distinctions between nature and the social, as well as dichotomise production and consumption (Murdoch & Miele, 1999). Consequently, food studies have alternately focused on either, production and economics to the omission of

consumption and socio-cultural factors, or vice versa[1]. However, contemporary agri-food studies are witness to attempts towards a more holistic and engaged approach to the explication of food production-consumption (Holloway, et al., 2007; Goodman & DuPuis, 2002).

Agri-Food Studies

The agri-food studies literature is dominated by approaches that work towards an integrated approach to production-consumption whilst simultaneously concerned to explore flows of power and politics, to unveil global hegemonic relations (Maye & Kirwan, 2010). Much of this literature until recently focused on the relationships between processes of globalization and the mass production of standardized, uniform commodities for global markets (McMichael, 2004). However, most relevant to the study at hand are those concerned with mapping the production-consumption of specific commodities: Commodity Chain Analysis, Commodity Systems Analysis and Systems of Provision.

The Commodity Chain Analysis (CCA) and Commodity Systems Analysis (CSA) approaches are closely aligned, working across global food systems to reveal the exploitative social relationships underpinning the production of particular commodities. Yet, they are distinct, with CCA studies seeking to expose the exploitative relations of food production mystified through a process of commodity fetishism (Dougherty, 2008; Barrett, et al., 2004; Hartwick, 1998; Cook et al, 2004). In doing so, CCA seeks to emphasis 'the interaction(s) and power relations between actors at different levels' (Buck, et al., 1997, p. 5) as well as attempting to delineate how one sphere of activity affects another. The objective being first to demystify notions of a 'world market', and second to critique universalising, homogenising discourses of globalisation (Raynolds, 2004) and conventionalisation (Buck, et al., 1997; Guthman, 1998).

Whilst CSA studies work to critically examine the dynamics of change in agriculture and the food industry internationally. Setting out from either an 'empirical or social problem' (Friedland, 2001, p. 84; Friedmann, 1993) CSA studies work to demonstrate how global interrelations and political economic changes have produced the issue at hand (Friedmann & McMichael, 1989; Friedmann, 1990; 1982; Friedland, 1984). Importantly, both approaches serve to explicate issues of exploitation, power, politics and hegemony imbued in, and orchestrated through, food systems. Moreover, both demonstrate some of the complexities of the social world, social relations and food networks and have contributed

[1]Goodman and Redclift's (1991) study of the modern food system is, as Tovey (1997) highlights, a notable exception, as it attempted to make account of producers, consumers, technologies and transformations from field to fork.

‘empirical depths to debates about agricultural transformation’ as well as having extended analysis ‘beyond the farm gate’ (Lockie & Kitto, 2000, p. 4).

Yet, these studies rarely attend to the ‘totality of the chain’ (Friedland, 2003, p. 15). Indeed, both CCA and CSA studies remain characterised by ‘vertical’ production orientated gaze as a consequence of the focus on ‘governance structures’ (Raynolds, 2004, p. 726). Furthermore, there is little consideration of individuals’ symbolic constructions of commodities, the social practices in which commodities are fundamental, nor the meaning of commodities in the reproduction of self and relationships. Within the CSA studies commodities are utilised as vehicles through which the problems of structures and governance are narrated. Now, whilst this is not a problem per se, such an approach results in the commodities themselves being omitted from the analysis, together with their meanings as they ‘are inscribed in their forms, their uses, their trajectories' (Appadurai, 1986, p. 5).

Subsequently, the objective of CCA and CSA studies to unveil global hegemonic relations, to defetishize food production-consumption systems (Dixon, 2003; 2002), drives such studies towards Political Economy (PE). With PE comes an orientation towards production at the omission of understandings regarding the consumer/consumption and their interconnectivity. Responsive to the oversight of socio-cultural factors in both the CCA and CSA studies, the Systems of Provision (SOP) approaches lays claim, once again, to accounting for both social and economic factors shaping food networks (Sousa & Busch, 1998). Here commodity production-consumption networks are conceived as discrete chains of activity originating from production, structured and reproduced in accordance with their unique context (Fine, et al., 1996; Fine & Leopold, 1993). Immediately the issue is apparent, with the primary focus on production positioning consumption as a secondary, distinct, yet structurally determined, sphere of rational activity. There being no consideration of actual consumption, the practices and symbolism commodity use. Thus ‘any claim for comprehensiveness or inclusiveness is overwrought’ (Friedland, 2001, p. 89).

Despite claims towards a more integrated approach, that attends to the complex relationships between people, places and commodities (Hughes & Reimer, 2004) across production-consumption, these agri-food studies are limited by an orientation towards production (Goodman & DuPuis, 2002). More than that, they are constrained by the binary nature in which they conceive of the world and of food production-consumption (Goodman, 1999). These studies are characterised by a marginalisation of interrelated

socio-cultural activities of consumption. Which, where it is considered is often limited to an examination of the demand, retail, marketing and the purchasing of commodities, with the point of purchase being framed as consumption and the end of the chain (Hartwick, 1998). Consequently, consumers, consumption, the meaningful discourses and social practices that form an essential aspect of the production-consumption complex are omitted, effectively suppressing the 'significance of contextualised human agency' (Arce & Marsden, 1993, p. 296).

Furthermore, the commodity remains an inanimate object, made almost invisible as medium for the narration of structures and governance as opposed to being explored in and of themselves, and merely the linkage between production and the market (Goodman & DuPuis, 2002). Thus production and consumption 'appear as autonomous, 'purified' categories of social life, sites only skeletally connected through the act of purchase' (Goodman, 2002, p. 272). Food, then, is 'little more than the terminus of the crop' (Whatmore, 2002, p. 6) wherein the socio-material value changes none from the field to fork.

Moreover, by prioritizing structures and institutions CCA, CSA and SOP studies persist in ascribing power, politics and the ability to make meaning, and thereby the ability to create fetish, to the sphere of production (Goodman & DuPuis, 2002). Resulting in understandings of governance and power being projected as sovereign (Foucault, 1991/1977) in nature. Functioning to (re)construct asymmetrical and hierarchical power relations mediated through binary distinctions and simplifications. This modern ontology, through which these studies perceive and construe the world, not only marginalizes the complex interconnections and relational processes which traverse either pole of production-consumption, but also that of nature-culture, human-nonhuman, alternative-conventional as well as structure-agency (Murdoch & Miele, 1999). Thus, reproducing distinctions that serve to limit their capacity to attend to holistic understandings of production-consumption (Goodman, 2002). Subsequently, it is imperative that such binary notions are questioned so as to explore food networks comprehensively as well as examine the flows of power upholding these constructions.

This is not to say that nothing can be taken from these approaches. Certainly there is a strength that lies in the SOP, CSA and CCA approaches Marxist critique of food networks. Furthermore, in their ability to contextualise food networks in terms of global, political, economic, institutional and structural relations. That is despite this body of literature contending that the complexity of social relations involved in 'bringing food to the table

has mitigated against holistic analyses' of food production-consumption (Friedland, 2003; 2001). Yet, these studies acknowledge the need to deal with the full material culture and consumption of foods (Fine & Leopold, 1993; Fine, 1995; Fine, et al., 1996) without recourse to productivist and deterministic stance in the face of complexities (Lockie & Kitto, 2000). A call to which has been answered (to some degree) primarily by relational AFN studies. Similar in their approach and globalised focus, Follow the Thing and Commodity Biographies attempt to integrate production-consumption more extensively in the study of food commodities.

Integrating Production-Consumption

Importantly, the work towards making comprehensive accounts of food production-consumption, in all its breadth and complexities, has been undertaken from a new angle, breaking from the 'division of labour' (Tovey, 1997). Analogous in method to ANT, Commodity Biographies and Follow the Thing (FTT) studies draw on the idea to map production and consumption (SOP, CSA and CCA) but work to incorporate the socio-cultural (the focus of social studies of food and eating). Subsequently, offering a promising route for the analysis of AFNs, one that has deeply informed the empirical research conducted in this study. Commodity Biographies and FTT work to integrate production and consumption by 'tracing' or 'following' commodities, and making good account of the social relations that work to (re)produce the commodity network. Heavily inspired by the early food ethnographies (Radcliffe-Brown, 1922; Richards, 1939; Levi-Strauss, 1963; 1966; 1970; Douglas, 1975; Murcott, 1983; Mintz, 1985) both approaches understand the commodity as having a social life. Yet they are quite different and there are clear distinctions to be drawn between the two approaches.

The distinction between these two approaches reflect the division between the early rural studies, of either making account of change in agri-food systems or defetishizing production-consumption. Commodity Biographies are socio-historical in nature, tending to trace (back from consumption) the historical socio-cultural shifts which underpin the commodity's consumption and contemporary social life (Mintz, 1985; Bobrow-Strain, 2012). The logic being, that in 'tracing back all the items used in the production of that meal reveals a relation of dependence upon a whole world of social labour conducted in many different places under very different social relations and conditions of production' (Harvey, 1990, p. 422). These socio-historical narrations work to demonstrate the interconnection of production and consumption. Linking changing practices of commodity production-consumption and the (re)production with the evolution of their different socio-cultural meanings in both production and consumption contexts (Redclift, 2002).

Moreover, showing how these commodities are woven through social relationships and made manifest through various social values, discourses, relationships and structures (Corrigan, 1997).

Tracing back (from consumption) the commodity's contemporary socio-cultural meanings, together with the practices and social relations which simultaneously produce the commodity and the commodity produces, are narrated in these biographies. Significantly, through these socio-historic accounts the interrelatedness of production and consumption are made explicit. Demonstrating how 'each may be said partly to have determined the other' (Mintz, 1985, p. xxix), as well as how through spatial and cultural relations food things are given meaning. Other commodity biographies in doing this are concerned to unveil the power of globalised capitalist food systems through a focus on the everyday, inconspicuous, aspects of production-consumption.

Redclift (2004; 2002) worked to demonstrate the transforming 'environment and working conditions' of production labourer (Redclift, 2002, p. 391; 2004). Similarly, Lind & Barham (2004) speak of the impoverishment of subordination to the Neo-liberal order in their exploration of the social life of the tortilla. Here they outline the transformation of the tortilla, the maize and the practices therein. Depicting them as having been *freed* of their sacredness and alienated from the meaningful properties and the people, in turn resulting in the simultaneous fracturing of identity and community. Positing commodification as a metaphorical transgression of the sacred, and ultimately presenting the socio-cultural changes, power relations and fetishization of commodities as more complex and sinister than imagined in other commodity biographies.

Importantly, the deep consideration and theorisation of the connection between production and consumption in these studies highlights the shortcomings and asocial/acultural character of the agri-food studies dominated by an orientation towards production. However, these studies are underpinned by a modernist interpretation of socio-cultural change. Each describing a transition from a local traditional and meaningful commodity (and related practices of production-consumption) to a modern industrial, even synthetic, commodity divorced of its original meaning and socio-cultural context. Allied to which, despite engaging in the web of relations around food commodities, the primary focus of biographies tends towards structural shifts in the sketching out of a social history of a class things (Appadurai, 1986, p. 34), much akin to the PE approaches discussed above. Thus this literature, barring notable exceptions, tells us little of the social life of food

commodities in contemporary production-consumption networks. That is, little about what 'our food might tell us if it could talk' (Cook *et al*, 2006).

FTT studies literally follow a commodity from its origin to its end consumption, exploring its contemporary social life, the social relations which (re)produce the commodity's network. Importantly, FTT studies, in the image of earlier food studies, have a clear critical logic to unveil the commodity fetish of contemporary global food production-consumption networks (Benson & Fischer, 2007; Freidberg, 2005). But attempt towards a holistic understanding of production-consumption through 'following' illuminating the relations between producers and consumers (Cook et al., 2006; Cook & Harrison, 2007). These studies work to show how food things are made meaningful in both the contexts of production and consumption as well as demonstrate the forms of mutual dependency that underpin the global food chain (Cook, et al., 2004). In doing so, the micro social relations which produce the global food chain are drawn out. Yet, the focus on the globalised nature of food relations functions as a window through which the detrimental impact of such transient and exploitative food relations upon 'vulnerable' agrarian populations are exposed (Benson & Fischer, 2007).

Fundamentally, however, many studies considered 'followings' are not 'followings' per se. For example, in Friedberg (2005) the French bean is not followed through its trajectory, through its manifold changing relationships. Moreover, whilst there are accounts of both production and consumption it is not the whole story of the commodity. What Friedberg (2005) actually does is to contextualise and detail the emergence of the production-consumption practices related to the French bean (and should be valued on account of this). Subsequently, this is a Commodity Biography and not a 'following'. This not the only 'following' study which fails to follow the commodity. Cook & Harrison's (2007) attempt to trace the network between a family in London and the rural Jamaican farmers. However, they contended that 'direct connections couldn't be traced' (2007, p. 58) and thus settled for an illusion, taking stories from similar producers and the production relations therein. In spite of these misappropriations of the approach the multi-sited ethnographic approach underpinning these studies allows for highly detailed accounts of production-consumption. Moreover, accounts that are thoroughly grounded in the trans-national/global food production-consumption socio-cultural and political context.

Possibly the most relevant of all food studies to the research at hand, but specifically of those studies that trace and / or follow, is that of Head et al.'s (2012) *Ingrained*. Exploring conventional Australian wheat networks through 'ethnographic windows' their work

focuses on 'selected everyday intersections' between humans, nonhumans and wheat (p.2). Importantly, then, the wheat networks narrated here comprise of people, plants, rain, machines, soil, silos, government policies and financial instruments (no one thing is omitted on account of apparent dependency or inertia). Committed to ideas of tracing/following, they work to first examine the plethora of ways in which wheat is cultivated, produced through contingent socio-material practices and heterogeneous (human-non-human) interactions. Secondly, they follow the wheat to its production as a comestible and constituent entity in various products. Whilst this is study is outstanding in terms of its integrated account of production-consumption it draws on different stories in accounting for different aspects of production-consumption. Which, similar to Cook & Harrison (2007), builds a piecemeal story which may not truly reflect any single food production-consumption network. Notably, the wheat seed is absent here and presumably not at all considered part of the life of the wheat. Furthermore, as is common place, they fail to make proper account of the socio-cultural meanings and practices which weave in and around wheat as a fundamental metabolic and symbolic artefact in daily human life. In spite of this, methodologically Head et al's (2012) *Ingrained* both follows and traces the wheat and thus offers a potential approach by which to make a comprehensive account of production-consumption.

Despite the degree of separation between these two approaches they are unified by conceptualising commodities as social things (Appadurai, 1986). Both Commodity Biographies and FTT studies also have a tendency to be framed by a desire to demonstrate the impact of global, institutional structures. Consequently, there is often no consideration of the practices, knowledges, meanings and relations surrounding food consumption at the localised socio-cultural level. Nor is there much analysis of the context of the emergence of these consumption-production socio-material practices. Whilst, there remains little concern for agricultural nature and its constituent metabolic relations, how the metabolic, material, fleshy connections consumers make with foodstuff inform their embodied knowledges (Roe, 2006a, pp. 2-3). Moreover, within these studies consumption, after some initial flirtation with sociological interpretation, is regularly transformed in to Western consumer 'demand' and as such deals inadequately with consumption despite producing more relational and culturally informed political economies of food stuffs.

Alternative Food Networks

The charge to move beyond such binary logic towards a comprehensive understanding of food production-consumption networks has been largely heralded by the works on AFNs. Certainly, it has been contended that encounters with AFNs 'demand that we somehow

overcome this consumption/production divide in our thinking about food' (Tovey, 1997, p. 23). The work on AFNs may be split into three broad camps, first are studies celebrating this apparent politicisation and awaking of the consumer. Second are the critical studies that follow the defetishization thesis of the traditional agri-food literatures (Carlisle, 2015). Whilst the third are relational, and relational material, studies that explicitly aim to break through the production–consumption fissure through the deployment of an ontological position which is radically different to that of conventional agri-food studies (Roe, 2006a; Lockie, 2002).

In making account of the emergence of 'alternative' food cultures, networks, and movements, celebratory studies work to interpret AFNs as a form of pre-figurative politics (DuPuis & Goodman, 2005). The general contention being that such assemblages have 'emerged in response to the glaring and multifaceted contradictions of the unsustainable industrial food system and the exploitative trading relations embedded in the global supply chains that support its growth and (expanded) reproduction' (Goodman, et al., 2012, p. 4). AFNs, then, are conceptualised as spaces of possibility in food production-consumption transformation (Chiffoleau, 2009; Kloppenburg, et al., 2000) and both celebratory academics and activists argue that AFNs are new civic organizations. Organizations that challenge the existing food system and work to affirm 'a shared political agenda', creating new food systems that are 'environmentally sustainable, economically viable, and socially just' (Carlisle, 2015; McNally, 2002; Allen, et al., 2003).

Consequently, it is suggested that AFNs point to a 'common experience' of a problematic commodified, industrialised and globalised food system (McMichael, 2000; Marcus, 1995). An idea of politicisation bolster in part by the food scares originating from industrialised food networks (Lamine, 2005; Guthman, 2002; Enticott, 2003). Framed as counter movements AFNs are conceptualised as the primary way in which consumers are expressing resistance to perceived problems in the food system (Goodman & Redclift, 1991; Goodman, 2000; Murdoch, 2000). Moreover, food here becomes the focus of resistance to 'the corporate takeover of life itself' (McMichael, 2000, p. 21), evidenced in the work of conventional food systems to increasingly concentrated power in the hands of agri-food corporations (Dixon, 2003).

Concomitantly, alternative food production-consumption relations, and (re)localisation specifically, are constructed as a strategy of resistance against a global corporate regime controlling food networks (Hendrickson & Heffernan, 2002; McMichael, 2000). Narrated as de-commodifying and thus challenging the commodification of food things under global

capitalism (Fridell, 2006). Food production-consumption networks re-embedded in apparently proximal (local) and ethical (organic and fair trade) social relations AFNs are positioned as a potential vehicles for social change (Raynolds, 2002; Murray & Raynolds, 2000). More so, as spaces wherein individuals can work 'to gain greater control of food provisioning' and through which reframe production-consumption relations (Goodman, et al., 2012, p. 4; Lamine, 2005).

Notably, then, the literature is concerned with power, the flows and relations of power, governance and rationalities which are often omitted from food studies. However, the understanding of power here are sovereign (Foucault, 1991/1977) and thereby problematic. Just as production and consumption make little sense when torn asunder, so too 'the notion of power must be understood as a property of relationships and not of the individuals involved' (Lockie, 2002, p. 281; Giddens, 1984). Furthermore, there is a telling omission of the capitalist relations which continue to underpin these so-called alternatives. Although some studies do concede that AFNs are embedded in and limited by capitalist social, political and economic relations (Goodman, et al., 2012; Kjeldsen & Ingemann, 2009), they also suggest that AFNs are not oppositional. They contend that they are in fact new ways of doing which intend to coexist with the hegemonic capitalist system. As such these 'alternative' food networks may even be considered 'exemplars of individualistic, market-based neoliberal ideologies of social change' (Guthman, 2008). Such conclusion lead to a questioning the 'positive gloss' on the politics, ethics (Clarke, et al., 2008, p. 220) and thereby alterity so widely charted in this literature.

The core assertion (or perhaps we may go as far to say assumption) that AFNs standing as critiques of inherently pernicious, exploitative and unethical/immoral 'conventional' food networks, has led to the literature being characterised by an unquestioning approach to alterity (Whatmore, et al., 2003; Kirwan, 2004). In addition to un-reflexive framings of traditional, local, sustainable, quality and ethical, in opposition to Westernised, industrialised, globalised, foods and food networks. So too, despite the promise of a holistic approach to food production-consumption, there remains a leaning towards production (Goodman & DuPuis, 2002) in the AFN literature. Subsequently, omitting substantive consideration of the consumer and consumption, with the supposed real acts of consumption being limited to anonymous purchases of foods of so called alternative origins. Moreover, consumption is implicitly presented as a realm of free choice and thus perpetuates individualistic, voluntaristic theories of consumption. Paying little heed to broader account of social and economic structures governing food production-

consumption. The inferred discourses of 'consumer demand' and individualisation functioning to obfuscate the continuing manipulation of consumers by producers, retailers and others in the pursuit of accumulation in so-called AFNs (Murdoch, et al., 2000; Lockie, 2002).

Correcting the balance somewhat are critical AFN studies. Following the traditional agri-food studies in their Marxian notion of fetishism (Goodman & DuPuis, 2002), they principally work to unveil the conventional, capitalist nature of the social relationships flowing within AFNS (Hudson & Hudson, 2003; Elson, 2002; Fridell, 2006). Explicating alternative/organic food production-consumption's conventionalization (Guthman, 2014; 1998; Wilkinson, 2006), in addition to a broader mainstreaming and globalisation of AFNs (Raynolds, 2004) working to reproduce, as opposed to critique, conventional political economic structures (Guthman, 2008).

Furthermore, critical studies highlight that the AFN label has become an umbrella term, encapsulating all manner of non-industrial food production-consumption. Everything from artisan and/or traditional, local and /or short chain, organic, fair trade to the broadly ethical (Goodman, et al., 2012). Simultaneously, the AFN is juxtaposed with notions of food 'quality' and 'wholesomeness' as well as anti-capitalist production relations and politics (Goodman, 2004), and concomitantly critiqued to the extent to which they are exclusionary (Guthman, et al., 2006) and elitist (Slocum, 2007). Subsequently, debates concerned with commodity fetishism and political consumerism are central to the AFN literature (Carlisle, 2015; Du Puis, 2000). Concentrating on the relationships between food cultures and the wider socio-political context, this literature works to 'problematize the question of food governance'. Furthermore, it highlights the changing relations (of power) occurring within the food production-consumption complex (Marsden, 2000, p. 27).

However, AFN studies remain caught up in a modern ontology, (re)producing the reductionist conventional/alternative binary ascribed to food networks. The lens of the modern prescribes what is out there to be known (Latour, 1993) and as such delimits the capacity to make a comprehensive account of such networks. Subsequently, much of this literature fails to attend to socio-cultural and material realities of (supposed alternative) food production-consumption. Aspects which are further clouded by the overt politics of these studies and their mapping of a prefigurative politics on to AFNs, and yet few agri-food and AFN studies attend to the contemporary biopolitical dispositif (Mayes, 2016) despite talking through and around it. It is imperative, then, that notions of alterity and conventionalism are questioned so as to examine the flows of power upholding these

constructions. It would also be pertinent to consider whether so called alternative food production-consumption works to disavow capitalist relations and capital accumulation and as such is a substitute for real action against capitalism (Atkinson, 1983).

Somewhere in the Middle: Relational Approaches to ANFs

Moving away from the politicised assessments of AFNs, relational food studies seeks to both understand food production-consumption holistically, as well as use AFNs as a means through which to explore the socio-materiality and embodied nature of food production-consumption. As Roe (2006a) suggest, the intimacy of the 'food network between humans, animals, plants and minerals cannot be over-emphasised' (p. 7). This cannon of studies offers an embodied, relational materialist approach (Thrift, 1999, p. 317) , and a different means by which to unpack the (materially embodied) relationships that traverse food production-consumption (Roe, 2006a; Buller & Roe, 2014). These studies investigate the everyday embodied and material practices of food production-consumption, and the shared corporeality of humans and nonhumans (ecologies and bodies) that characterize agri-food networks (FitzSimmons & Goodman, 1998). As such, here corporeality is conceived as 'metabolism and metaphor to signify organic, eco-social processes that are intrinsic to agriculture, to food, to agro-food networks and to hybrid constitutions of these practices in the social world' (Goodman, 1999, p. 18).

Visceral embodied food geographies, are central works here capturing 'at once the physical capacities, relational processes, and fuzzy boundaries of the human body' (Hayes-Conroy & Hayes-Conroy, 2010, p. 1274). Importantly, these studies work to explore 'the sensations, moods, and ways of being that emerge from our sensory engagement with the material and discursive environments in which we live' (Longhurst, et al., 2009, p. 334). Specifically in regard to food things, functioning to account for the 'crucial ways that we 'feel' food in the 'gut'' (Goodman, 2016, p. 259). Concerned for relationalities of food, bodies, affects and practices these studies take seriously the materiality of both foods and bodies. Importantly, suggesting that literal food consumption, eating (on account of its sensual, visceral nature) is strategically positioned, allowing us to begin to explore and understand processes of 'identity, difference and power' (Hayes-Conroy & Hayes-Conroy, 2008, p. 462). Specific visceral work on AFNs centre upon the qualities of alternative foods, working to disrupt the 'relational contingency of food' (Goodman, 2016, p. 260). As well as the binaries through which alternative food things are constructed (experienced even) as 'good' (or in the least better than conventional). Accordingly, these studies aim to move beyond the proselytizing discourses surrounding AFNs, often critiquing AFNs on one hand and presenting them as progressive on the other.

Contributing to the broader relational-material food studies visceral geographies focus on everyday entanglements of bodies and food, narrating food's a/effect on bodies (Goodman, 2016). Whilst simultaneously theorizing manners of 'being with' and 'doings with' food, together this literature explores the co-production of bodies, subjectivities, food things and food politics. Exploring our embodied connections and subjective interrelationships around and through foods in terms of food based belonging 'translocal subjectivities' (Johnston & Longhurst, 2012) and food movement 'mobilisations' (Hayes-Conroy & Martin, 2010). Addendum to this, a 'political ecology' of the body (Mansfield, 2012) has emerged, 'facilitating a concurrent awareness of the structural, epistemological ad material forces that affect food judgements and behaviours' (Hayes-Conroy & Hayes-Conroy, 2013, p. 88) (Hayes-Conroy & Hayes-Conroy, 2013, p. 88). Drawing on insights from ANT and STS these studies explore food and drink as non-human entities which build, maintain and stabilize links between diverse actants (Valentine, 2002). Moreover, to examine the encounters between food things and bodies, the ways in which these are played out and the broad socio-cultural discourses that are woven through, colouring these encounters (Abbots & Lavis, 2013; Turner, 2011; Carolan, 2011).

Much of this work is critical in its delineation of relational embodiments and food, obesity (Slocum & Saldanha, 2013; Guthman, 2011; Mansfield, 2012). Yet, it has been levelled that the focus on the embodiment and the eater perhaps contributes to the responsibilisation of the individual eater. Yet, more work explores embodied collectives, our inter-corporealities and intersubjective states, working to illuminate responsibilisation of the eater as narrow and reductionist. Indeed, studies exploring obesity implore that the socio-economic and material contexts of bodies are accounted for, and that 'responsibility, power and emotion' (Goodman, 2016, p. 260) too are critically courted in questions of obesity. Perhaps more importantly, this lively turn has been reflected in work more specifically focused on food things as living precarious actants that populate, propagate, human lives. That being egress of 'vibrant materialism' captures the more-than-human, more-than-food studies exploring how things becoming food (Bennet, 2010; 2007; Mol, 2008; Probyn, 2012).

These relational material studies, then, explore the intersection of the human and nonhuman at the heart of food production-consumption networks, specifically focusing on the symbiotic metabolic relationship (Goodman, 1999; Bingham & Lavau, 2012). Through a focus on the socio-material practices of food and eating these studies work to problematize the 'enduring metabolic intimacies between human and nonhuman bodies'

(Stassart & Whatmore, 2003, p. 450; Mansfield, 2003). Whilst other relational material studies explore the socio-material performance, or enactment, of food networks, the enactment of food things (Evans & Miele, 2012), associations and subjects (Roe & Buser, 2016). However, whilst the attention to materiality should not be dismissed, as it is intractable from the (re)production of agri-food networks, there is a tendency to focus on the socio-material practices of consumption to the exclusion of production. Thus although these studies offer deep insight into the socio-material (re)construction of food things and consuming subjects, they are not comprehensive accounts of the production-consumption of (alternative) food networks. As Goodman (2016) highlights, there has been a marginalization of actants/actors in food production-consumption networks that have a 'socio-economic stake in manipulating our visceral reactions to food' (p. 261) such as health agencies, environmental bodies, industrial food corporations and so on. Moreover, we may well add to this omission of the production of scientific knowledge, discourses circulating regarding 'good' and 'bad' foods, bodies and agriculture.

Yet, within the material-relational contingent there is a small but growing application of science and technology studies (STS), the approach in the least, to foods, bodies and the political ecology of food: such as industrial bagged salad (Stewart, 2011), deconstructing the obesity 'epidemic' (Guthman, 2011) and the micro-biopolitics of raw dairy consumption (Paxson, 2008). STS focus on examining 'the production of scientific knowledge and technologies within a social (cultural, political) context', as well as 'the various ways in which science 'works' to produce (and circulate) knowledge about the world' (Goldman & Turner, 2011, p. 11). Given this, the STS approach could be usefully applied in exploring the production and dissemination of scientific knowledge regarding food things, their production-consumption and related bodies. More than that, how these processes are shaped by social and power relations, deconstructing notions of scientific objectivity (which are often concerned to privilege specific scientific knowledges above (Haraway, 1988)). Studies examining the 'food-ization' of things in terms of the processes of 'marketization' (interactions/interrelations that are simultaneously political, economic, cultural and material, and therein affective) (Caliskan & Callon, 2009; 2010) do come some way in addressing this. However, there remains a broad political-economic / socio-cultural divide in the work of food studies.

That being said, agri-food studies undertaking more broadly relational approaches (Whatmore & Thorne, 1997) work to elide the modern binaries (of nature/culture, human/nonhuman, subject/object, production/consumption, alternative/conventional (Nimmo, 2008b)) that mystify the depth and complexity of relations and processes which

constitute food networks (Kjeldsen & Ingemann, 2009; Whatmore, 2002). As such, relational studies attempt to develop a more comprehensive account of agri-food networks through a renunciation of the 'methodological erasure of nature and expose its foundations in the reductionist ontology of modernity' (Goodman, 1999, p. 18; Nimmo, 2011). Focusing on the 'more-than-human' (Whatmore, 2002) aspects of food networks, placing the emphasis on the food thing itself, or the nonhumans that constitute/ produce it (Lorimer & Driessen, 2013). Despite this, there remains a tendency for consumption and the consumer to remain 'black boxed' (Lockie & Kitto, 2000). Yet, relational materiality does afford more socio-cultural and embodied understandings regarding food production-consumption. Certainly, Lockie & Kitto (2000) suggest an approach consistent with the ontology of ANT, will allow for a focus on the discursive and material, intermediaries and putative actors that work to constitute and shape food production-consumption. Certainly, it is the application of ANT to agri-food studies that has both attracted the most attention in surpassing the limitations of agri-studies, and is most relevant to the research undertaken here.

Actor-Network Theory in Agri-Food Studies

As Goodman (1999) acutely expresses, the theoretical scope and political relevance of agri-food studies are 'significantly weakened' by the modernist ontology and the dominant methodological approaches (p. 19) discussed above. It has been made clear that there is a need to traverse the cultural/economic divide that this underpinning ontology and methodology fosters. So as to allow for an explication of the relationships, practices and other socio-cultural factors lying behind the political economic displays. To that end, much of the literature suggest that in order to move beyond discourses which reify and stratify abstract conceptualisations of social phenomena, a post-structural relational and material approach is required (Holloway, et al., 2007).

The contention being that a symmetrical approach enables an exploration of meaningful everyday practice, whilst permitting individuals and other 'objects' agency and readily recognising heterogeneity (Nimmo, 2011). As such, these relational approaches, wherein 'links rather than distinctions' are investigated (Murdoch, 1997, p. 322), have become an ever more present feature of agri-food studies, and are most definitively tied up with the cultural/consumption turn (Goodman & DuPuis, 2002). The most considerable contribution comes from ANT which, unlike other relational approaches such as the application of Convention Theory[2] (Murdoch & Miele, 2004a; 1999; Storper & Salais,

[2] Originating from the works of Boltanski & Thevenot (2006) and Boltanski & Chiapello (2005).

1997; Straete, 2004; Barnett, 2014) that retain essential PE distinctions (Murdoch, et al., 2000), is underpinned by a relational ontology (Goodman, 2002).

The relational ontology works to shift the focus of agri-food studies, from charting, explaining and predicting macro changes in the global food system, to human/nonhuman social relations, practices, discourses and how they come together to (re)produce food networks. Yet, ANT is more than focusing on how things are 'stitched together across divisions and distinctions' (Murdoch, 1997). ANT conceptualises 'everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located' (Law, 2009, p. 144). As opposed to economic or socio-cultural structures being the determinants of activity. Such 'structures' are here the outcome of labours to (re)construct power relations (Murdoch, 1995), thus inverting the structural approach. More broadly, ANT works to recognise and account for heterogeneity, granting a conceptualisation of varying connections between human and, most importantly, non-human social actors (Goodman, 1999). Thereby, ANT also works to give sharp prominence to the materiality of interactions, relations and (re)production of the social.

ANT, then, presents an opportunity to explore the socio-cultural, material relations, practices and discourses as well as the actants that comprise food production-consumption complexes. More than that, for them to be accounted for and understood without reduction or subjugation to reified exogenous forces (Lockie & Kitto, 2000; Goodman & DuPuis, 2002). Although, it is contested that ANT, or the radical relationality of such works are politically 'inert', not going far enough in allowing the food thing to be agentic (Bennet, 2007, p. 145). Yet, demonstrative of the affordances of the ANT approach stands the contention that, what is analytically distinctive about AFNs is 'how they strengthen relationships amongst formerly 'passive' actants in commercial network' (Whatmore & Thorne, 1997). In seeking to understand what constitutes 'alternative' agri-food networks, and the way in which they and their food things are (re)constructed, traditional hierarchies of actors/actants are flatten. Highlighting that the actants were only passive, on account of the constructed hierarchy, in perspective.

An ANT approach, then, may work to overcome the 'ontological discontinuity between production and consumption' (Goodman, 2002, p. 273; Goodman, 1999). Permitting production-consumption to be understood as existing, not as distinct spheres but, as being co-determined, conjoined and mutually constituted (Goodman & DuPuis, 2002; Lockie & Kitto, 2000). A notion reflected in the oxymoronic binding of the terms 'actor' and 'network' works to 'combine(s) – and elide(s) the distinction between- structure and

agency' (Law, 1999, p. 1). Similarly, the local-global hierarchical binary is rejected and translated into a question of length, wherein the global is understood as the effect of the integration of local networks into long-distance networks (Murdoch, 1995). Perhaps more significantly still, ANT approaches reject 'categorical notions of 'nature' and 'society'' (Goodman, 1999, p. 25). Conceptualising heterogeneous networks of 'elements of Nature and elements of the social world' (Latour, 1993, p. 107). Hence ANT's prominent application in food studies working to reappraise 'nature's' supposed subjugation by, and passivity towards, capital and human agency/culture (Castree, 2002; Murdoch & Miele, 1999).

Within the agri-food studies literature there is much discussion of forging a post-structural critical political economic theory through the incorporation of ANT (Busch & Juska, 1997; Arce & Marsden, 1993; Marsden & Arce, 1995). To that end, Busch & Juska (1997) have attempted to demonstrate how ANT can be utilised to enhance PE understandings of the processes of globalisation. Arguing that traditional PE approaches 'tell us little of the specifics' of the processes of globalisations, whilst micro approaches suggest that globalisation is the 'aggregate outcome of autonomous individuals acting in pursuit of their interests' (p. 689). Busch & Juska (1997), through an analysis of the rapeseed industry, demonstrate how networks are built via the processes of technological innovation. Suggesting that, it is the radical modification of relationships between humans, plants, technology and knowledge which produces globalisation. However, to some extent such studies betray the principles of ANT by continuing to examine the processes of industrialisation, globalisation, re-localisation and alterity, not only in terms of sovereign power relations but as reified concepts. Subsequently, social relations, practices, knowledges and other institutions remain here 'punctuated' (Callon, 1987). Yet, ANT has been adopted in agri-food studies in a more critical and holistic manner, as new method and analytical lens. Seemingly finding a niche place in both food studies broadly and AFN specifically.

Critical applications of ANT have been popular in the examination and exploration of agri-issues concerned with human-nonhuman mixings, such as food scares (Goodman, 1999; Stewart, 2011) and the human-nonhuman enactments of food. In exploring foodborne outbreaks, the studies on food scares articulate such epidemics as co-productions of human-nonhumans (Stassart & Whatmore, 2003). Here, food networks are conceived as hybrid metabolic collectives of human and nonhuman actors. As such, foodstuffs that usually pass for a passive objective nature are treated as a non-human actor with agency,

as co-producer of the network. Most importantly, Goodman (1999) demonstrates that the application of ANT to the study of food networks also works to facilitate politicised understandings of the social world. Deconstructing food scares as events that work to disrupt the 'fetishized, punctualized and 'naturalised' co-productions of everyday foodways' (p. 29). Whilst illustrating the seamless mixing of 'chemical reactions and political reaction' (Latour, 1993, p. 2) together with political, historical and ethical narratives as well as the technological and biological (Lockie, 2006a).

In working to shed light on the socio-material constitution of alternative food things these followings reveal controversies, such as in the cases of milk (Larssæther, 2011) and organic produce (Roe, 2006a). Yet, these studies marginalise taken-for-granted 'mundane practices of producing, processing, transporting, retailing, preparing and ingesting food' (Lockie & Kitto, 2000, p. 13). However, much of the socio-cultural aspects of food networks, particularly those pertaining to consumption, that remained 'black boxed' here are explored in the studies of food enactment/performance (Evans & Miele, 2012; Miele & Evans, 2010; Jackson, et al., 2010). Most inspirational amongst the relational material works stands Lien's (2015), a multi-sited ethnographic following of Salmon. Drawing on the conceptual framework of ANT, this study outlines an exemplary account of a food production-consumption network. Speaking of the domestication and enactment of Salmon, the narration works to blur traditional distinctions between humans and nonhumans. Furthermore, attending symmetrically to both the economic context of industrial food production and the materiality of human-animal relations, the fragile and contingent relational practices that constitute salmon and the multiple ways in which salmon are enacted and performed is demonstrated.

Fundamentally, then, there are four points upon which ANT departs from the rest of the agri-food approaches discussed above. First, inverting the structural approach and assuming that all reified social phenomena to be the effect of actants interactions. Second, ANT surmounts the limiting dichotomies through a symmetrical relational approach. In addition to, recognising and account for heterogeneous social relationships. Therein ANT admonishes structural and PE accounts, whilst its concern for issues such as power and knowledge are sites of theoretical continuance between ANT and critical/post-structural food studies. Moreover, in seeking to describe socially and materially heterogeneous systems, in all their fragility and obduracy, ANT approaches describe how change occurs, how network patterns (re)produce power, inequality and knowledge effects (Law, 1992; 2007), as opposed to attempting to chart historical structural shifts or explain why social

changes happen. This is an approach to the social then that, not only invites grounded empirical analysis but also grants the articulation of the complexity of interactions. Granting an encompassing understanding of food network through the incorporation of the food thing, social relations, practices and discourses which simultaneously produce the organic matter and construct it as food. As well as accounting for what the food its self produces in others, hence the application of ANT in agri-food studies leading a focus on the governance of nonhumans (Nimmo, 2008b).

Despite the strengths of the application of ANT there remains the critique that the approach works to depoliticize that which is at hand, and fails to deal with issues of hegemony (power, politics & ideologies). This critique primarily emerges because these issues remain understood through an anthropocentric lens as human problems, human productions. That it is the inherent role of humans to define and that nonhumans could neither instigated nor problematize a (political) network (Wood, 1998). However in the second it derives from an understanding of ANT as ahistorical and aspatial, apparently leaving associations decontextualized (Lee & Brown, 1994; Fine, 2005). Yet, there are several applications of ANT to AFN studies (Lockie & Kitto, 2000; Lockie, 2002; Larssæther, 2011) clearly demonstrating an enveloping of issues of power, politics and governance. Indeed, Jarosz (2008) contends that AFNs are 'not a 'thing' to be described, but rather emerge from political, cultural and historical processes' which must be attended to. Whilst much of Lockies' work sets out to use ANT to direct increased attention on the symbolic economy of food and the effect of 'action at a distance' (governance) (Lockie, 1999; 2004). Thereby explicating the complex and relational nature of power as it is extended through production-consumption networks (Lockie & Kitto, 2000; Lockie, 2002).

However, it has been suggested that even through a symmetrical approach to food production-consumption it remains difficult to account for particular socio-cultural and political aspects of consumption adequately (Lockie & Kitto, 2000). Bringing us to the crux of the problem, how to attend to production-consumption in its breadth whilst speaking to issues of power, politics and governance. One ambition of the thesis is to use ANT to do just that, to use ANT to develop a politicized yet symmetrical approach production-consumption that speaks to issues of hegemony. This is not unprecedented, authors such as Larssaether (2011) have laid pathways which may be followed. Moreover, here ANT functions as a lens through which we may understand the construction of the social world, affording the opportunity to understand to processes and performances of (bio)politics, (bio)power and governance.

Addressing Biopolitics, Biopower & Governance in AFNs

Whilst many agri-food and AFN works address broader socio-political questions regarding governance, politics and power (Lockie, 2009; Coveney, 2000; Morgan, et al., 2006), few speak to biopolitics and biopower and even fewer work to draw on the principles of ANT in doing so. Importantly, Foucauldian conceptualisation of power, politics and governance are reflected in ANT. Certainly, Latour (1988; 1993) echoes Foucault's (1991/1977; 1991) disciplinary power, as forms of power that 'traverse the social realm, partitioning, grouping, enclosing, separating, and categorising individuals and groups' (Murdoch, 1997). Many AFN studies utilise the principles of ANT, and work to develop understandings of governance, of 'action at a distance' (Lockie, 2006a; Nimmo, 2008a; 2008b; Barnett, et al., 2011). Other studies explore modes of ordering (Law, 2002) as shaping 'alternative' production-consumption commodity networks. Whatmore & Thorne (1997) in their examination of Fair Trade coffee, for example, speak of a mode of 'a discourse of 'connectivity' working to order a set of non-hierarchical relationships, linking producers, co-operatives, fair trade organisations and consumers in a globally distanciated exchange network. In spite of exploring governance in food production-consumption networks, there is here 'little sense as to how the actions of those who purchase and/or ingest FT coffee recursively affect the configuration of the alternative production-consumption network' (Lockie & Kitto, 2000, p. 14). An omission reflected across much of the AFN literature examining power, politics & governance, where subtle notions of Modern power (productivist, sovereign) seep through the gaps.

Most importantly, the contemporary context of food production-consumption is one of a widespread biopolitics. In contemporary Western societies the 'biological existence of human beings has become political' (Rose, 2001, p. 4). With the 'object, target and stake' of this 'vital politics' being human life 'as it is lived in its everyday manifestations' (Rose, 2001, p. 4). Within the biopolitical milieu interventions, governance and regulation of our corporeality are imminently present in everyday life. More than that, food and eating have become *the* biopolitics of the everyday (Goodman, 2015). Yet, paradoxically, agri-food studies, despite their persistent talk around, in and through the contemporary dispositif (Mayes, 2016), rarely attend directly to biopolitics.

Whilst a small number of studies speak to the biopolitics of food provisioning and food security (Bingham & Lavau, 2012). Specifically, in terms of consumption and governance of food and eating practices (Mansfield, 2012), in addition to that which refracts this through issues of obesity and lifestyle (Mayes, 2016) and particularly children's' bodies/diets (Truninger & Teixeira, 2015; Gibson & Dempsey, 2013).

Within the AFN and agri-food literatures studies biopolitics have found narration in the examination of food scares (Goodman, 1999; Stewart, 2011), the egress of biotechnologies (Goodman, et al., 1987; Yin-liang, 2006) and the implicated risk to human health arising from each (Nadesan, 2008; Lupton, 1996; Bobrow-Strain, 2008). Furthermore, biopolitics has been situated in discussions of political and materials a/effects of AFNs. With Alkon (2013) suggesting that local/organic food things represents the 'ultimate socio-nature', working to illustrate the co-production of society as practiced in manifesting AFNs and the political a/effects these practice create. To which Herman (2010; 2012) also contributes the notion of 'tactical ethics'. Suggesting that AFN food things have mutable social and ethical meanings and, most significantly, materialities. Herman contends that political and ethical marketing produces material effects 'acting at a distance' on farmworkers in distant regions. Whilst Puig de la Bellacasa's (2010) theorization of permaculture as a collective biopolitics of the nature-cultures, centering on a politics of hope woven through its material praxis, socio-nature and social activism. Despite the limit number of studies, such works are important contributions to ANT/STS AFN scholarship, in their working to through relational-materialities to draw in the broader issues of power and politics specifically in the 'making' of ethics and biopolitics.

Perhaps though this lack of engagement is not so paradoxical. The modern binaries, besetting the agri-food literatures, most certainly works to deny an exploration of biopolitics, biopower and governance of (supposed) alternative food networks. The shared corporeality, the intermingling of the human and the nonhuman that constitute food production-consumption networks are beyond the grasp of studies that work to abstract nature, and the human body. Just as Goodman (1999) suggest, 'the modern ontology…undermines coherent engagement with the biopolitics and ethical principles of environmental organizations and Green movements' (p. 17). Subsequently, a relational understanding of nature-culture (and so on) is absolutely necessary in the examination of both food networks, and issues of biopolitics, biopower and governance therein. In understanding contemporary food production-consumption networks, it is imperative to take account of these rationalities and techniques of governance (Guthman, 2008). As in doing so, the possibilities and limitations of food networks may be mapped alongside the relations, processes and constituent entities.

Here, biopolitics are conceived of as political strategies that aim to regulate biological life, more than that, optimise biological life. Drawing directly from Foucault (2008; 1997/2004), biopolitics are understood as techniques of government that have as their

object ‘the basic biological features of the human species’ (Foucault, 2007: 1). Importantly, though, biopolitics has come ‘to name a much larger number of things than those discussed explicitly by Foucault (Chung, 2011). Within such politics, then, life is specified as that which ‘must be protected’, and ‘protected against…natural disasters, climate change, global pandemics, and the ongoing spectre of bioterror’ (Thacker, 2011, p. 159). It is this matrix of threats that constitutes the contemporary biopolitical dispositif (Mayes, 2016), and the context of (and actants within) food production-consumption networks.

Furthermore, in this context, we must take account of the complex corporeal states and embodied conditions that ‘are coded as social and economic risks with calculative costs for industry and the state that must be administered’ (Anagnost, 2011, p. 215). That the salience of biopolitics in late modern capitalist societies is grounded in the ‘vitality of the body itself’ (Anagnost, 2011, p. 226) as a source of (surplus) value, life itself has been financialized and the body commodified. Biopolitical discourses, then, are understood as seeking to manage this commodity, regulating life and death, fertility, birth, vitality and mortality not just of the individual, or even the population but the species at large. Subsequently, ‘‘bare life’ is constantly rendered in its precariousness, a life that is always potentially under attack’ (Thacker, 2011, p. 158).

Significantly, here there is a concern to speak directly of the biopolitics, the biopolitical technologies of ‘alternative’ food production-consumption networks as they attempt to open up everyday practices to strategic forms of conduct. Moreover, to examine the flows of biopower as vested interests are woven through with various biopolitics, seeking to govern practices and shape subjectivities. Following Goodman (1999), ANT is understood as means by which to resolve the ontological impasse of the modern binary logic and engage in the relational issues of biopolitics, biopower and governance in alternative food networks.

Situating the Social Life of BOB Wheat: Summary

Within agri-food studies broadly, there is a tendency towards a global focus and a ‘division of labour’ (Tovey, 1997). Complicity with the modern binary logic and in tune with the domains of academia. Subsequently it has been argued that, in order to make account of the complex interconnections traversing ‘alternative’ food production-consumption a relational approach is imperative. Moreover, that in order to work towards a holistic, inclusive, account studies must look to ‘follow the thing’ (REF). As Sousa & Busch (1998) suggest, by ‘following a thing we may see it transformed, restructured, pressured and rearranged, but we will also see it resist human wishes’ (pp. 215-2). Such an approach

permits for the complexities and dynamics of consumption to be accounted for (as has long been aspired to in the food studies literature). Working towards making 'sense of the interdependencies of consumption and production without positioning the two spheres as dichotomous categories, or reinforcing these by assuming that consumption is a cultural phenomenon and production an economic one' (Mansvelt, 2005, p. 101). Whilst relational-material ethnographic approaches offer the most comprehensive accounts of food production-consumption networks, ANT holds a greater promise. Certainly, ANT is best placed to draw out the entities, relations and processes (re)producing food network. Moreover, it opens up a means through which biopolitics, biopower and governance may be explored as aspects and effects of food production-consumption networks. Important given the need to speak to issues of politics and power, more than that, to biopolitics and governance, as few agri-food and AFN studies have to now. Accordingly, in achieving such aims, and working to overcome some of the limitations of agri-food and AFN studies, a methodological and analytical approach is required that can move, follow, flow and look behind constructions. It is to this method and theoretical framework of the research to which we turn to next, in chapter 2.

Chapter 2 Methods: Tracing the BOB Wheat

Figure 1 Research Insights Gifted by a Watermill Regular

Introduction

Contemporary AFN studies have highlighted the need to attend food production-consumption holistically and to make account of both the 'natural' and the 'social'. The research presented here has taken seriously both the drive towards relational-materiality in exploring AFNs (Lockie & Kitto, 2000; Goodman & DuPuis, 2002) and the application of ANT, as a means by which the limitations of traditional asymmetrical approaches to agri-studies may be overcome (Jarosz, 2000; Holloway, et al., 2007). That is, despite ANT's often levelled critiqued suggesting it to be apolitical, and failing to deal with issues of politics, power and governance (Alcadipani & Hassard, 2010). Certainly, here, ANT is understood as a lens through which the (re)construction of biopolitics, biopower and the forms of governance therein may be made visible and unpacked.

Inspired by the followings and tracings narrating the social lives of food things at the heart of this study stands ten months of ethnographic fieldwork, conducted from August 2013 to May 2014 across multiple sites. What emerged was a core ethnography supported by a series of shorter interconnected ethnographies. The central ethnography was carried out at The Watermill, a restored eighteenth century two wheeled watermill nestled deep in the Eden Valley, Cumbria. There I worked with the millers and bakers learning how to mill wheat grain into flour, bake bread and more, as well as how the Watermill functions on a day to day basis. Whilst the shorter ethnographies commenced in August 2013, the first

with the Biodynamic farmer in Kent (cultivating the grain being milled at the Watermill) and the second an organic farmer in Cumbria (appropriating and consuming the Watermill's flour). Episodically over the ten months, then, I became an apprentice farm hand, being tutored in the skills, knowledges and practices of Biodynamic and organic farming. The ethnographies tapered off in the spring of 2014, yet this was not the end of the research. Several more weeks were devoted to conducting interviews with consumers as well as other connected individuals and organisations. Leading to conversations, in-person as well as via both telephone and email, with individuals spread far and wide across the UK. Similarly, prior to the core ethnography, I oscillated in and out of fieldwork, recruiting, interviewing and conducting general research regarding the 'alternative' foodscape (Sonnino, 2013; Sage, 2010) of Cumbria.

For a plethora of reasons the research took a number of unexpected turns, and as such the fieldwork did not play out as planned. In part, this may be attributed to the commitment to 'follow' (Callon, et al., 1986; Miettinen, 1999) which led the research to places beyond my imaginings. The present chapter then, works to first outline the objectives, central questions and design of the research, including an account of the underpinning logic and theoretical inspirations. Followed by, a reflective storying of the fieldwork as it played out, the difficulties and successes. Recounting the research as ideally imagined at my desk, proceeded by an account of the fieldwork as it un-folded. The latter being committed to the objective to allow the messiness and contingency that is the research process (Law & Singleton, 2005) to exist, and to be presented. Not wanting to make a retrospective fit of scientific strategy, I have attempted to earnestly to convey the complexities and ambiguities of research as subject to, and constituent of, daily human life. Together these accounts, with the insights drawn from the literature discussed in the previous chapter, form the empirical foundations of the study.

Research Objectives

The principal objective of the research was to develop social science understandings of the assemblages, entities and processes that constitute and (re)construct AFNs. Central to which was the exploration and tracing of the actors, relations, discourses, practices and knowledges making up such food systems. Originally conceptualised as a critical sociological investigation of self-defined 'alternative' food networks the research aims were four-fold: To conduct research not constrained by modern binary categorisations of, but not limited to, nature/culture, production/consumption, and alternative/conventional. To draw out a comprehensive picture of what constitutes these AFNs, as well as the ways

in which they and their food things are (re)produced/ (re)constructed. Mapping their origins, organically, geographically and socially, through production, distribution and consumption to final disposal. Thirdly, aspiring to develop a breadth of knowledge the research aimed to explore multiple AFNs. In addition to, aiming to contextualise the emergence and ongoing conditions of reproduction of these networks.

These were the ideals going into the research, and whilst the fourth aim, to contextualise the emergence of the AFNs, proved a little optimistic for a project of this size the others remained firm guiding pillars. Empirically, the research sought to focus on food networks that defined themselves as 'local' and 'organic', and thus normatively categorised as 'alternative' (Goodman, et al., 2012). Furthermore, the research aimed to ground the notion of 'local' by studying AFNs of a specific and well defined UK region, that of Cumbria. Finally, throughout the research there was a notion to be mindful of the (bio)power, governmental and biopolitical relationships that persistently shape (and are remade by) our actions, interactions and understandings of ourselves and the world around us. Most importantly the research was guided by five key questions:

- Who are the key actors and institutions within 'alternative' food networks?
- Between whom, or indeed what, are the relational flows between and what are these relationships, what constitutes them?
- In what ways are alternative food networks shaped/ (re)constructed? Furthermore, how do they expand/persist?
- What are the fundamental modes of ordering, social discourses and knowledges underpinning the processes and relationships contributing to the network's reproduction?
- In what ways are these food production-consumption networks constituted as 'alternative'/ 'local'/'organic'?

Designing the Research

The central puzzle in designing the research then, was how to explore AFNs without circumscription and reduction. That is, without falling prey to the limitations and trappings, that have been common place (outlined in the previous chapter). Specifically then, the question was how to go about following and tracing the actors, relations, discourses, practices and knowledges making up AFNs. Whilst allowing for capricious objects of study, movement over time and space. Following the charge of existing agri-food and AFN

literature, the research approach was conceptualised through a symmetrical, relational, material lens (Goodman, 2001). Together the research objectives, the questions posed, the conceptual framework and the legacy of the literature, pointed the research in a very particular direction. To undertake three multi-sited ethnographic (Hannerz, 1997; 2003; Marcus, 1995; Hine, 2007) 'followings' of 'alternative' food things (Appadurai, 1986; Cook & Harrison, 2007).

There are a plethora of qualitative methods, techniques and practices, grounded in interpretivist and constructivist philosophies (Mason, 2002) which may have been usefully applied. However, contemporary agri-food studies are dominated by tracings and followings, and, in spite of the limitations of these studies, methodologically the FTT approach offers huge potential. Historically, FTT studies have been well received in the agri-food literature as a methodological approach that steers academics through the dominance of the production orientation, the local/global and economic/cultural fissure (Whatmore, 2006), moving studies beyond some of modernity's dualisms (Goodman & DuPuis, 2002).

As discussed in the previous chapter, the FTT approach traces international commodity chains unveiling where, by whom and under what conditions these food things are produced (Cook et al, 2004; 2016; Hawkins, et al., 2011; Fischer & Benson, 2006). By focusing on the trajectory of the commodity the FTT approach grants a comprehensive mapping of the relations, places and spaces through which the commodity passes (Cook & Crang, 1996). A such 'followings' have the potential to both, comprehensively narrate the social life of the thing (Appadurai, 1986) and bridge the gap between production/consumption, nature/culture and so on. Furthermore, methodologically FTT, as a consequence of the global and de-fetishizing focus, works to map the network within which the social life of the thing is embedded through multi-sited ethnography (Cook & Harrison, 2007). The multi-sited ethnographic method has two key strengths in terms of the objectives for the data desired to be elicited both here and in FTT studies more broadly. First as with all qualitative approaches, is its potential for 'thick description' (Geertz, 1973), secondly, its capacity to trace and do so across spaces and time.

Emerging out of anthropology, ethnography has been widely undertaken within sociology (Hammersley, 2006) because of its great potential to explicate in-depth understandings of social organisation, practices, knowledges and cosmologies. Ethnography is an 'engaged, contextually rich' qualitative method of which 'fine grained daily interactions constitute the lifeblood of the data produced' (Falzon, 2009, p. 1). The capacity of ethnography, to

generating thick descriptive data without recourse to simplicity, results from the researcher's immersion in the field and 'attention to the everyday intimate knowledge of face-to-face communities and groups' (Marcus, 1995, p. 99). Through the ethnographic method, reductions are avoidable and provide opportunity to develop a rich understanding of the dynamics and complexities of the social life, social relations, and workings of the AFNs in question. Moreover, complexity is intrinsic to the ethnographic enterprise (Strathern, 1991, p. xiii) and permits for a more than simple 'following of the thing', embedding the food thing it in human-nonhuman relations, practices, its socio-cultural production and context as well as the things very own materiality.

Equally important for this particular research project is the flexibility of the ethnographic approach, but specifically that of multi-sited ethnography. In seeking to follow and trace a food thing through its production-consumption complex it is imperative to have an amenable strategy, open to the unexpected directions the research may take. Furthermore, the ability to move with the thing through (time and) space whilst still 'being there' (Hannerz, 2003) to capture the everyday, ordinary activities, interactions and relationships. The multi-sited ethnographic approach, then, contributes significantly to developing an approach to food/commodity research that bridges modern binaries, the global-local in particular (Wood, 2007; Massey, 2005).

Within a multi-sited ethnography the research sites, strategy and direction can be altered with relative ease (Hammersley & Atkinson, 1995), allowing the researcher to construct a true 'following of the thing'. Such a following can then explore the 'invisibility as well as its visibility' (Head, et al., 2012, p. 3) of the thing. Bringing a plethora of 'sites into the same frame of study', positing 'their relationship on the basis of first hand ethnographic research' (Marcus, 1995, p. 100). Importantly, such an approach 'reflects the nature of such societies, where …activities are segmented in diverse geographical and social locales' (Hammersley, 2006, pp. 4-5). Whilst limiting the external imposition of meaning (Brewer, 2000) in the development of a comprehensive understanding of the constitution and (re)construction of AFNs.

As such, the ethnographic approach is well suited to elicit the data desired, and the following and tracing of the actors, relations, discourses, practices and knowledges making up AFNs. So whilst these FTT studies outline a basic framework of approach to following 'alternative' food commodities, there was a need for a more contingent and reflexive approach. By taking the ethnographic approach seriously, there is an opportunity to go beyond the FTT approach, mapping the tracks that the commodity travels along, and

investigating the associations and relational flows that constitute these networks, the food things and vice versa.

Moreover, in order to conduct research not constrained by modern binary categorisations and follow actors, associations and interactions across time and space, there was a need for a *more than* (Whatmore, 2002) FTT approach. In this respect ANT was hugely inspirational in designing an approach to research that would meet the objectives and serve to answer the questions central to this research project. More than that, the methodological and philosophical precepts of ANT speak directly to my own understandings of the nature and constitution of the world around us. However, it is well recognised in the agri-food studies literature, that the binary dilemma may be surpassed thorough the application of ANT principals (Goodman, 2002; Holloway, et al., 2007; Goodman & DuPuis, 2002; Murdoch, 2000). Such as in the 'more-than-food', 'more-than-following' approaches, working from a relation perspective (seeing ideas of culture, space, economy, politics and materiality as inseparable and entirely imbued with food) to 'stitch together deeper as well as more quotidian stories of relationalities of food, space and place' (Goodman, 2016, p. 258). Although, many of these studies remain limited in their focus on discrete moments in production-consumption as opposed to tending to breadth of production-consumption in following the food thing.

The multi-sited ethnographic approach is at the heart of ANT inspired methodological approaches. Emerging from within the ethnographic tradition, ANT shares with it philosophical foundations, methodological maxims (Baiocchi, et al., 2013), together with a concern for everyday practices and the inductive weaving together the 'heterogeneous elements' that make up 'social worlds' or 'life-worlds' (Nimmo, 2011; Callon, et al., 1986). Moreover, both the commitment 'to follow people, connections, associations and relationships across space…because they are substantially continuous but spatially non-contiguous' (Falzon, 2009, pp. 1-2) and the 'capacity to make connections through translations and tracing' (Marcus, 1995, p. 101), speaks of the harmony between the ethnographic project and the ANT approach.

Actor-Network Theory as Methodological Approach

The research as imagined, demanded for a very particular methodological tool set. One characterised by an ability to move through the production-consumption nexus in its entirety, and capable of recognising the material as well as the immaterial, humans and nonhumans. Specifically within the agri-food literature ANT is cited as a potential means of reconciliation on three accounts: First, the principle of generalised symmetry (Callon,

1986a). Second, the methodological axiom to 'follow' (Goodman, 1999; Lockie & Kitto, 2000). Third, the objective 'to analyses how social and material processes (subjects, objects and relations) become seamlessly entwined within complex sets of associations' (Murdoch, 1998, p. 358). It is this final point, the focus on associations and connections that defines this as methodologically different to the FTT approach.

Attending simultaneously to the material and immaterial, humans and nonhumans is a substantial task. However, ANT in its principle of generalised symmetry offers a 'strategy for unthinking' (Nimmo, 2011, p. 116) the modern binaries through which the world is normatively conceived of (Latour, 1993). Generalised symmetry is in practice, to approach all things in the 'social' and 'natural' worlds as a 'continuously generated effect of the webs of relations within which they are located' (Law, 2009, p. 141). This relational materiality (the presupposition that all entities achieve significance in relation to others) works to dismantle modern binaries as well as *a priori* hierarchies that prioritise humans, and the 'social', over nonhumans and 'nature'. Treating everything equally as an effect of relations, then, flatten hierarchies (Latour, 1999) and rejects ideas that a purely 'social' realm consisting of human relations only can exist, as human relations are always mediated, transformed and enabled by nonhumans (Nimmo, 2011).

This 'more-than-human' (Whatmore, 2006), more-than-food (Goodman, 2016) ontological position does away with the culture/nature, agency/structure, human/ nonhuman, subject/object, mind/body dualisms that have proven so delimiting to agri-food studies. Thus allowing ANT inspired food studies to emphasise the 'relationality of production-consumption, the joint significance of the material and the semiotic' (Holloway, et al., 2007; Goodman, 1999; Whatmore, 2002; Murdoch, 2000). The principle of generalised symmetry, and the relational underpinning of ANT more broadly, then, is particularly relevant for food studies as well as being of specific importance to this research project. In treating all things as equally, as the product of relationships, food things become 'noisy' (Cook et al, 2004; Cook & Harrison, 2007) and begin to 'speak' (Stassart & Whatmore, 2003). In accounting for this 'liveliness', the voice, agency and effect of these food things themselves find greater presence, their role in human lives made visible. The nonhumans that constitute food networks, animals, crops, flora and fauna usual have 'ghost like presences' in other theoretical approaches (Head, et al., 2012, p. 4). Yet, good ANT accounts are narratives or descriptions 'where all the actors do something and don't just sit there' (Latour, 2005, p. 128).

Utilising ANT methodologically, allows an exploration of not only human-human and human-non human, but also human-plant (Hitchings & Jones, 2004) and specifically wheat in this case, encounters. Thus, the relationality and symmetry of ANT opens 'up the possibility of seeing, hearing, sensing and then analysing the social life of things- and thus of caring about, rather than neglecting them' (Mol, 2010, p. 255). Moreover, it also enables the exploration power and actantiality (Latour, 1999) throughout the entirety of the food production-consumption nexus. Indeed, ANT infused agri-food studies conceptualise power and agency in food networks as contingent effects of the assemblage of actant relations (Lockie, 2006a; Goodman, 1999). Subsequently, such studies make good account of the distribution and (re)construction/production of governmental technologies, mechanisms of control and enactment of agency within the networks (Alkon, 2013; Herman, 2012). This methodological approach then becomes key in elucidating the type of data desired here. Applying insights from ANT methodologically allows for an 'avoidance of monocausal explanations' and facilitates attempts to narrate a 'nondualist account of society and nature, taking seriously the significance of material artefacts, and studying the concrete networks of actors instead of interrelations between macro- and microscale phenomena' (Miettinen, 1999, p. 171).

The FTT approach, multi-sited ethnographies and ANT all converge around the maxim to 'follow the actors'. However, without adaption FTT would fall short in the exploration of the association, the relational flows, the ways in which the commodity is an actant, as well as the ways in which the network, the actants and food thing itself are (re)produced/ (re)constructed. Thus, a more contingent and reflexive approach was called for and such dynamism is drawn from the approaches of ANT and multi-sited ethnography. Certainly the ANT researcher is not required 'to decide in advance on a list of actors and possible actions' (Latour, 1988: 9). Whilst the multi-sited ethnographer's 'site selections are to an extent made gradually and cumulatively, as new insights develop, as opportunities come into sight, and to some extent by chance' (Hannerz, 2003, p. 207). Furthermore, multi-sited ethnographies compliment ANT's eschewing of reductionism and neatness in favour of non-coherence (Law, 1994), messiness (Law, 2004; Law & Singleton, 2005), fractionality/partiality (Law, 1999; Strathern, 1991) and heterogeneity (Mol, 1998). With ANT advocates suggesting too, that it is through ethnography that we can 'experience the fragmentation of ordering rather that the purity of order' (Law, 1994, p. 123).

More than that, faithfully following allows for the 'messy' assemblages that are AFNs to be explored without reduction. While the intellectual 'sensibility' (Law, 2004b, p. 157) of

ANT renders research more open to 'complex and multiple realities which might otherwise have remained obscure' (Nimmo, 2011; Mol, 2002). Whilst the value of ethnography here is in its 'capacity to depict the activities and perspectives of actors in ways that challenge the dangerously misleading preconceptions that social scientists often bring to research' (Hammersley & Atkinson, 1995, p. 23). Certainly, agri-food research stands to benefit significantly from the insights of both contemporary ethnographic sensory methods and (material) nonhuman ethnographies. This is, admittedly, a retrospective insight as the fieldwork experience brought acute attention to corporeality, embodiment and symbiotic relationships of humans and nonhumans, nature and culture, subject and object. Without question, the fieldwork was something of an assault to the senses, as the myriad 'bodily senses, materials, and rhythms' that are 'key aspects that co-constitute our daily experiences' (Yi'En, 2014, p. 214) where thrown into sharp relief.

The key objective of this study was to draw out a comprehensive picture of what constitutes 'alternative' agri-food networks, and the ways in which they and their food things are (re)constructed. Following the actors, 'as they attempt to transform society', construct knowledge and build 'technological systems' (Callon, et al., 1986, p. 4), works to reveal the relationships, connectivities and other actants through which AFNs are (re)constructed (and the evolutions, or mutations over time and space therein). Most importantly, here ANT is utilised as a lens through which the field was encountered, the empirical data interpreted and through which broader social issues are understood and engaged. As Murdoch (1998) highlights, ANT is primarily concerned 'with only one type of action, that is, with how networks and the elements that compromise them evolve' and it 'shows in marvellous detail how things are brought into alignment as networks draw together various elements' (p. 369). ANT is used here to unpack and understand that which was encountered and how the issues of power, politics and governance are woven through social relations. That is, as a window through which to understand the construction of the social world, biopolitics, biopower and governance.

Research Design Practicalities

In designing the research, the decision was taken to conduct three 'followings' in light of two considerations. First, the objective to gather a breadth of information regarding AFNs generally necessitated the investigation of multiple agri-food production-consumption networks. Second, the desire to avoid a comparative study. Whilst the comparative approach has its place in social research, this study was primarily about depiction, description and even perhaps about characterisation. But centrally about exploring what

makes up ‘alternative’ food networks and in doing so the aim was not to compare, nor invite comparison, of the organisational structures, ethics, morals, ontologies and so on.

The idea of conducting three ‘followings’ was bolstered by a further logic, that of the human diet. It requiring a range of food stuffs to meet the nutritional requirements of the body. This together with food culture means that the food stuffs through which these nutritional requirements are met vary across time and space (Lupton, 1996). Contemporary British food culture focuses on grains, particularly wheat, meat, vegetables (roots and brassicas) and fruits. Thus the idea came to be that if a following of a meat, a grain and a vegetable could be established, this would cover the basics of the British diet and conceivably these things could end up on a plate together. Furthermore, in terms of practicalities, empirically the research sought to focus on food networks that defined themselves as ‘alternative’, ‘local’ and/or ‘organic’. Whilst, the contested and ambiguous nature of the term ‘alternative’ itself led to it being utilised and conceived of progressively differently throughout the research. In order to explore alterity it was necessary to start with food networks self-characterised, or normatively conceptualised, as alternative. Initially, then the concept is broad and accepting, given over to the actors, the potential participants.

Less contentious is the identification of organic production-consumption with organic cultivation being both widely understood[3] and governed at a national and international level. Specifically, then, the identification of organic production-consumption was guided by these national and international[4] certification schemes. As such the search looked for organisations approved by one of the UK Government’s nine approved organic ‘control bodies’ (Department for Envrionment, Food and Rural Affairs, 2015), including Demeter (Biodynamic certification body). The most prominent of these bodies being The Soil Association, which defines organic as meaning ‘higher levels of animal welfare, lower levels of pesticides, no manufactured herbicides or artificial fertilisers and more environmentally sustainable management of the land and natural environment’ (Soil Association, 2016).

3 Organic cultivation, that which ‘does not use artificial chemical fertilisers and pesticides’ and in terms of animals, ‘reared in more natural conditions, without the routine use of drugs, antibiotics and wormers common in intensive livestock farming’ (Seyfang, 2006).

4 In addition, presiding over the UK certification schemes stands the European Commission’s organic certification setting intra-national standards for organic produces across member states of the European Union.

Finally, in order to critically assess the 'localness' of these food production-consumption networks the notion of the 'local' required defining. Here local food networks are understood as those wherein food things are available for acquisition close to the site of production and are predominantly consumed by proximal consumers. Consequently, the 'local' is here delimited by (UK) county boundaries and empirically focuses on Cumbrian AFNs. The selection of Cumbria was a very pragmatic choice, based on there being access to, and availability of such networks. Heavily reliant on tourism Cumbria has a high prevalence of 'local' food things, but also 'organic' food things (Knickel & Renting, 2000) following the BSE crisis and the 'move west'[5], subsequently there was an abundance of opportunity. In addition, I have over the course of my lifetime spent a great deal of time in Cumbria, as well as having resided in Carlisle for some time previous to commencing the research. Resulting in knowledge of region and the AFNs available that was quite in-depth in advance of the research. Moreover, during my time in Cumbria prior to the research I established connections with many individuals and organisations connected with 'local' AFNs. Whilst these already established connections and possibilities did not manifest into a formal aspect of the fieldwork, my knowledge of the community and status as being married into Cumbria proved invaluable in achieving access.

The Research in Practice

Recruiting Participants

The process of recruitment and entry into the field began in October 2012, the initial task being the identification of appropriate 'alternative' organisations. Through a systematic search, via the internet and other sources (Holloway et al, 2007) together with my background knowledge of Cumbrian food enterprises, numerous 'alternative' food projects were identified, selected and contacted. Arguably this method of participant recruitment means that commodity producers with no internet visibility, or poor key word tags, may have led to these individuals/groups/networks being marginalised. However, I would suggest that given my knowledge of the area and previous contact with 'alternative' food networks in Cumbria that this 'invisibility' is negated[6].

[5] The 'move West' was something my informants spoke of a few times and makes reference to "when the organic dreamers began setting up in the West because land had become too expensive in the East" during the 1960s and 1970s.

[6] Over the years from 2007 to 2015 I spent large swathes of time in Cumbria, and actually resided in Carlisle for twelve months, prior to commencing my Doctorate. During this time I became highly familiar with the local, organic and other 'alternative' networks in the region.

The opening email[7] courted a response from five producer-proprietors, inciting a short exchange of emails discussing the details of what the research would require of both them and me. Central to these discussions was the exchange of their time and knowledge, as well as the cost/benefit of my presence, together with any possible and perceived risks of having a researcher investigating the day to day production of the commodity and their lives. Then, on the other hand, what I could offer in terms of labour, 'critical feedback' and customer research or 'positive exposure'. Certainly, the idea of reciprocity was fundamental in the research design as qualitative research is 'a relational endeavour'[8] (Trainor & Bouchard, 2013, p. 987). More than that, without reciprocity I felt I would be exploiting the participants to some degree. The ethnographic approach requires a deep commitment from them, there being 'thick interaction between researcher and researched' (Falzon, 2009, p. 1), using up the most vital commodity we each have, time. The data garnered from our interactions is a gift 'with all the implications of reciprocity that gift exchange implies' (Falzon, 2009, p. 1).

My position was, if in showing me what they were doing on a day to day basis, they could show me what to do and I would labour for them. In this labour exchange I hoped to simultaneously learn the knowledge-practices, so fundamental to the network and how the network functions from within, as a 'professional apprentice' (Maanen & Kolb, 1985) whilst 'giving something back' to the commodity producers. Most obviously in the form of 'free' labour. Here reciprocity is something of an ethical act, an 'ongoing process of exchange with the aim of establishing and maintaining equality between parties' (Maiter, et al., 2008), and a driving force underpinning the momentum of qualitative research. With four of the initial respondents the email exchanges stopped at the point at which the producer came to fully comprehend that I hoped to work closely with them for twelve weeks. Such a commitment, in terms of time and strain on resources particularly in the first few weeks, is understandably too great for some small producers.

Certainly, access to the relevant networks is notorious as being one of the most difficult steps in ethnography. However, despite a very low response rate and four failed recruitments, achieving an agreement to access to three appropriate 'alternative' food

[7] The opening email enquiry worked to outlining my interest in their projects and a briefly introduction to myself and the research. Importantly, even in this first contact I stated that the research itself would be in-depth and would require working alongside the producers themselves, seeing how the product was produced and then following it out to their consumers.

[8] Trainor & Bouchard (2013) highlight that 'framing reciprocity as a central consideration of research necessarily invokes the humanity of what we know to be true and how we know this, eschewing the tenet of objectivity, a foundational plank in positivistic scientific method' (Pp. 987). Which is regarded as unproblematic given ontological position of the study and the author.

commodity producers proved to be not too tricky. This may be being due to the relatively open nature of these food networks (Bell, 1969; Hammersley & Atkinson, 1995) and what it is they are trying to achieve. Or perhaps this relative ease of recruitment was in-part as Van Maanen & Kolb (1985) suggest: 'gaining access to most organisations is not a matter to be taken lightly but one that involves some combination of strategic planning, hard work and dumb luck' (p. 11).

The Watermill was amongst the first batch of commodity producers contacted and the very first to respond. Following an extended email exchange it was agreed that we should have a face to face meeting to ensure that we could work together (indeed that we got along and could be in one another's company for this extend length of time), as well as to negotiate the day to day practicalities of the research and discuss any reservations. By the time of the meeting, in early November 2012, the winter's chill had settled in. The meeting took place in the tearoom, the first in a terrace of three buildings and a converted hay barn/ cattle shed (see Figure 2). Noel, Annabel and I sat around the end of a large table in the heart of the dining area. Warmed by the log burner and loose leaf tea, poured from a voluptuous scarlet teapot before being carefully sipped from hand crafted cups, we discussed various relevant and related topics: my research interest and background, their deep engagement in the environmental/organic movement, their anthroposophical beliefs before meandering through politics, moralities, ethics and a brief diversion into Romanticism.

Figure 2 The Watermill

There are two important points to make regarding this initial meeting. The first is that, whilst engaging in an exchange, that established shared interests, beliefs and political dispositions, at the initial meetings with the network 'Gatekeepers' (Hammersley & Atkinson, 1995; Welsh, 2012) I was careful to speak only on shared interest and politics.

Not because my position was, or is, contrary to theirs but sensing the high value of *Politics* here I instinctively steered away from what might be sensitive or emotive. The initial in-person encounters with each of the producer-proprietor were distinct, in and of themselves but also collectively, different from all the other interviews I conducted across the research. The degree of emotional investment, subjective investment, in the ethics, politics and values constructed a palpably precarious inter-action. Comparatively, interviewing consumers and supermarket buyers had a sense of 'professionalism', a distance and in some cases a disengagement from the moralities, values and subjectivities of the network. Secondly, towards the close of our meeting Noel and Annabel informed me that they were trying to sell the Watermill and there were plans for a 'community buyout' but this was taking a long time to put in place. I suggest this is interesting because I believe it gives some partial insight as to why Noel and Annabel were keen to participate in the research. In amongst a whole host of reasons, they clearly stated a desire for 'critical feedback' regarding their activities, I suspected exposure, that is the circulation of the Watermill, the ethics, morals, values and beliefs, was the main perceived benefit to participation. Furthermore, it seemed to me that Noel and Annabel wanted to have what they had done there documented, a legacy in writing, something that could be passing down the knowledge and inspiring others. Many months later, at the very end of the research, when they were in the process of handing the Watermill over to those that would be the new proprietors, this was something that Noel and Annabel spoke on.

At the finish of this convivial first meeting at the Watermill it was set. Going forward Noel and Annabel would contact the two farmers producing the wheat they milled and we would meet again in the spring, at which point they would put me in touch with the farmers and then in September (2013) I would begin working with Noel and Annabel at the Watermill. Whilst in between the second meeting and beginning with them in September I would make contact with the farmers and commence tracing the wheat back through its cultivation. After this meeting I began to keep a research diary, jotting brief accounts of the meetings although much less detailed than the full field notes later in the research (Lofland & Lofland, 1995; Wolfinger, 2002), as well as taking a few photographs.

As agreed I returned to the Watermill in the spring of 2013 and met with Annabel, Noel was absent on this occasion, for a second time. This meeting was relatively brief, we discussed some political issues and Annabel shared the contact details of the two farmers whilst advising that I didn't contact either for a few weeks for various reasons. Following this advice I didn't attempt to make contact with either farmer until early summer.

Establishing relations with the farmers took much the same path as with the Watermill, except that emails quickly gave way to short telephone conversations, this being a modality of contact that fitted more easily in their daily lives than emails. However, in spite of this shift in communication, it became apparent quite quickly that one farmer was more willing to be involved than the other.

Whilst neither farmer responded promptly to the first email, I eventually received a response from Leonard at Station Road Farm expressing interest and willing. He asked that I called him explaining that whilst he could answer the phone, or call back at an appropriate time, he didn't have much time to respond to emails. When working with Leonard I came to understand the time pressures of farming and observed his ability to juggle telephone calls and text messaging whilst labouring. These were means of communication that didn't particularly disrupt the follow of on farm tasks whereas emails required taking time out of either farm work or family life.

Subsequently, I called Leonard and we arranged a meeting at Station Road Farm, where I could better inform him of what the research would entail and he could show me what he does and around the site. The meeting took place in late June, I arrived a little before Leonard who lived off site (Leonard had inherited the farm from his father earlier that year however his mother remained in residence at the farm house). So following his prompt I took a wander around whilst he travelled the short distance from his home in a nearby village to the farm (See Figure 3). Leonard arrived with his wife and young son twenty minutes or so after I and the four of us spent a couple of hours walking the site, discussing the business of the farm and the research. Leonard and his family were exceptionally warm, congenial and hospitable, at the end of the day we then harvest some chard, potatoes and lettuce from their garden patch and agreed that Leonard would contact me when the harvest was about to begin. Leonard and his family then filled up a carrier bag, with said harvested goods, and a bag of 100% flour, made from the grain harvested in the previous summer and milled (using a small stone mill powered by a small diesel engine) at the farm, for me to take home.

This initial meeting with Leonard was more a 'discursive walking' (Edensor, 2010), simultaneously we were both actively participating in conversation with one another, whilst exploring the landscape and 'sensorially experiencing it' (Wunderlich, 2008, p. 132). Moreover, our ongoing relationship continued be one where in our bodies, our

Figure 3 Station Road Farm

interaction, was persistently rhythmically in 'conversation' with the environment 'seduced by the forces of our socio-material worlds' (Yi'En, 2014, p. 215).

In contrast our second farmer did not respond at all to the first email nor the second sent some weeks later. Upon beginning work at the Watermill Annabel encouraged a last attempt to recruit him by calling him. Not getting an answer I left a (mildly apologetic) message, explaining who I was, why I was calling for and that I had emailed. At this point I did not expect a returning telephone call and thus was surprised when he did return my call. During this conversation Jason offered that I joined a Biodynamic training group that were due a training visit to his farm, Moor Lane Farm. That way, he suggested, I could spend some time becoming more familiar with the Biodynamic 'way' and have an in-depth tour of the farm site. This I did, but it was the only visit that I made to Moor Lane Farm. There was a stark contrast between my experiences at Moor Lane Farm and Station Road Farm. Where Leonard and his family were open, familiar and willing, Jason was more distanced, closed off and more about practicalities and business. The visit to Moor Lane Farm was alienating and at times antagonistic, some of the Biodynamic students were deeply committed, militant even, and seemed to feel that my position as a researcher made me disingenuous in some way. The mood of that day was even reflected in the weather, which was cold, wet and grey in opposition to the bright warm days spent at Station Road Farm, even in October. Despite all this I did learn a great deal that day and although I did not visit Jason again we did have some further conversations regarding the principles of Biodynamics via email.

Quite separately, although I would later find that all three of the networks were connected and overlapped in numerous ways, I established an exchange with Fred & Wilsons Box Scheme, through an exchange with an earlier respondent who eventually declined to

participate. Following the same pattern of recruitment we arranged a face to face meeting late in December 2012. This meeting was more like the farm meetings to come, Fred & Wilson showed me around the main growing site (their total growing space was fragmented, three sites including their home garden), one large field adjoined by an area hosting six polytunnels and two long cultivated strips, whilst we discussed what they did and what I wanted to do. Again, by the end of the meet it had been agreed that I would work with them, in this case from June 2014. Just before parting company Fred asked about the broader plans of the research, who else in the area I was working with or hoped to work with. In response I explained I was still in search of a meat to follow, having been in a long exchange with one producer who had just declined to participate. In answer to this problem Fred & Wilsons suggested that I contacted Marion at Rowan Tree Farm, an organic beef farmer.

Marion was quick to respond to my contact and immediately agreed to participate on the condition that we met in person and felt we could work together. So as with the others we met at site of production, Rowan Tree Farm, and like Noel and Annabel at the Watermill this was also her home. Our meeting began in the farmhouse kitchen sharing a lunch of local and mostly organic stuffs (cheeses, mackerel pate, breads, butter, and homemade flapjack) prepared by Marion, including homemade scones using, to my surprise, flour from the Watermill and apples from Fred & Wilson's orchard on the Farm. All squeezed in amongst the numerous piles of papers and necessary crockery that occupied the surface table. Marion, an entirely gregarious and assiduous character, discussed the work of the Farm and incisively enquired after the research and myself. This whirlwind of food and talk was sharply followed by a tour around the farm and a meeting of the Long Horn herd that I would be 'following'. By the end of that early spring day it was agreed that I would work at Rowan Tree Farm from February 2014, but in the meantime Marion would contact me if there were significant life 'events' (for the bovine) that I should be involved in.

Finally, then, the plan was laid. Across twelve months from September 2013 I would conduct the three ethnographic followings: The first tracing Biodynamic Organic British Wheat, the second Cumbrian Organic Beef and the third Cumbrian Organic Cucumber. Together these food things would reflect the complex interconnection of 'alternative' food networks in quotidian terms, food we encounter in some form on a daily basis, bread, beef and salad (Figure 3). Spending twelve weeks working with each producer, with a 'buffer month' at the end of each 'following' to allow for complications or further work if

necessary. Although, to complicate this neat presentation, by the time the plan was laid I was already tracing the social life of the BOB wheat.

Figure 4 Look Familiar?

An Account of the Fieldwork

'Matters grow from the middle, and from many places. But one has to start somewhere'

(Law, 2002, p. 1)

With 'following' food things it is assumed that there is an apparent trajectory, clear and obvious beginning places and ends, with food production-consumption normatively conceptualised as having a sequential logic. Whether that be starting with the food commodity (as available in Western supermarkets or found on Western plates) and tracing its trajectory back to its origins, or starting in the field and following it out to retail and on to the fork. This logic of tracing back or following out should theoretically be relatively simple in the case of 'local' agro-food production-consumption networks, as the distance, or 'hops', between production (the field, the producer, processor and retailer) and consumption (the consumer and the plate) should be significantly less and more direct then in the global case. However, in beginning to explore the Watermill's wheat and Rowan Tree Farm's beef, I found myself simultaneously following out and tracing back. Negotiating the complex social lives these Cumbrian commodities as well as the overlaps and interconnections between the three commodities/sites/producers, it did seem that matters grew from the middle and most certainly didn't 'start' there.

The Gatekeepers (that is the proprietors of each of the food thing enterprises: Noel and Annabel at the Watermill, Marion at Rowen Tree Farm, Fred and Wilson at the box scheme) and the main sites of each enterprise appeared as a site of convergence. Holding

the connections across the production nexus: Being intimately familiar and connected to the consumers/consumption and the other actors/actants concerned in the production of the food thing, as well as everything in between such as the cosmologies and knowledge-practices underpinning the food thing's production-consumption. Setting out from the middle was a pragmatic decision, made almost without reflection, having already established relationships with the Gatekeepers it was the starting place that organically emerged. Spontaneously, methodologically enacting ANT's rhizome and subsequent contention that we cannot ascribe a place from which things start nor a place from which to start from. Importantly, the ANT methodological approach is concerned with positive discovery and the construction of networks, as opposed to the inverse teleology of 'follow the thing' studies which holds little appeal to the ethnographic method.

Upon reflection the main sites of each enterprise also function as the point at which the food commodity is enacted. Where the food thing becomes, and is articulated as, 'local', organic, 'traditional', 'sustainable', making it all the more important to start at this place, that is somewhere in the middle. From here the method deployed was one of careful spatial, temporal, material and socio-cultural following and tracing of the 'food artefact' (Lind & Barham, 2004). Going into the field the commitment was to depth and complexity, but not complexity for the sake of intricacy but in the name of thick interaction and description, of irreduction and truth.

August 2013: The Harvest

Having established regular contact with Marion at Rowan Tree Farm, Leonard at Station Road Farm and Noel and Annabel at the Watermill the fieldwork began, in quite dramatic style, in August 2013. Marion had invited me to spend a couple of days at Rowan Tree Farm so as to observe the Pregnancy Diagnosis (PD) of the heifers. At the same time I was awaiting word from Leonard notifying me when he would begin the wheat harvest. This I had been forewarned would be very short notice as the harvest is constrained by the ripening of the wheat and the weather being dry, thus if I wanted to be there for the harvest I would need to travel to Kent without hesitation.

I awoke on the morning of the 'PD-ing' in the guest room at Rowan Tree Farm, having arrived the evening before. Late in the night I had opened up the large pink journal, acquired especially for this ethnography, and began keeping my field journal. Despite having started a research diary earlier, this 'event' was the formal beginning of my ethnographic fieldwork and the writing up of full field notes. It was just a couple of pages

of notes, detailing the evening, the food, the conversation, the atmosphere, some reflections and questions that had occurred to me, but it was a start.

Greeted by an almost shrill but melodic 'she's here' that rang through the lit windows and closed doors. Marion, quite blustered, swung opened the glossy deep green 'back door' and enthusiastically invited me in. Having wrestled off my walking boots in the entrance hall I took the two or three steps to join the others in the kitchen. Marion had not yet broken for breath, excitedly introducing me to two other young females who were there for work experience [living in], telling me what had happened that day, what she was doing now, what we would be doing tomorrow, clarifying if I was vegetarian or not, if I was a coffee person, asking what sort of tea I would like to drink. All whilst preparing supper, putting the kettle on, washing cooking utensils and clearing space at the kitchen table, which overflowed with papers.

My ethnographic practice improved over time, in an attempt to overcome the 'frailties of human memory' (Bryman, 2008), creating more detailed accounts of my observations as well as individuals and nonhumans I encountered, events, behaviours/reactions, locations, timing, situations and contexts. Notably, in this moment, the commencing of the fieldwork proper, I took the decision to not take notes during the time I shared with participants. I felt that it would disrupt the 'natural' flow of conversations and disrupt the building of relationships, creating a lasting division leaving me 'outside' (Sachs, 2000). Thus each evening was spent writing up full field notes. There were odd times that I could dig out a note book and jot things down, such as when visiting buyers or customers. On other occasions I could record exchanges[9], one such moment was the final interviews with key informants, the Gatekeepers.

Returning to the account of the first fieldwork encounter. That first morning at Rowen Tree Farm, the 'real' work of the day had not yet begun, breakfast had not even been had, before I received a text from Leonard at Station Road Farm:

"Hi Sam. It is looking like I will be harvest the wheat tomorrow. Will be more certain later today. Regards Leonard"

Suddenly the day was no longer just about learning to herd cattle and observing the vet 'PD' the heifers (see Figure 5), but a race to travel to the other end of the country before

[9]The recording were done using a smart phone as opposed to a Dictaphone and whilst this was not an explicit decision, emerging out of contingency, it struck me that the phone had less presence than a Dictaphone.

the following morning. At breakfast I spoke with Marion, explaining that I would have to leave earlier than expected in order to make it to Kent, but I would stay as long as possible for the work with the herd. To my great relief this was well received by Marion, her thoroughly understanding the immediacy and nature of farming, and it was agreed that when the work with the herd was done I would begin by journey south. As it was I spent the morning learning in practice how to herd cattle, armed only with a crook three young women and myself followed the instructions of an experienced agricultural worker. At first it was messy, with confusion as to who should be where and doing what, cattle breaking away, heading in different directions. But as David explained the logic, bovine cattle will follow boundaries but will bolt if they are not given a wide berth, and we came to read the movement of the animals and each other we started to actually shepherd the herd. However, our success was fragmented, managing to herd one or two females at a time and often causing the herd to bolt. Come lunch time we had managed to herd and the vet 'PD' all the relevant heifers, in the early afternoon I began my journey south arriving in Kent late that evening.

Figure 5 Pregnancy Diagnosis at Rowan Tree Farm

Come morning, I made my way to Station Road Farm, arriving at the top field I could see that the landscape was already very different to my first visit just a few weeks before. The day's work started promptly, first cleaning and drying the grain that had been harvested the day previous, whilst the day warmed and the morning's dew dried up. By mid-morning the wheat crops that remained to be harvested were deem ready to harvest and so we began. Leonard climbed into the 36 feet combine harvester and I climbed into the tractor cabin

(of a tractor pulling a trailer) and we drove up the farm lanes, me following Leonard, to a large asymmetrical field. After a short discussion of how the harvest worked I jumped in the cab of the combine harvester with Leonard and we spent the next two hours talking about the harvest, the crop, the farm, and Biodynamics amongst other topics as we made our way up and down the field. Around every 30 minutes the grain chamber on the combine harvester would require emptying into the trailer. Breaking for lunch briefly, we sat in the field in the heat of the midday summer sun, chatting a little, enjoying the break from the sound of engine driven machinery. For the remainder of the harvesting of that field I watching Leonard roll up and down, taking photographs and mulling the day's events so far. An hour and a half passed by like this, slowly but surely the harvesting of the field was complete. The remaining hour or so of the afternoon was spent depositing the grain in the grain store ready for drying the following morning and talking about what would happen next with the grain and on the farm.

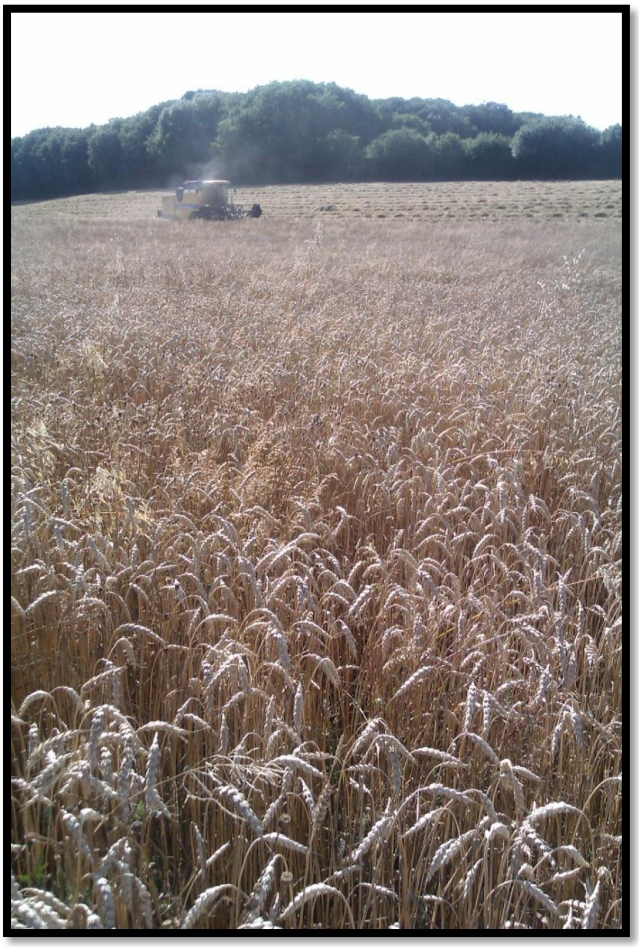


Figure 6 The Harvest at Station Road Farm

That evening, my face warm from the day's sun, I broke open the journal once again. First jotting down the things that had really struck me as significant, important in some way or meaningful, before building the details from my memories of the day. These notes were

long, so much had happened. Then I scrolled through the photos I had taken, nearly 90, making additional notes regarding the image, what had incited me to take the shot, what was in the image and what had been discussed at that time.

Subsequently, in addition to the field journal I amassed a large collection of photographs. Indeed, from the very first encounter with the key informants I began taking photographs as a means of documenting, where I had been, when, who with and doing what. These pictographic notes where intended as a means by which to remember details, 'reminders and representations of materiality, sensoriality and sociality' (Pink, 2008), to 'stir the ethnographer's memory' (Bryman, 2008, p. 419). Photography became the main way in which I documented eventful days, such as the harvest and sowing. Photographing activities, people and my surroundings was much easier than trying to note important things down, or sketch scenes. It was less intrusive and it gave me occupation during those dry moments in ethnographic fieldwork. Then in the evenings I would scroll through the photos, using them as a reminder of what had occurred chronologically in the day, and journal from the images. Now, whilst photographs started out as a digital notebook, and not at all intended as a contribution to the data, they have since been incorporated into the ethnographic data, used to colour the research depictions and analysis.

September to December 2013: Learning to Mill at the Watermill

From September 2013 I was 'in the field' full time, spending three to four days at the Watermill and the remainder of the week tracing/following the wheat. The days at Watermill over the weeks from September to Christmas were spent in the actual mill, working with the main miller Clive and occasionally the packer/delivery driver Neil. Early on I spent the days helping Clive and Neil, doing as instructed to do by them bagging and weighing flour. After the third week my presence was no longer novel, I became less obvious, less obtrusive, I came in and worked the same hours as everyone else and had roles and tasks that I performed.

In the Mill, during working hours, there was incessant noise, from the mill and the stereo blearing out Radio 2 all day, but most importantly conversation. Having established a rapport with Clive and Neil, having allied fears and reservations, that what they say will get back to superiors and/or other colleagues (Maanen & Kolb, 1985) they spent all day telling me how the Watermill worked, describing all the characters involved, what the relationships between different people were like, what activities were (or were not in some cases) carried out, when and why. Later they talked about their families and personal lives and Clive started to show me how to operate the mill.

After a few weeks the routine become one where Clive would let me 'start' the mill, adjust the mill and change the bags. Clive would often write my name down as the miller in the log books, but it was like he was letting me think I was milling the way a father lets his kid think they are driving when they are moving the wheel of a stationary car. Together we would unload deliveries from lorries, work through check lists, move large bags of flour from one place to another, mix flour recipes, 'bolter' the flour, weigh bags, sew bags, pack bags, load up vans for dispatch, restock the mill shop, listen to Radio 2, talk shop, put together mail orders, clean down and shut up for the night.

Each day featured a shared soup and Watermill bread lunch in the tearoom most often with Noel and Annabel, but also at times with the tearoom staff and the administrator (all women). This time with Noel and Annabel was spent sharing news and information. Often regarding what I had found so far, activities they were participating in, who I should, or indeed should not be speaking to. There were more general conversations, often pertaining to Guardian articles that they would have cut out or the conditions of contemporary food culture. The objectives and philosophical underpinnings of the research allowed a great degree of freedom and fluidity. With no specific questions that had to be directed to individuals, I was free to follow these interactions and conversations to see what they would reveal or where they would lead. I was free to interact on real foundations and to build very real relationships with these key informants.

This not to say that things always ran smoothly, there were times when, in the spirit of reciprocity, I would be doing administrative tasks. Which, although a fundamental aspect of the Watermill and the wheat flour production-consumption more broadly, would take up a great deal of time, time which I felt would be better spent more involved in the 'following'. As such I had the tricky task of negotiating this with the Watermill proprietors. Furthermore, in the early days I found I was often a sounding board for the staffs' work place dissatisfactions, which initially obscured the usual pattern of everyday life at the Watermill. But later, as I become a more familiar aspect of day to day life at the Watermill, these relationships become more relaxed and they would talk about their connections to the Watermill, the flour, their work and each other.

Similarly, the aim to be a 'participant-as-observer' (Gold, 1958) was relatively easily established in the mill, as opposed to my experience in the tearoom. In the mill I was a fully functioning member of the social setting, whilst the members of the social setting were aware of my status as a researcher. Such a position allowed for the development of trusting relationships, of in-depth understand of the network that makes up the Watermill

as well as allowing me the opportunity give something back. But, this integration was not consistent across the various sites, my role varied between 'total participant' working in the mill with Clive, 'researcher-participant' with Nick and Annabel and 'total researcher' most of the time in the Tearoom (Gans, 1968; Bryman, 2008, p. 421) .

The days spent outside of the Watermill spent 'following the flour out' of the Watermill, which involved visiting numerous retail outlets of varying sizes, from supermarkets to indoor market stalls, visiting cafes and bakeries , interviewing retailers, 'buyers', flour procuring proprietors and bakers. Alternatively, I would spend this time tracing the Biodynamic wheat 'back' visiting the two farms that cultivate the wheat grain working with the farmer at Station Road Farm during the autumn seed sowing. This tracing 'back' of the wheat went further, as I visited and interviewed the seed distributor and their contractors, the farms and farmers that cultivate the seed, and finally exchanging emails with the seed breeders.

Occasionally the rhythm was broken by attending events that took several days, such as the Biodynamic Associations AGM and the Sustainable Food Trust Inaugural Conference. In doing so, I travelled the length and breadth of the UK, from the Scottish Boarders to Southern Counties, across from the Cumbrian coastline to the Lincolnshire Wolds, interviewing, touring, visiting and participating in events and gatherings. Each day was documented through extensive notes in my fieldwork journal and, where it felt appropriate or necessary and possible, through photographs. However, just as with taking notes I felt that it would be detrimental to take photographs at the Watermill during the initial and main part of the ethnographic work. In practical terms the ethnography was achieved through a combination of research techniques 'rooted in the ideal of participant observation' (Falzon, 2009, p. 1): observation, note taking, interaction, discussion, interviewing, examining literature, photography.

November 2013: Depth or Breadth?

Life continued in that way for three months and with the time allocated for the first case study drawing in, it was becoming ever more apparent that the most fundamental aspect in this approach was time. It is time that allows for the development of relationships, understanding and exploration of social theory, as the ethnographer investigates 'social processes in everyday settings' (Hammersley & Atkinson, 1995, p. 24). However, by mid-November I was only just discovering the wheat seed. Moreover I was struggling to establish willing participants on the consumer 'side', people just weren't that keen to have me in their kitchens whilst they used the flour. These things together meant that it was

taking longer than I had anticipated investigating the production-consumption to the depth I hoped for.

It became clear that there was a choice to be made between breadth, continuing with the original research plan, and depth, staying with the Biodynamic organic wheat and dropping the other two case studies. A major factor here was the fact that I had not long been 'in the field' when the three case studies, or at least my relationship with the proprietors of each enterprise, took quite different paths. Whilst there was a good relationship with Noel and Annabel at the Watermill, which had felt solid from the start, and an excellent communicative relationship with Marion at Rowan Tree Farm. Marion sent regular enthusiastic email exchanges informing me what was happening and any key events I should be aware of/ in situ for. The same was not true for Fred & Wilson's box scheme. In stark contrast to that of the Watermill and Rowan Tree Farm, despite the research having been arranged in very much the same manner, following the same pattern of emails and meetings, there was not quite the same quality of rapport between us. Following the initially meeting and agreeing to participate in the research Fred & Wilson's organic box scheme, despite being present in the Watermill tearoom as the fruit and vegetable boxes arrived weekly, fell silent.

Following some deliberation the decision was taken to go for depth. Given that the Biodynamic organic wheat following was yielding very interesting data and, upon reflection, the three studies were intertwined and thus the research design could be simply reconfigured. In this new approach the position of Rowan Tree Farm and Fred & Wilson's organic box scheme would be that of context for the central case study. Serving to illustrate the network that the Watermill was embedded in, focusing on their relationship to the Watermill, their use of flour or their role in the 'production' of the Watermill. Which would be easily implemented given that the vegetables, salads and fruits served in the Watermill tearoom were from Fred & Wilson's, the flour from the Watermill was being used in food preparation at Rowan Tree Farm, the honey produced at Rowan Tree Farm was served and sold in the Watermill and that the fruit orchards of Fred & Wilson's were on Rowan Tree Farm land.

'Every field situation is different and initial luck in meeting good informants, being in the right place at the right time and striking the right note in relationships may be just as important as skill in technique. Indeed, many successful episodes in the field do come about through good luck as much as through sophisticated planning, and many unsuccessful episodes are due to bad luck as bad judgement'

(Sarsby, 1984, p. 96)

Shortly after this decision was made, when I was in the process of setting up meetings to discuss and inform Marion and Fred & Wilson of the changing format of the research, the proprietors of Fred & Wilson's were affected by a sudden change in the personal circumstances. This ill fate meant that it was only really appropriate for me to conduct just one further interview with them, discussing their relationship to the Watermill and to the organic movement.

Following the decision to focus on the Watermill and following the wheat I also met with Marion at Rowan Tree Farm to discuss the new direction. Although a little upset at first Marion soon returned to her gregarious self when I explained that I would still want to understand the work of Rowan Tree Farm as context in addition to the relationship with the Watermill. We agreed that, come the New Year, I would spend regular time at Rowan Tree Farm, learning of the broader work of the farm, its connections to the Watermill and the use of the Watermill's flour in the context of home life and the Farm work. Having established the new direction, I continued to work at the Watermill, learning about the wheat grain and its transformation, via stone grinding, in to flour, up until Christmas.

January to April 2013 Tracing Forward and Back

The months from January to April were spent working in the Watermill Tearoom, watching and learning how to make the various flour based goods (bread, scones, cakes etc.) and helping out where I could. Which often meant maintaining the fire or doing the washing up. The inclusiveness I had experienced in the Mill with Clive and Neil was not replicated with most of the women that work in the tearoom. I was not given the opportunity to become part of the daily 'team', part of the tearoom, as such. I was allowed to assist with certain tasks where invited to do so.

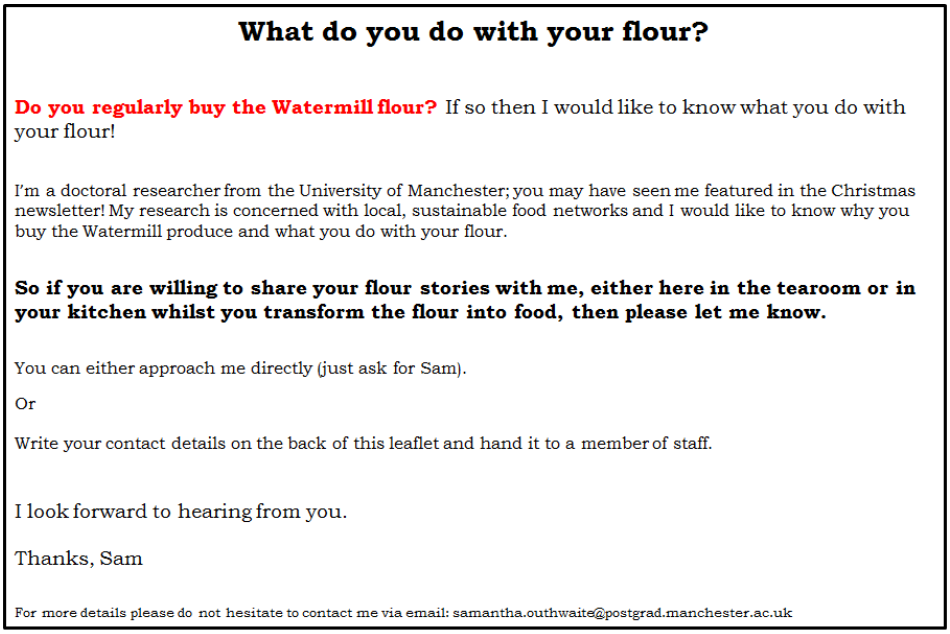
It was an interesting situation, it became clear that 'access does not finish when you have made contact and gained entrée to the group. You still need access to people...Simply because you have gained access to an organisation does not mean that you will have an easy passage through the organisation' (Bryman, 2008, p. 408). However, the time in the tearoom provided an opportunity to talk with many customers buying flour and diners in the tearoom. During this time I also participated in the bread making courses at the Watermill, wherein I learnt how to make bread with the Watermill's flour and according to their logic. This too provided lengthy amounts of time to converse with people new to the Watermill, its' flour and bread making.

Also across the late winter and early spring months much time was spent seeking out ways to follow the flour out into the site of consumption, in its broadest sense. Despite direction from Noel and Annabel of whom to approach, indeed by this time they had developed a keen 'appreciation of the research'[10] pointing me towards 'situations, events, or people likely to be helpful to the progress of the investigation' (Bryman, 2008, p. 409), I was still struggling to gain access by the end of January. In an attempt to recruit individuals softly I designed an A5 leaflet (Figure 7). This leaflet was stacked on top of the flours in the tearoom, where individuals considering their purchase would see it, and put in with flour mail orders being dispatched. Finally, in mid-February I began receiving emails from consumers telling me their 'flour stories'. Each of the emails I received continued into longer exchanges and in-depth accounts of how they used the flour and why. As the exchange developed some individuals agreed to telephone interviews and others made and sent videos of how and what they did with their flour.

Furthermore, I spent numerous days at Rowan Tree Farm, learning of the broader work of the farm and its connections to the Watermill. This meant attending Farmers' Markets, collecting the processed beasts from the butchers, observing and participating in educational visits, collecting flour from the mill amongst other activities. First and foremost, however, in this time I was concerned with Rowan Tree Farm as a site of regular consumption of the Watermill flour, and this was in the end the only kitchen, apart from my own (quite soon into the research I began using the flour to make bread every week) and that of the Watermill tearoom, that I made it into.

Whilst this is not what I had hoped for, in terms of exploring production-consumption, consumption need not be black boxed here. Every day I consumed the wheat together with many others, discussed the food, the politics, the problems and the solutions it manifest. So although consumption was not perhaps addressed in quite the explicit manner in which I had hoped it was nonetheless a large aspect of each day of the fieldwork. It is also important to acknowledge that the research and thesis became something other than I had planned as following led it away from these original premises.

[10] Certainly Noel and Annabel where very forthcoming with contacts and events, but not always it became clear that they were selective of whom they put me in touch with and which events they told me about, particularly regarding activities they were involved in.



What do you do with your flour?

Do you regularly buy the Watermill flour? If so then I would like to know what you do with your flour!

I'm a doctoral researcher from the University of Manchester; you may have seen me featured in the Christmas newsletter! My research is concerned with local, sustainable food networks and I would like to know why you buy the Watermill produce and what you do with your flour.

So if you are willing to share your flour stories with me, either here in the tearoom or in your kitchen whilst you transform the flour into food, then please let me know.

You can either approach me directly (just ask for Sam).

Or

Write your contact details on the back of this leaflet and hand it to a member of staff.

I look forward to hearing from you.

Thanks, Sam

For more details please do not hesitate to contact me via email: samantha.outhwaite@postgrad.manchester.ac.uk

Figure 7 Leaflet

The spring months also brought about further investigations into the seed, stemming from the winter and spring seed sowing across the two farms. Seeking out the seed distributor, seed contractors and tracing the seeds back to their origins and original seed breeders. This marked a divergence from the more participant-observatory practices towards more in-depth interviews and email exchanges, although this is not to say that the investigation was somehow no longer ethnographic:

> *'not all sites are treated by a uniform set of fieldwork practices of the same intensity. Multi-sited ethnographies inevitably are the product of knowledge bases of varying intensities and qualities'*
>
> (Marcus, 1995, p. 100)

The fieldwork finally came to a conclusion at the end of April, but this was not the end of the research. The research has been ongoing throughout the creation of the thesis, with regular communications with some participants and key informants as well as broader forms of investigation and exploration. Certainly, as a consequence of the direction away from the imagined trajectory, there was a need to commit time to establishing the broader historical context of the network, Biodynamics, bread and wheat.

This chapter has storied the ideas and aspirations underpinning the methodological approach to the research as well as the actuality of the fieldwork and the path it took. By following the food thing from its socio-ecological origins to final end, forwards and backwards, vertically and horizontally as required the network that both makes up the food

thing and which it is embedded was allowed to emerge organically. In adopting an ANT inspired faith following of alternative food things, attention was paid to the 'recursive relational organisation of socio-material networks, reflecting the mutually constitutive material and symbolic interactions between production and consumption' (Lockie & Kitto, 2000). Furthermore, this methodological approach, worked to elucidate the actors/actants, relations, discourses, practices and knowledges fundamental to the (re)production of the BOB wheat network and the social life of BOB wheat specifically. Before moving into the ethnographic (data) chapters that narrate the social life of BOB wheat it is important to clarify the terms in which the world I encountered was interpreted and analysed. As such the following chapter maps out, in greater depth, the guiding conceptual and theoretical framework of this research.

Chapter 3 Drawing Out the Network Part I: Heterogeneity, Hybridity & Networkiness

Figure 8 A Visual Representation of the BOB Wheat Network

Introduction

Drawing on the multi-sited ethnographic following of British Organic Biodynamic (BOB) wheat, this and the following two chapter works together to outline the 'hazy relations between commodity producers, consumers, and those in between' (Cook & Harrison, 2007: 40; Cook et al., 2006). Whilst the division of the account should not obscure the continuity of the BOB wheat network each chapter does work to reflect the BOB wheat through different theoretical concepts. The objective of these empirical chapters is to quite literally draw out the social life of BOB wheat, to sketch out the actants (human and nonhuman, material and semiotic), relationships, processes and transformations that make up the network, that the following revealed. In doing so there arises the question of where to begin? The BOB wheat actor-network, like all actor-networks, is a persistent circulation of entities, interconnected, overlapping and feeding back. However whilst there is no desire to impose a particular logic or chronology, in making intelligible this messiness (Law, 2003; 2007) is unavoidably ordered. So, where should we begin? In answer to this here we turn to Latour (2005) who suggests it is best to begin in the middle of things, *in medias res* (p. 27).

Whilst, ideally the narration of the social life of BOB wheat, of the network, would here follow the same path of discovery as in the research itself the conventions of presentation delimit this. Moreover, even if presented in the ideal fashion the narration itself infers more order than the capricious reality of the nature of the fieldwork. Subsequently, in order to make the BOB wheat intelligible the narration is broken down into four parts, reflecting the four sites within which the BOB wheat's life is performed. Here, in part one of Drawing Out the Network, the work of Biodynamic Farm is storied. Part two explores the Seed, the Seed Breeding Station and Merchants, as well as the concepts of translation as a means by which to understand the coproduction of relations. Finally, part three narrates the activities of Watermill and beyond, the BOB wheat is transformed and consumed. It is important to note that there is no claim here to presenting a full account of the BOB wheat network for several reasons, most prominent of those being that (in the spirit of ANT) it could never be complete, and would always be incomplete (Law, 2002; Nimmo, 2011).

These three chapters are heavily ethnographic chapters, descriptive and storying BOB wheat. Weaving through the seed from breeding to certification, the grain crop's cultivation, harvest and milling, and the final transformations from flour to real bread and its consumption. They form the foundations for the deeper theoretical analysis that follows wherein the interconnectedness and complexities of the network are brought to the fore in the exploration of multiple wheats, their performances and enactments through practices and their inextricable connectedness. The intermittent theoretical reflections, through the ontology and key concepts of ANT are a lens through which the world maybe understood, storied and, more importantly, the framework through which the BOB wheat network was experienced, interpreted and unpacked. The objective here is not to attempt to contribute to the theoretical debates concerned with ANT, whilst they will be considered to some extent, nor further social theory. In delineating the framework and concepts these chapters begin to introduce BOB wheat, the actors, the network, the processes by which the relationships are (re)constructed and the assemblage maintained and lengthened. ANT here, then, is used as a tool by which to talk about BOB Wheat.

The Farm: Cultivating Biodynamic Wheat Grain

Wheat Grain Harvest

The following of the wheat, that is to say the (very literal) fieldwork, truly began with the wheat grain harvest at Station Road Farm on the 15th of August 2013, only eleven days after my initial visit to meet Leonard. It was only 7:30am when I set out on foot to the farm but it was already a warm day with sun beating down drying the fine morning dew. Nearing the farm I took the public footpath that runs downhill through the 'top field', rather than

taking the road route round. From the stile at the crest of the field the entirety of Station Road Farm fills the view (Figure 9) it was immediately obvious that the landscape had changed, the patchwork of colours and movement of the landscape was quite different a few days earlier, some of the fields were now flat and motionless whilst others still rippled with crops an even darker golden hue.

Figure 9 Station Road Farm

Walking down the broad slope the ground was hard, the ashen soil, peppered with flint, covered only by a thin dry spread of grass (over the last growing year this field had been for grazing however in the new rotation of the coming winter it was due to be sewn). Whilst from here Station Road Farm appears as one unit it is most certainly two separate enterprises as the farm is divided between Leonard and his brother. Leonard, our Biodynamic farmer, manages approximately 255acres (103Ha) which roughly breaks down into 5 acres of woodland, 114 acres of cereals (42 acres winter wheat, 35 acres winter oats, 2 acres rye, 15 acres spring beans and 20 acres spring wheat), rest grass, a lea for silage and grazing as well as 30 acres of permanent pasture a few miles off the main site which is also for silaging. Although, due to the necessities of crop rotation in the Biodynamic system the split of the acreage ‘changes a bit from year to year, but not too much’. Whilst Leonard’s brother manages an organic fruit and vegetable box scheme from just one shed and 35 acres of fields, including polytunnels. Wherein he and his team, of up to 15 individuals, work to cultivate, harvest, pack and distribute both Biodynamic and organic fruit and vegetables.

I arrive around 9 AM and after a little wandering up the dirt track through the farm I discover Leonard at the 'new shed'[11]. Stood out in the sun wearing earth-filthy jeans, a navy blue t-shirt and beige cap he was in the company of a stockier man in comparatively clean deep green overalls (a mechanic by trade but a 'part-timer' at Station Road Farm working mostly with Leonard's brother across on the vegetable side of the farm). After a brief greeting the day's work began. Walking across to a heap of rich golden grain, spotted with green and browned poppy heads, Leonard thrust both arms deep into the mound. Simultaneously Leonard explained that he was checking for heat, excess warmth and damp, as dampness in the grain is risky, leading to the generation of living bacteria that in their activities create heat which can lead to combustion.

Follow up on his assessment Leonard retrieved an alloy bodied canister with black plastic features from the tractor. Holding it in his left hand he scooped up a handful of grains with his right and proceeded to filtering a steady stream of the grain through his fist, held several inches above the head of the canister, into the canister body. So practice at this that barely a single grain bounced away on the black edges. Having filled the canister and screwed on the black cap Leonard addressed the illuminated display and the hidden technology of the canister. Selecting the correct grain on the screen, in this case wheat, the canister was set to work measuring the levels of moisture, or the water content, in the grain. This moisture reader, more formally regarded as a 'portable grain moisture tester', is the technological or scientific equivalent of thrusting your arms into a heap of grain. This grain, Leonard explained, had been harvested the day previous and was resting in the 'new shed', waiting to be dried, cleaned and stored. But as all grain from the point of harvest is risky, due to potential high levels of dampness, it requires monitoring. Hence a primary and secondary supportive assessment, from the moister reader, disclosing to Leonard that the grain is not so damp as to prove at risk of combustion but not so dehydrated to negate processing through the Grain Dryer prior to winnowing and storing.

Actants, Actor-Networks

Here already we have a constellation of human and nonhumans interwoven, interdependent and co-produced (Murdoch, 1997). Indeed, the principle position of this thesis is that no one actor, human or otherwise, is a discrete singular entity. Actors[12] are constructed and

[11] The 'new shed' had been constructed a couple of years previous to the research to house both the Grain Dryer and the new combine harvester that Leonard was due to acquire at the time. As such the 'new shed' was built for purpose, with a grain pit at the foot of the Grain Dryer, and large enough to house the Grain Dryer, the new thirty-six foot combine harvester as well as several tonnes of grains, in addition to a tractor and trailer.

[12] Here actor, actants, networks and actor-networks are used interchangeably as they all are taken to represent the same thing.

enacted through relationships, through the interaction of multiple entities, and are thus 'made to be by other actors' (Latour, 1996a, p. 255), the environment, or 'nature', isn't external to farming itself (Tovey, 1997, p. 24). The 'grain moisture tester', the farmer, the farm are all 'artful arrangements of bits and pieces… visible and invisible, present and past' nature and culture (Law, 1994). Certainly, the canister would fail to be without the grain, moisture and farmer, whilst our farmer cannot be so without the grain, land and canister. Together these 'social' and 'natural' actants constitute the Biodynamic farm, enact the harvest, and perform Biodynamic wheat grain and so on. All actants, then, are hybrid networks, heterogeneous contingent assemblages. Subsequently, associations make up the basic elements of the 'social', society being 'not what holds us together, it is what is held together' (Latour, 1986c, p. 276).

Importantly, this metaphor allows us to envisage the varying connections between human and non-human social actors whilst centralising the material coproduction of food networks, food things and the (re)production of that is in between. Always overlapping with other actor-networks, there are no purely social actors or relations. Human-plant networks are comprised of people, plants, rain, machines, soil, silos, government policy and financial instruments among other things (Head, et al., 2012, p. 3). The interactions of the natural and the social are irreducible, intractable and relentless in their acting upon each other. Thus social relations are not independent of the material and natural world (Latour, 1996a). Moreover, an entity may only become an actant in relation to other entities, as an actant(-network) is something 'granted to be the source of action…something that acts or to which activity is granted by others' (Latour, 1996a, p. 373). All entities require others to incite action, movement, or act, revealing the 'networky character of actants themselves' (Latour, 1996a, p. 373).

Returning to Leonard, throughout this discussion in the 'new shed' it became ever clearer that the harvesting of a crop is made up of several stages that begins with the reaping and threshing before moving over to winnowing, drying and storing. Reaping being the cutting and gathering of the crop, whilst threshing is the process by which the grain is separated from the chaff and the straw (stem). Whilst winnowing is a cleaning process wherein 'foreign' bodies, such as other seeds or grains, are filtering out from the wheat grain before the grain is finally dried and stored. Storage though is not a static time, as this is when samples are sent out to governmental laboratories for regulatory tests prior to exchange and distribution. Yet, before even reaping it must be established that the grain is ripe and

dry enough to harvest, too early and Leonard risks both yield and quality ultimately translating to economic losses. Once the wheat is ripe the moisture levels in the grain become the problematic vector, too damp and the grain poses both a fire risk and an economic drain, as it requires lengthy drying. Too dry and the grain starts to lose its carbohydrate stores (flour), moreover the crop could wither in death all together. Significantly, this 'natural' balance has been bureaucratised and written into national and international guidelines and governmental regulations, as part of quality control and management[13] of agricultural produce.

On a daily basis Leonard walks the holding, observing and surveying the crops and Luing cattle, often if necessary moving the Luing and pulling toxic weeds from their grazing pastures. However, as the late summer rolls in this surveying heightens with regard to the cereal crops. The wheat is checked on a daily basis for ripeness and dryness, using both 'traditional' techniques such as structure and colour observations, as well as 'cracking' the wheat grain in addition to 'modern' practices, specifically deploying the moisture reader.

Figure 10 Wheat grain ready to be harvested

As these ripe qualities quicken Leonard's monitoring of the weather escalates too, checking the Meteorological Office[14] detailed reports not just daily, UK 5-30 day forecast, but every few hours, using the UK 3 hour site specific forecast . At this point, when the

[13] Best Practice and Guidelines for the UK and EU, see HGCA Armitage et al (2008).

[14] The 'Met Office' is a Public Weather Service funded by the UK government that provides a range of information, but specifically generates day-to-day site-specific forecasts and long range forecasts that form an important tool in farming practices. Particularly at key points in the growing year such as harvest and seed drilling. For further information please see The Met Office webpage http://www.metoffice.gov.uk.

grain is ripe and drying but not so far dry that losses are incurred, the harvest is coordinated as best as possible with the Biodynamic calendar[15] and the precarious British weather. Subsequently, the crop maybe ripe although not quite as dry as it should be at the point of harvest if it is due to rain or be overcast for days or even the next few hours, as electing to not harvest the grain might prove cataclysmic.

In terms of the wheat harvest, specifically, Leonard had decided that Thursday 15thAugust 2013 was the best day to complete, as the grain was ripe (cracking) and dry enough, whilst not too dry, as it had been dry(ing) for number of days in the good weather. Furthermore, it is was due to rain on Friday 16th which would lead to a need to dry the grain which has reasonable economic implications in that the grain dryer is powered by diesel and expensive to run as well as increases the riskiness in terms of loss as the grain itself as it becomes more unstable. On the day of wheat harvest then all things were as best as possible, even to the extent that the moon phase, it being in Sagittarius, a fire sign and thus a fruit day, made Thursday 15th August the perfect day for action. This kind of harmony across the wheat, weather and Biodynamic calendar was, Leonard explained, mildly unusual. Although not rare, it just doesn't always work out that way, and often the Biodynamic calendar has to give way to the weather conditions. Moreover, Leonard continued to outline that the Biodynamic calendar was more important at other points in the growing cycle, with the harvest being the least important, contending that he wasn't sure it made much of a difference at harvest, however it was of greater importance in the sowing and growing stages.

Overnight it had rained very slightly, Leonard pointed to the dry dirt track and the 'fresh' tractor tyre markings, where yesterday there had been a maze of tracks, indicating that dusty earth had been evened out by a change in the weather, there were even a few discernible rain droplets in the dirt. Consequently, it was important to give the crops time to dry, to allow the morning dew to burn off under the morning's sun, bolstered by a 'good dry breeze'. However, it being mid-harvest there where jobs to be done tying up the harvesting of the previous day, drying grain, hand sieving, winnowing, storing and cleaning of the equipment and storage areas. Once the harvest is underway the seemingly chronologically ordered processes of reaping, threshing, winnowing, drying and storing are overlapping, and intersecting even, at times, occurring simultaneously. Certainly, the

[15] The Biodynamic calendar is a lunar calendar that plots categories of plants (roots, fruits, flowers and leaf) over moon phases as deciphered via zodiac signs (earth, fire, air and water respectively). The calendar was developed my Maria Thun across several decades from the 1950s and now stands at the heart of Biodynamic cultivation.

combine harvester overlaps processes as it works to simultaneously reap, thresh and winnow. Whilst some processes are duplicated, such as winnowing, which is repeated between drying and storing the grain in temperature monitored silos. Returning to the day of the wheat harvest, we begin the day drying and winnowing the grain left over from the previous day's harvesting whilst the warmth of the day is allowed to rise and further dry the wheat crops.

Finally, come late morning the harvest of the BOB wheat begins. The initial stage of the harvest requires at least one person (Leonard) and if possible two (either a farm labourer, in the past his father and that year it was to be me), a combine harvester, of which Leonard has the smallest available (36 foot), a tractor and a trailer. Leonard operates the combine harvester whilst I'm in the tractor pulling the trailer. As Leonard mows his way up and down the field (Figure 11), I wait for a signal to pull the trailer up to the combiner, so that Leonard can make the harvest as efficient as possible. By pulling up to the combiner when the grain store is full, Leonard can operate the auger on the combiner and empty the store. Then whilst I am running the grain away from the field, down the farm lane to the first of three grain stores, Leonard can continue on with the harvest. In this first grain store the grain is tipped from the trailer either into a corner or directly into a deep pit, at the foot of the grain dryer, ready for drying (Figure 17). By the time I return with an empty trailer the combine harvester grain store will not be far from full again. Or at least this is the ideal scenario, possible with experienced farm labourers, but not with someone who requires training in the operation of such machinery and mechanics such as a researcher. This to-ing and fro-ing will continue throughout the warm day light hours and even into the night. The window for harvesting is so very small that farmers must take full advantage of the time they have.

Figure 11 Leonard Harvesting Biodynamic Grain Whilst I Await the Signal.

For a time I jump in the cab of the combine harvester with Leonard, this slows the harvest a little as Leonard beings to operate as though working alone (Figure 12). This means leaving the tractor and trailer by the field gate and strategically timing the emptying of the harvester's grain store (so as to not get to the far end of the field and run out of storage leading to a wasted run back down the field). As we begin to move up through the field of wheat we are enveloped in life. The field is alive with ladybirds, butterflies and other flying insects as well as birds spiralling up out of the wheat just ahead of the rotating reel. Behind us, visible through a small porthole, bugs are crawling around inside the grain storage tank. The field of wheat simply was alive, the vibrancy and diversity of its life was striking. Upon commenting on it Leonard recounted harvesting a couple of fields for his 'Conventional' neighbour one year, after his harvester broke down. Leonard described those fields as 'dead', nothing moved, there was no life and the harvest as monotonous, there were no weeds, no jams, no problems. The description of the neighbouring farm's harvest stood in stark contrast to what we were experiencing, not just the cornucopia of life but this harvest was anything but smooth as the dense patches of 'weeds' in the fields caused very particular problems.

Figure 12 Leonard Working Alone, Displacing the Grain.

'Weeds' are an issue in Leonard's harvest, the farm being Biodynamic, organic, and thus spurning the use of artificial fertilisers & pesticides. Despite the 'weeds' harvesting is a long, steady and highly strategic process. Calculations are made on how best to cut so as to avoid going back on ones' self, or making the job longer than it needs to be, calculations that are made all the more challenging by the fields being far from square, rectangular, or regular shapes. Yet, the harvest is made significantly more difficult and slower when the combiner hits the green 'wet' 'weeds', it is harder work for the cutting blades, meaning the speed at which the combiner can travel must be reduced. Although often moving slower is an act in vain, as the weeds get caught up around the Feeder (two helical structures feeding in towards the middle), the noise emanating from the harvester changes and the blades are no longer effective in cutting. When this happens it requires the whole header to be lifted and for the harvester to reverse away from the crop until the blockage clears by unwinding itself. This is not the only problem the 'weeds' cause as they also get caught up and gather on the inside crop divider which works to eventually wedge the divider and pull the whole machine off course. This requires again for the header to be lifted, and then dropped again, whilst still reversing. It is a particularly deft movement given that the Harvester is controlled via a joystick. In both instances the 'weeds' once freed from the header or divider must then be eaten up by the harvester so as not to pose a further problem. Although, Leonard informs me whilst dealing with a particularly difficult patch, that this is not the only problem 'weeds' pose, as beyond the process of harvesting, they work to reduce yield and increase the risk of heat in the grain stores.

Harvesting the crop is high monotonous and repetitive, with the view changing little with each passing. With a small but steadily increasingly open view where the crop has been cut and the crowded area of tall wheat grasses declining. As my ride in the cab of the combine harvester progresses I become increasingly aware of the complexity of this piece of agricultural technology. There is an elaborate display of digital interfaces, buttons, dials and switches. Indeed, the contemporary combine harvester is a technologically complex piece of machinery, capable of relaying a great amount of information to the farmer-harvester. Certainly, in the least the harvester informs Leonard as to the overall yield as he works, it alerts him to uneven ground and notifies him as to when the grain store is nearing capacity. The technology here is far and beyond anything I have conceptualised but nor does it appear superfluous.

Networkiness & Actantiality

Looking in on the harvesting of BOB wheat 'grain' neatly reflects the nature-culture hybridity and heterogeneity of the assemblage of associations and entities that come together across the BOB wheat network. Most clearly drawing out ANT's central concept of the 'acteur-reseau' (Callon, 1986b), that is neither reducible 'to an actor alone nor to a network'. What we have here is a collective of nonhumans, including technologies (tractors, trailers, silos, dryers, combine harvesters, brushes), plants, insects, beasts and elements (earth, wind, rain, fire – aka the sun) as well as humans coming together to perform and enact the farm (Pugliese, 2001), the harvest, the wheat grain, and the farmer. Yet, by making no distinction between humans and nonhuman the principle of symmetry invites numerous theoretical challenges (Murdoch, 1997; Pickering, 1993; Fine, 2005). Most pertinent are those questions that regarding agency and forms of agency as means by which distinctions should be made.

Other relational theorists have contended that, on the one hand humans and nonhumans are distinguishable on the grounds of intentionality in action (Pickering, 1993). Whilst on the other, that actors are purposive and thus different to the inanimate (Crossley, 2011, p. 17). Yet, Latour (1999) contends that subjectivity, allowing for intention and purpose, and corporeality are 'no more a property of humans, of individuals, of intentional subjects, than being an outside reality is a property of nature' (p. 23). Humans, nonhumans are hybrid heterogeneous networks (Michael, 2000) and agency is an effect of these networks. Moreover, regardless of intention, questions of agency preclude to whether humans and nonhumans are distinguishable in terms of their ability to form part of a network and contribute to effect. In this respect, Law (1994) suggests that any network counts 'as an agent if it embodies a set of ordering processes which allows it (or others) to say 'it is an

agent, an actor'' (p. 34). Here other relational theorists concedes that agency and action are emergent effects of heterogeneous interactions (Pickering, 1993).

Actantiality then is 'collective and relational' (Goodman, 1999: 25) and in order to act actants must form associations, farmers with technologies, wheat grain with elements and so on. Yet, networks are more than mere associations they are active performances which together enact a series of transformations, translations and transductions (Latour, 1999, p. 15). Here interaction ignites agency, action and the enactment of actants in a persistent dynamic, wherein the 'actor whose activity is networking heterogeneous elements' is simultaneously 'able to redefine and transform what it is made of' (Callon, 1987, p. 93). Crucially, a (actor-)network is only as such when there is the mobilisation of people, texts, technologies, non-human organisms and so on. For a network to exist it must be in continuous motion, associations between actants only exist in their enactment, in interrelationship, in exchange or 'conversation' between those 'things' (Murdoch, 1997). As such (actor-)networks are persistently (re)constructed through interaction, interaction that is the mobilisation of an actant, that requires the translation of the subject-object, and some form of 'force' (Latour, 1986c). The network, the actants, then are either being produced or they are not, if they are not they do not have a capacity to act, and they cease to exist. The social life of BOB wheat then is a 'chain of translations' (Law, 2002), or a series of transformations (Latour, 1999). Without this movement, this perpetual interaction the BOB wheat cannot exist, it is a dynamic network where in actants and actantiality is in persistent co-production.

Significantly, this perpetuum mobile (Brown & Capdevila, 1999) points towards the nature of networks as expressions of the processes of translation, of transformations (Goodman, 1999). More than that, 'all reified social phenomena' being an 'effect of actants interactions within networks of hybrid social relations' (Latour, 1996a). Furthermore, as an aspect of actantiality, hybridity gives rise to actor's identity, subjectivity, intentionality, and therein morality (Latour, 1999, p. 18). Crucially, it is the networky character of actants and the subsequent 'morphology of the relations in which they are involved' that ultimately shapes actant(-network)'s dimensions, that is what they are and do (Callon, 1999, pp. 185-6). Consequently, agency is a particularly pertinent question in its relation to questions of power.

At completion the wheat field is left only with stubbed straw spears sticking out of the ground and levied rows of long lengths of straw (Figure 13). Nothing is wasted, however, as straw is an important element in the closed farming system, being fermented (silaging)

and used as winter feed for the Luing, as well as an additional exchange commodity given there is enough beyond that which is required. As such, straw is bailed ready for storage, use or economic exchange. Much like the grain it is considered important to get the straw bailed at the right time, when the straw is dry and before any less than good weather rolls in. Although for Leonard there is the additional factor of not owning a bailer and thus he is required to contract out this element of the harvest. The contracted 'bailer' is a neighbouring farmer and as such the timing of the bailing is negotiated.

Figure 13 Straw Fields: Following the grain harvest but before bailing.

During a break from the harvest the contracted 'bailer' calls in with the number of bails bailed across several other fields. Leonard, using a piece of chalky stone from the ground draws the figures on the tractor tyre (Figure 14). The figures represent Leonard trying to work out whether there is enough straw to silage for the Luing's winter feed.

Figure 14 Bail figures: Chalky Stone Notes on Tyre.

Soon after returning to the harvest the 'bailer' arrives in the adjacent field and begins, comparatively speedily, turning through the field. Once we spot him Leonard suspends the harvest and dashes across to the field the 'bailer' is working in. Together Leonard and the 'bailer' talk and handle the straw, assessing as to whether the straw is in fact dry enough to be bailed (this Rye crop had only been harvested the day before). After some discussion and several grabbing's at the straw, where they appeared to be (and as it turned out were) checking that the straw closer to the earth was equally dry, the decision is made to go ahead, especially as it is due to rain the following day. Whilst Leonard returns immediately to the harvest I stand for a few minutes and observe the 'bailer' in action. The tractor pulls the bailer, which looks to be a yellow box on wheels, and moves very quickly through the field. Every minute or so the yellow box opens, the upper jaw lifts, and a tight and neatly rolled bail of straw is gently turned out (Figure 16).

Figure 15 Discussing the Bailing of the Straw

Late in the afternoon the last of the wheat is harvested, the combine harvester's grain storage tank is emptied for a final time into the trailer, and the tractor-trailer-and I make one last run to the 'new shed'. Leonard follows in the harvester. Here, where the grain dryer is housed, the grain is stored before being dried and for one last time this summer the grain is tipped into a trench at the foot of the grain dryer (Figure 17 & Figure 18) ready for being dried the following morning.

Figure 16 Bailing in Action

The grain dryer is a diesel powered hot air convector system, in effect an oversized turbo powered tumble dryer. Large heaters and fans work to dry the grain, fed to the dryer via

augers, whilst the concurrent flow of hot air pushes the drying the grain, it becoming lighter, to the far end of the funnel to the drop out shoot. As both the grain and air are moving in the same direction, the wettest grain, as it is heavier is exposed to the hot drying air for longer, subsequently all grain leave the dryer at the same temperature and the same moisture content. Dropping out of the shoot the grain is, once again, collected in the tractor-trailer ready to be transported the short distance down the lane to the 'old shed' housing the winnower. Here, again, the grain is deposited in a trench. All the while Leonard is surveying the grain, picking out large thistle heads. He informs me that at this stage some of his crops require cleaning by hand, using pan sieves, as various 'weeds' with large heads, such as thistles, can be present in large volumes and not only cause problems, blockages in the equipment, but are an economic drain (to the effect of - why would he want to work to run the grain dryer for longer to dry something that is of no value to him at all).

Figure 17 Tipping Grain

Figure 18 Grain Dryer

The morning breaks with light rain, fulfilling Leonard's weather expectations and supporting the decision to harvest the last of the crops, of the wheat, the previous day. The day begins with work to wrap up the harvest, drying, winnowing and storing the wheat harvest. Following the wheat being dried, it is deposited in the trench at the base of the winnower, ready to be 'cleaned'. The winnower is the mechanism by which grain is 'cleaned', it is something of a big automated sieve. There are two stages, the first, following the augur transporting grain from the pit to the height of the winnower, uses air to blow the chaff off the grain. The chaff is propelled down a long cylinder and released 'south' into the far end of the 'old shed'. The grain then drops down a level on to the sieve plate, of which there are different ones for different grains, which is moving back and forth in short, fast rhythm. Here anything that doesn't fit through the pores is 'rejected', running to the end, in the same direction as the chaff above, and dropping to the floor.

At this stage the process of cleaning can be doubled up with storing the grain, if there are two bodies working at the winnower at once. Given my presence Leonard took up the job of ensuring that the 'clean' grain being deposited on the 'north' side of the winnower was being fed to an augur which, in turn, fed one of the eight silos in the adjacent compartment of the 'old shed', as well as monitoring the filling of the silos and modify the track of conveyor belts if necessary. Whilst I was given the 'south' side of the winnower, where I worked to brush back in the grains that had passed over the sieve without dropping through. Double and even triple grain heads get stuck, blocking the pores of the sieve leading the grain to flow over and be 'rejected' as oppose to dropping through. My task was, whilst

stood on the chair to the side of the violently shaking winnower with the deep grain trench just a small distance behind me, to brush back and forth across the sieve (Figure 19 & Figure 20) and thereby save grain from being rejected.

Figure 19 Winnower: Standing at My Work Station

Figure 20 Winnower: Leonard Shovelling 'Clean' Grain

Once all the grain has been 'cleaned' and transported, via an augurs and conveyor belts to the storage silos, it was time to clean the winnower, the grain trench and the general area,

so as to not contaminate the next crop of cereal grain with remnants from the previous. Leonard uses an industrial vacuum and brush to clean the entire area. This was also an opportunity to make sure that all the grain was cleaned and stored, thus avoiding as little loss as possible. The grain being cleaned and stored represents the end of the harvest, however the grain is not quite ready to be shipped off to the Watermill just yet. Leonard is required to send samples of the wheats for analysis and testing at national laboratories, in accordance with national regulations. Whilst further small samples of both spring and winter wheats are sent up to the Watermill, for their assessment. Eventually, having been legitimated by the laboratories (which is of no significance to the Watermill as no matter the reported qualities of the wheat grain 'officially', the grain is Biodynamic and thus of superior quality to all other wheat available) the first lot of grain is transported, using a local family owned bulk transporting company (Leonard uses the same firm every year), to the Watermill in the late autumn, although it will not be milled until Christmas at the earliest.

Seed Drilling

Each year both Biodynamic farms produce a winter and a spring variety of wheat, both possessing qualities suitable for stone milling and bread making, however, these are not necessarily the same varieties. Some years between the two farms three or four different varieties of wheat are cultivated, leading to a 'grist' at the Watermill. In the year previous, both farms cultivated the same winter and spring varieties (Magister and Paragon), whilst the harvest I was witness gathered three varieties across the two farms (Magister, Paragon, and Daphne). Leonard at Station Road Farm had, in the previous year taken the decision to cultivate Daphne, a newly released variety, as well as Magister, whilst the other farmer had elected to cultivate the same varieties two years running (Magister and Paragon). Once again, this winter Leonard had chosen to cultivate new varieties, Nelson and Crusoe.

Following the harvest in August, then, the land is left to rest, the roots of the harvested crop 'return' to the essential components of the earth. October brings with it winter, wherein the farmers begin planning to preparing the land for 'seed drilling'. That is the sowing of the 'C2 organic' seeds (what 'C2' means exactly will be covered later, however, the 'C2' status is what is most important) from which the coming year's grain crop will spring forth. Whilst the immediate task is to till the soil, which is to carve up and rotate the soil, preparations for sowing began months in advance of these wintery days. What is more is that it could be argued that the strategic planning never really has a start date because it never stops. Not only have our farmers been planning which varieties of wheat they will

cultivate, where these specific crops will be sown, at which time, and in what quantities as a matter of practicality, but also meeting contractual requirements whilst balancing the needs of the farm as an economic, Biodynamic and value laden venture.

In this planning and practical cultivation it is the Biodynamics that take precedent, this isn't to say that economics and the viability of the farm are secondary, certainly the two are inseparable. The integration of Biodynamic principles means that the sowing, certainly all activities regarding wheat, is where possible done on fruit day. Having long since prepared the components for the 'preparations'[16] Leonard is primed for the sowing of the winter variety around the end of October, early November (the spring variety is sown late February, March). The timing of the sowing is led by the weather, the temperature being the lead factor with rain, or the prospect of it, and its threat of producing soft muddy ground coming second. Following the weather and ground conditions the Biodynamic calendar enters into the considerations, much like the harvest timings are about balancing various demands and to some degree, at times, compromise.

Whilst then the soil is still warm and moist enough to encourage germination, but not so wet that the earth is soft and would be compacted, as compact earth encourages 'weeds', by driving heavy machinery the winter seed is drilled. The same rules apply but almost in reverse for the spring sowing it is a matter of waiting for the ground temperature to come up, the frosts to pass and the earth to dry a little. As such, when the most appropriate conditions avail the preparations for winter seed sowing commences. Initially this means dragging a soil rotator across the land that is being sown, the rotator gouges into the earth, turns and lifts the soil 180 degrees. The gouges of the tilling are deep, easily 30 cm, and the land becomes loose and fluid, moving smoothly under pressure, I discover walking down to the farm via public right of way through the 'top field' (

Figure ***21*** & Figure 22).

[16] Whilst some of the preparation components, such as ground quartz or pressed Valerian flowers, and whole preparations can be bought, for the most part provisions for the 'preparations' are made up by hand by Leonard about a year in advance of the preparation's application. With a variety of flowers in bovine intestines or bladders, 'changed manure' packed in to cow-horns, and oak bark in the skull of a cow or a sheep and more besides being buried. Later, at the appropriate time, just ahead of application, the components, correctly measures, are stirred into the water, stirred in alternating direction (to instil cosmic energies in the preparation) for an hour and then applied to the ground or crops.

Figure 21 The Tilled 'Top Field'

Figure 22 The 'Top Field' From the Perspective of the Farm: A Stark Contrast to the Images of the Summer

Leonard tilled the fields in the days prior to 'drilling day' and thus the day is to be spent sowing winter wheat seed. The morning of the 30th October commences with the seed driller being hooked up to the tractor and loaded with a tonne of seed (Figure 23).

Figure 23 The Seed Driller Being Loaded with 'C2' Nelson Winter Wheat Seed.

Having loaded up the driller with seed Leonard works to set the seed drop rate, which despite the drop being less than exact is quite a delicate and precise task. At the base of the seed bin there is a mechanism controlling the rate of seed release, without it the seed would run out uncontrolled at a terminal velocity. This release mechanism is not dissimilar to a waterwheel, except that the force turning it is friction between the earth and the large toothed wheel at the very end of the driller. As the tractor moves forward, dragging the seed driller, the relationship, the friction, between the earth and this wheel enact a rotation in the wheel. The wheel, via a system of shafts and cogs, is connected to the seed release wheel which has buckets (just like a waterwheel) that collects the seeds and as it turns dispensed amongst the tentacles. Due to a number of factors the drop is inexact, however the mechanism can be set to release at a specific number of rotations of the wheel, setting a distance between the seeds as they are released from the seed bin.

The drop rate, then, translates into wheel rotations and rotations translate into distance. The number of rotations can be selected via a count-display, this varies from crop to crop but beans for example would need more space than wheat and thus the number of rotations needed would be higher to increase the distance between the seeds as they are dropped. In setting the drop rate Leonard opens a small hatch just underneath the seed release mechanism, allowing him to hold a bucket under the wheel and catch the seeds as oppose to them funnelling down the tentacles. Then a second person (me) turns the now elevated

toothed wheel, setting the while system into action, for a set number of rotations, this number equates to the distance that would be covered by the tractor-seed driller.

Having completed the rotations Leonard weighs the contents of the bucket (that was being held underneath the release), this tells Leonard what kind of drop rate he has. The drop rate is not only about giving each plant space to grow but also about balancing the seed tonnage with the space (acreage) available. This process is repeated a few times until the drop rate is at the desired level, at which point Leonard marks it up in the dust on the driller (Figure 24) for later reference so as to be able to make a more formal note when the job is done. This marking up on the equipment was something I witnessed in the summer during the harvest when Leonard marked up the number of bails of straw made up on fields in chalk on the tractor wheel. It captures something of the fluidity and grounded nature of the relationships and processes of the farm. How every entity forms a part of the farm and its on-going production, so visceral, so simple, so real.

Figure 24 Drop Rates Recorded in the Dust

Seed drilling, although not as long and laborious as harvesting of crops, is not quickly done, Leonard must keep a steady speed to maintain the integrity of the seed drop. The

seed driller is a very simple piece of engineering, as the tractor moves forward the first rotator prepares rows for the seed to be dropped into. It cuts 'V' shapes, manipulating the fluid earth into a 'VVVVVVV' shape, that can be traced by the feelers at the back which guide the tentacle like tubes through which the seed is delivered to the earth. The tentacles that drop down from the seed bin are aligned with the centre point of each 'V' so that when released the seed scurries, under the force of gravity, down it is deposited at the deepest point of the 'V'. The final action of the seed driller is, via long crooked fingers, to gently roll some earth back into the 'V' cut.

Over several days Leonard had wound his way, up and down, the clotted earth sowing the 'C2 Organic' winter seeds. The winter wheat was the last to go in the ground, Leonard-tractor-seed-driller mow up and down, in their wake follows a flock of seagulls, crows and magpies. The wheat seed drilling completed in the 'top field', Leonard sets me to work whilst he continues to drill another. As a second hand, I undertake the assemblage and application of the 'BD 500'. In usual circumstances the application of the 'BD 500' would have had to wait until all the seed crops were sown, as Leonard would be working alone. But given the opportunity, Leonard would rather have the BD preparation applied at the appropriate time as oppose to compromising. Leonard briefs me and then leaves me to assemble and apply the 'BD 500' preparation.

The foundational component of this 'preparation' is humus produced, in brief, by compacting fresh BD cow dung into cow horns, which is then buried for four to six months between the autumn and spring equinoxes. The cow horns are retrieved from the clay pot in the spring and the cow dung, now transformed into 'humus', is displaced into glass jars. The jars are then stored in the workshop-shed, where Leonard stores all the BD elements as well as the quad bike and countless other things, until needed at the end of a seed drilling day. This humus is then combined with water, on homeopathic principles, which must be stirred for sixty minutes, creating a vortex in one direction and then smashing up that vortex by changing the direction of the stirring. At Station Road Farm Leonard's father built an automated stirrer (Figure 25), allowing the work of the farm, at this point the seed sowing, to continue as the farmer has not been taken out of action as it were. Subsequently, during a break from seed drilling Leonard shows me how to fill the stirrer chamber with water using the tap and hose on the wall of the shed by the contraption. Then, retrieves the humus in addition to chamomile, nettle, oak bark and valerian (Figure 26) from within the shed laying them out for me in their required order and quantities in which they should be dropped into the chamber of water. Returning inside the shed Leonard demonstrates how

to set the timer that controls the electricity supply to the stirrer to cut supply in sixty minutes time.

The horn manure humus, the principal element, is to be combined with water at the rate of approximately 25 grams to 13 litres and the rate of application is 13 litres of water per acre. Given that there were just over 40 acres of land to be treated the preparation amounted to 520 litres, and 1 kilogram of humus. The existence of the automated stirrer, which had previously struck me as detracting a little from the principles of Biodynamics (as requiring a human conduit), at this point began to make perfect sense. The stirrer can mix up to 300 litres at a time and as such I would need to make up two batches. Each batch of the preparation requires stirring for one hour, making a vortex or crater in one direction and then reversing the direction and making a vortex in the other direction, and so whilst I would be waiting for the first batch the second would be 'doing' whilst I was out on the quad (dragging the sprayer) applying the first batch of the preparation. Having finally assembled the elements in the drum, with a flick of a switch, the stirrer springs into action and all the while Leonard can continue with the winter wheat seed drilling.

Figure 25 The Automated Stirrer

Figure 26 Biodynamic Preparation Components

Having been left to stir for an hour, whilst Leonard continued on with the seed drilling and I watched on as the fresh clear sun light began to fade, I return to ready the quad bike and hook up the sprayer. Connecting the stirrer and the sprayer chamber I transfer the now ready preparation and before setting out to apply the preparation I put together the second batch. Subsequently, whilst Leonard finishes sowing the winter wheat seed I drive the quad at a steady pace up and down the 'top field', spraying the freshly sown earth with the 'BD 500' preparation. Just before the light fades entirely in the late October afternoon I catch up to Leonard who is just finishing the last run sowing the seed. Following the seed sowing, including the application of the 'BD 500' preparation, the seed is then 'left' to germinate, the crop is given over to 'nature to do its thing' and after just a couple of weeks the winter seeds sprout up through the earth.

Each preparation, made up of a plethora of entities including fermented manure, minerals, and herbs, has a discrete ritual of practice (what should be done, in what order and at what time), a unique (but correlating with the overall Biodynamic calendar of rituals) temporal rhythm across its provisioning and application (when each component of the practice should be done) and specific logic (with regard to the overall cosmological doctrine). Within each stage the concern is always to draw etheric and astral forces, so as to imbue vitality, in to the components or complete preparation. Throughout the farmer is a conduit, channelling the vital energies of the universe into the preparations, soil and plants through the mindful practice of each ritual. The skill of the farmer is 'to awaken the sensitivity of plants to the subtle influences that continuously stream in from the stars'[17] (Osthaus, 2004/2010, p. 9).

[17]This is a quote from a book Leonard recommended in coming to understand Biodynamic farming and his practice on the farm, arguing that the Steiner lectures are very esoteric and dense whereas this text would be more accessible. Osthaus, K. (2004/2010) *The Biodynamic Farm: Developing a Holistic Organism*, Edinburgh, Floris Books.

Figure 27 New Shoots

Further Biodynamic preparations are applied at the 'two leaf stage', or as close as possible to circumstances allowing, this being the 'Horn Silica BD 501' (Figure 27, whilst this image is of young plants just beyond the two leaf stage this image was taken on the day that the BD 501 could be applied). Following the application of the 'BD 501' preparation the young plants are again 'left' whilst 'nature' run its course. The cold winter temperatures temporarily freeze the young winter wheat plants in a state of arrested development until the warmth of the spring incites their continued growth, only a severe flood threatens the grain crop (Figure 28). Despite the crop being submerged for several days they go on to grow handsomely over the later spring months.

Actantiality & Power

Agency or actantiality, then, is an effect of the network, a relational property emerging in hybridity, providing 'actants with their actions' (Latour, 1996b; 1999). Consequently becoming an actant is a co-produced achievement as whilst one entity grants actantiality, that entity simultaneously affects the latter and connected others. The actantiality of BOB wheat, its' status as an actant is increasingly evident as we move through from the grain crop at harvest to, particularly explicit displays, the metabolic exchanges seen later in symbiotic relationships of between humans and the BOB wheat as bread. Furthermore, although less immediately present, the actantiality of the BOB wheats and other non-human entities, becomes apparent in the daily performance and enactment of the Mill. Most important in considering actantiality, beyond conceiving of its possibility, is the ability to affect other actants, to contribute to the actantiality of other actants. Making

agency intractably linked to ideas of power, to the relational manifestation of power (Callon, 1986b; Murdoch, 1997).

Power as an effect of the network, of associations, is the ability to act and to grant action, to be granted actantiality. Moreover, power here is the ability to define the situation, to characterise the network and actants, circumscribe associations and govern actions/interactions (Callon, 1980; Roep & Wiskerke, 2012). Power, then, is in the ability to translate, translation being the imposition of meaning and a value framing of the situation. Subsequently, much critical thought turns to consider the ability to 'speak' as central to being capable of imposing definition and meaning. Latour (2005) draws parallels between politicians, speaking for other people, and biologists as speaking for nonhumans. But it is this notion of 'speaking' that piques questions regarding the capacity of nonhuman actantiality, of their ability to speak, to hold their supposed representatives to account (Kirksey & Helmreich, 2010).

Certainly, theorists argue that food things are 'mute' that 'we cannot see the fingerprints of exploitation upon them or tell immediately what part of the world they are from' (Harvey, 1990, pp. 422-3). Yet, Latour (1999) contends that all entities 'associating deserve credit for the action involved in their getting together' (Latour, 1999, p. 264), that is in manifesting the network and the effects thereof. The idea of an ability to speak, to literally putatively verbally define, is equitable to the idea that inaction is of inferior effect or value to action, or that an absence is of less worth than a presence (Hetherington, 1999; Lee & Brown, 1994). Asking if the non-human can speak is an implication of a lack of something (Star, 1991) and not at all the right question (Kirksey & Helmreich, 2010). Fundamentally, looking to speech for agency, as power, supports asymmetrical, hierarchical, understandings of entities and interaction and is ultimately anthropocentric (Law & Hetherington, 2000; Castree, 2002; Murdoch, 1998; 1997; 1995). This human exceptionalism problematizes the nonhuman category itself (Haraway, 1991).

Yet, power may take many forms including material resistance, or indeed compliance. Certainly, the seed may not germinate, pests, weeds and weather may out run the wheat and the farmer, ruining the grain crop. Furthermore, whilst plants have needs for 'light, water, nutrients and a lack of pest attack' they wanted to survive, and as Hitchings (2003) suggests, different plants have 'different ideas about how to do this and to manage the things around them to achieve these ends' (p. 105). 'Weeds' are noncompliant, making the harvest tricky and lengthy. Grain may be moist and combust or not perform within quality control checks in laboratories. What about the actantiality of the wheat grain? Wheat grain

acts on the Mill it poses a problem and a solution. The ability to affect is myriad (and too multiple to account for), through various interrelations, interactions, associations, the wheat simultaneously translates and transforms that which it is interacting with and is itself translated and transformed. Subsequently, the conceptualisation of agency in ANT 'sidesteps the question of just how agency is to be ascribed' (Lockie & Kitto, 2000, p. 8; Callon & Law, 1995). Agency is a relational phenomenon and thus may 'take potentially infinite forms in the context of an equally diverse array of relations between beings, things, times and spaces' (Lockie & Kitto, 2000, p. 8).

The interaction between humans and nonhumans, then, must be one of consensus building (Latour, 2005), given that (although not for a lack of trying) humans may not impose their 'will' in totality. First as actantiality, the ability to impose any degree of will, is an *affect* of hybridity and secondly because others, nonhuman others, have the ability to resist. Certainly, in sowing organic wheat 'seed' into the earth at Station Road farm our farmer incites a convergence between the seed, previously at rest in the polythene bag, and a very specific bounded area earth, for the enactment of Biodynamic wheat plants/grain but only as a result of a plethora of other entities working together. The seed may or may not 'will to connect' (Hetherington, 1999), the other actants of the network, reciprocally granting action all together inciting germination and the wheats ongoing vitality, may or may not cooperate. Moreover, once in the ground our farmer is no longer a necessary entity in the wheat plant actor-network, he is however an actant in the Biodynamic enactment of wheat (plant/grain) actor-network. Importantly, power is an effect that may only be 'granted' by the other entities within the network, by the association. Such as it is, that the superior man can only be so by convincing others they are inferior, he can only be superior whilst they grant him to be so (Anthony & Henry, 2006). Thus human/nonhuman entities can only be subject to the 'power' of another if we grant them this action, if we allow ourselves to be subject to it.

Figure 28 2014 Spring Flood Threatening the Crop

Finally, the 'BD 500' preparation is applied to the crop for a second time in the spring, when the winter wheat has recommenced growing and the ground is sufficiently stable following the flood. Leonard articulated that a further application of 'BD 500' would be ideal, if at all possible, just before the true heat of the summer. But as with all farm activities it is precarious and entirely dependent upon numerous factors. Furthermore, if possible Leonard usually tries to apply the 'BD 501' at the emergence of the wheat ear and again more than once is better if possible: 'some people may do it slightly differently, but that is what I try to do'. Beyond these further applications of 'BD 500' and 'BD 501' the wheat crop is left in the hands of 'nature' until harvest.

The Biodynamic farm has presented a constellation of heterogeneous actants all coming together to perform the farm and enact Biodynamic grain. Certainly, the story has traced a network that is made up of nature, culture, humans, nonhumans (plants, insects, and technologies), knowledges and practices. We have seen the networky character of these entities and the emergent actantiality BOB wheat(s) as we have narrated BOB wheat plants springing forth from organic wheat 'seeds', but only as a consequence of its association with earth, rain, sun and our farmer sowing the 'seeds' together with tractors and trailers as well as various knowledges and cosmologies. Yet, our farmer cannot act as such without other entities (crops, stocks, seeds, sun, earth, tractors, sheds) to interact with. From here our narration moves on to the social life of BOB wheat leading up to its arrival the farm gate, its life as seed before addressing, in the third part of Drawing Out the Network, the

BOB wheat's life at the Watermill and beyond. In the coming section the analytical refractions build on the discussions here, exploring the ideas of translation, the processes by which association, networked relations, are (re)constructed.

Figure 29 A Translated Biodynamic Tractor

Wheat Before the Farm: The Seed Before the Grain

The early winter months saw the seed being drilled at Station Road Farm piquing questions: where the seed had come from, how the seed had come to be here, why was it so important that the seed was Organic Certified Second generation ('C2') and how did Leonard (and James) go about selecting the varieties of wheat to cultivate. Each year approximately five tonnes of organic wheat seed is transported to each of the two Biodynamic (BD[18]) farms. The first batch received is the winter variety, this is usually the larger of the two weighing in at around four tonnes, and arrives in the autumn. The second batch, approximately one tonne of a spring variety, lands up at the farm gate in the depths of winter. However, in coming to be at the farm these wheat seeds (varieties) have undergone a long journey beginning with the development of a variety at a seed breeding station a minimum of twelve years prior to being drilled on the farm.

Networks as the Expression of Translation

The BOB wheat is a heterogeneous collective in perpetual motion, the 'networking activity' that is the interactions between actants (re)producing the network and simultaneously

[18] The use of the term 'BD' is a reflection of the language used by the interlocutors.

translating and transforming the entities in reciprocation. Yet, the BOB wheat is not limited to the various wheats (seed, plant and seed) of the Biodynamic farm. BOB wheat circulates in the Seed Breeding Station, the Watermill and many more networks besides. Thus complicating matters a little further as actants themselves, as hybrid nature-culture collectives, form constituent entities in a multitude of networks all at once. The question arises then, how are these numerous linkages in various networks achieved, particularly given the persistent re-making of actant(-networks). Too, how is the BOB wheat simultaneously seed and grain, how is it not a grass or a weed instead of a commodity crop? Moreover, how do these heterogeneous entities described across the Biodynamic farm, and more as will be discovered in time, come together, stay held together?

For actor-network theorists the metaphor of translation is deployed to articulate the 'essential principle of composition, of linkage, of recruitment' (Latour, 1991, p. 124). Translation, then, represents the methods 'around which and through which' (Brown, 2002, p. 6) the networks of associations of heterogeneous actant are enacted. Subsequently, actor-networks are the 'expression of the translation processes' (Goodman, 1999, p. 27), the externalisation, or objectification, of networking activity. The processes of translation then are the 'formative steps taken to align and bind human and non-human entities into alliances' (Callon, 1991). It is the 'elementary relationship between actors' (Callon, 1991, p. 143), the methods by which an actants enrols others (Callon, et al., 1986). Furthermore, translation is the means by which an actant is shaped, their potential form and actantiality defined and realised, and enrolled into a network. Critically, the methods and outcomes of translation are concerned with definition, that is to say 'the definition of roles, their distribution, and the delineation of a scenario' (Callon, et al., 1986, p. xvii). Subsequently, it is through these processes that networks, actors/actants, objects/subjects and social 'worlds', are (re)constructed (Callon, 1986b).

At its most essential translation is a triangular process involving 'a translator, something that is translated, and a medium into which that translation is inscribed' (Callon, 1991, p. 143). Importantly the translator may be any actor-network of any length. Through the processes of defining, the methods of translation work to create 'convergences and homologies by relating things that were previously different' (Callon, 1980, p. 211; Latour, 1987). The enactment of 'something new', then, is the result of a bricolage (Latour, 1987; Mol, 2010) of new associations and a social and/or physical displacement (Latour, 1986), a 'drift' (Latour, 1988, p. 253). Indeed, the tractor featured above may be explained neatly in these terms, a standard human-nonhuman collective (the tractor) has been translated

through its associations with an oak barrel, various pipes, a mounted frame and the Biodynamic preparation (BD 500) that fills the barrel. These previously discrete and heterogeneous bits and pieces have been sewn together like a patchwork quilt, on this occasion by the farmer, into a Biodynamic tractor, a unified functional unit (for now).

Translation, then, means there is a shift, a 'drift, betrayal' (Latour, 1988, p. 253), a form of treason (trahison) (Law, 1997), as two previously inequivalent entities are made homologous. Here, the highly conventional tractor is made alternative, there is a drift in the meaning and a material transformation. Other forms of translation may displace either the semiotic or material, as will be discussed in chapter 6, the seed and the grain are materially the same object the difference is socio-cultural. Whilst grain and flour are the same object per se, flour is a material reorganisation of the entities that make up the grain. Once again, this returns us to notions of power as 'translation has a strategic meaning', the translator is then actant(-network) working to define the situation, the other actor-networks, identities, actions and interactions. Subsequently, for enrolled actants to remain an aspect of the network they are required to adhere to these definitions. That is to maintain convergences they must comply with the translator and 'pass through the contender's position' and thereby further the interests of that actor-network (Latour, 1988, p. 253).

The process of translation, of creating convergences between previous unrelated entities, has been collapsed, by Callon (1986a) into four 'moments': 'problematisation', 'interessement', 'enrolment' and 'mobilisation'. These moments may happen both sequentially and simultaneously, either way it is during these moments that the role, function and identity of actors as well as the limits of possibility (Morgan & Murdoch, 2000; Winter, 1997), that is the possible interaction and the 'margins of manoeuvre are negotiated and delimited' (Callon, et al., 1986, p. 6). It is these moments that will be reflected upon and refracted through the narration of the social life of BOB wheat in this chapter.

Seed Breeding

Important in understanding the emergence of wheat seed, the social life of variety of wheat (seed), is the regulatory context framing it. Wheat varieties, more broadly cereal varieties, are heavily regulated with national, trans-national and global forms of classifications and certifications. All wheat seed marketed in the UK must be certified by the Home Grown Cereals Authority (HGCA), and thus must have met minimum 'quality standards' (HGCA, 2015) in their national trials. Furthermore, this regulation requires that new potential varieties must have significantly different qualities to other varieties currently available.

As such, the objective in seed breeding is to produce a new variety of wheat that meets specific requirements pertaining to particular qualities or traits and in doings so the seed breeder aims to develop a certifiable variety that has 'market demand'.

With regard to the varieties that were weaving themselves' between the Biodynamic farms, the Watermill and beyond, these specificities were very particular. The wheat must have characteristics suitable for organic (read here also Biodynamic) cultivation, stone milling and bread making. In the case of organic cultivation this means that the wheat needs to have genetic traits that lead to disease resistances and other characteristics that resolve issues associated with organic cultivation, such as long stalks so as to (attempt to) outgrow 'weeds' that would otherwise tower over the wheat shadowing out sun light. Moreover, a 'hard' grain is required as the wheat intended for stone milling. Yet the grain must simultaneously also hold a reasonable amount of starch (flour), the (flour's) 'end use' is consumption, through its transformation into bread. Overarching these other objectives is the desire to create a variety that will ultimately produce higher yields than that which is already available, thus driving up its value to both 'the market' and our farmers.

At the time of the research there were four varieties circulating within the Biodynamic farm-Watermill complex: Nelson, Daphne, Magister and Paragon. The Magister and Paragon varieties harvested in 2012 were being stored and milled at the Watermill, whilst the Nelson, Daphne and Magister, again, were being cultivated across the two BD farms. Each of these varieties 'started life' at different seed breeding stations a minimum of twelve years previous to the 'C2' Organic seeds arriving at the farm gate. Magister and Nelson were both developed in Germany, although by different breeders, whilst Paragon was manufactured in Cambridge, and Daphne originates from the Czech Republic.

The seed breeding process begins with the broad stroke design of a variety. Here the seed breeding organisation makes decisions regarding which wheat plant traits and qualities are desirable and marketable according to the type of cultivation (conventional or organic), the conditions of cultivation (climate, soil types, prevalent pests and diseases) and the projected 'end use' of the grain as well as 'gaps' in the 'market'. The projected end-use is more often than not to produce a flour suitable for bread making, as this carries the highest return, it is a premium commodity. Next down from that would be a biscuit flour, still carrying a premium, but not as high as flour of the standard for bread making, and after that cereal feed where there is little profit. The overall objective in seed breeding is to produce a new variety of wheat that meets specific requirements pertaining to particular qualities and traits so as to fill 'a gap in the market' and produce a premium flour. Seed

breeders then work to develop new varieties in accordance with these design specifics to put into the national trails, as success in these trails results in certification and entry into 'the market'. Importantly, certification in National trials translates to certification across Europe, meaning entry into the whole European market place[19].

Having established a guiding set of objectives the seed breeder can begin the process of selecting parent plants from the currently available varieties of wheat plants. These two parent plants are cross-fertilised, using both 'traditional' and more contemporary technological 'Double Haploid' techniques (Busyer, et al., 1987). Traditional cross-pollination is done by hand and works to mimic 'nature' whilst the technological Double Haploid techniques utilise 'anther culture'[20]. These are technologies and techniques that transforms the mutation process itself by forcing a plant mutation. Subsequently, what is ordinarily a relatively time consuming process, traditionally requiring several years of inbreeding following the initial cross fertilisation, is radically reduced. Consequently, the double haploid techniques cut the overall number of years, by a minimum of two years, spent breeding and selecting lines developed from the parent plants. Moreover, these techniques are doubly efficient in that they provide opportunity for 'safe selection' of 'true-breeding plants', those being potential varieties that are likely to succeed to full certification.

However traditional techniques are more widely used, these more technical methods (whilst time saving) are extremely expensive and thus require an economy of scale to justify extensive use. Following cross fertilisation each seed produced is a new seed plant. On this first seed plant, each seed will be different, that is of a different genetic organisation. Thus, from each plant first resulting from the cross-fertilisation, an average of twenty plants and thereby possible wheat varieties spring forth. This cross-fertilisation produces a minimum of 400 new 'possible' varieties from the parent plants, each seed being different from the next as each contains the genetic material from either parent plant and in varying patterns and degrees. Significantly, these first two stages, crossing parent plants and cultivating the harvested seed stock, are achieved within twelve months. By cultivating the wheat plants indoors, using cold storage and UVA-UVB heat lamps to simulate the four seasons, seed breeders can manifest two growing years in just one. Making in fact this

[19]Significantly, the whole seed breeding process is highly collaborative with breeders working with 'end users' such as millers and bakers as well as cereal farmers (Goodman, et al., 2012, p. 192). Moreover, as my Seed Breeding interlocutor informed, despite seed breeding being fiercely competitive, there is also collaboration across breeding organisations, developing new breeding techniques, and the creation of new traits such as disease resistance.

[20] Anther Culture is a process using tissue cultures to cultivate plantlets (Guha & Maheshwari, 1964).

aspect of the BOB wheats' social life a minimum of 18 life cycles so 18 (plant) years so to speak and not 12.

Each seed is given just enough earth, contained in a plastic planting tray, and housed, in the first place, in a cold store, with temperatures increasing from around 3 to 12 degrees centigrade, as well as the volume of water required to incite the germination process. Once the shoot, considered the first leaf stage in Biodynamics, comes through the seedlings are moved to a new climate controlled store and laid underneath time and temperature controlled heat and light lamps. These lamps simulate the seasons increasing temperatures and daylight hours, however, as the seedlings do not require natural length of darkness and also respond to increased light and temperatures by developing faster the hybrid network that is the seed breeding station and those wheat plants manage to simulate a growing year in just six months (currently). Once again there is a mimicking of 'nature', wherein climate controlled stores and lamps replicating, more over speeding up, the passing of winter to spring and then summer.

Cross fertilisation, then, results in a vast collection of seeds bearing a different assemblage of traits belonging to the parent wheats, therefore identifying the seeds with the most advantageous collection of traits at an early stage is a fundamental aspect of the seed breeding station. Having sown and cultivated each of these seeds to the leaf stage a section of the leaf is dissected from the plant. Through DNA mapping techniques, these samples are used to identify the particular possible varieties' traits and qualities. The incorporation of genetic markering, developed through the human genome project, allows for the identification of collections of particular desirable and undesirable traits across the vast collection quickly.

In the subsequent stages of selection, narrowing down the plants with more desirable traits, the wheat plants continue to be cultivated indoors twice across twelve months. Next the plants move to field tests, where the seeds are sown outdoors in soils of differing qualities, they are also cultivated differently, applying different fertilisers and pesticides. It is at this stage that vectors of agronomy are tested and utilised in assessing the plants' traits, strengths and weaknesses in 'real' conditions of agriculture and over 'real' time. Equally, the wheat grain is assessed in terms of whether it is fit for its end use, its purpose. As such some of the seed is harvested as grain, then milled, using a scaled down conventional roller mill, and next baked in a bread-making machine, or transformed into biscuits.

Moments of Translation: Problematisation

Problematisation is a 'double movement' involving the definition the situation, here the 'problem' is constructed and the interrelated networks/actants are identified. Seed breeding is an acute explication of this networking activity, as the seed breeders work for years in tandem with multifarious technologies, wheat plants, wheat seeds, bakers, farmers, weather/climatic conditions, government policies and regulations, corporate brief and so on in attempting to enact a batch of 'certified organic wheat seed', a breed of wheat suitable for organic cultivation as well as bread making. Hundreds of potential new varieties are disregarded, as unsuitable or inferior due to a particular quality being present or absent, until but a few are put to trial in National Government Certification. Even at this point there is no guarantee of the seed, the variety, being accepted and qualified, enacted as a certified variety.

Problematisation takes myriad forms here, reflecting the multitude of actant-networks that constitute the Seed Breeding Station, however the central problem is wheat and its cultivation (others include the production of surplus value, the qualities of the potential wheat plant or grain, 'nature', the Market and many more besides). Problematisation, is a process that attempts to frame networks, particular associations, and determine the 'identities' of specific actants and situations. In doing so there is a construction of differences as well as homologies. Moreover, those in effect problematizing establish themselves as obligatory passage points, rendering themselves indispensable, in the 'new' network of relationships being built under this semiotic rubric. Indeed, problematisation may be alternatively described as 'how to become indispensable' (Callon, 1986a). Certainly, the Seed Breeding Station, as a complex, including legislation and certification has become indispensable to the BOB wheat network, and agri-food networks more broadly, in its position as the designer and manufacturer of certified seeds.

However, problematisation is about constructing a commonality around which actants can unite and circulate around: Something through which the force of the network may pass forwards and backwards, not as a start point but as a perpetuum mobile (Brown & Capdevila, 1999). It is a process of inter-definition of actants to a point of convergence, wherein there is a purifying of the order of things. In the process of establishing common ground, divisions, distinctions and hierarchies are created. Here potential seed is not true seed, true seed is that which is certified and thereby can be legally exchange on the Market, and provision returns on the labour of the Seed Breeding Station.

Crucially, problematisation is about definition and as discussed in the previous chapter whilst non-human entities may not literally speak to define networks, situations or problems, non-humans still act and are granted agency to act in numerous ways. Furthermore, we must not be caught up in the idea that the processes of translation, that interaction only exists in the positive, inaction is a form of action, absences are presences and silence speaks (Hetherington, 2004). Take for example the lack of biodiversity, of life, in the neighbouring farm to our Station Road Farm. Is this absence of non-humans in and of its self not working to problematize the conventional practices of this farmer, or do we require human observation of this absence, recognition of this absence, to define it as a problem? But what if we take problematisation and think of it in the negative, so to speak. Is it not that without that bolt, shaft, running beck, cog, chain, sunshine, technology, practice, symbolism and discourse that the network fails to function? Certainly, the displacement of even a small bolt would render the Mill no longer able to function as such.

Moreover, the process of problematisation, it being a means by which things are defined, fundamentally works to generate the effect of power: Key actant-networks become indispensable to the intelligibility of a situation, as the central knowledge producer and thus authority on the subject. Furthermore, the creation of the problem requires that there is a potential solution, resolutions bolster authority and thus position the authors as the figurehead of a movement, constructing a web of associations that accept, submit and create the effect of power. Looking back to Station Road Farm, Leonard's story of harvesting the neighbouring fields is demonstrative as he works to frame his neighbour's conventional farming practices as problematic. Furthermore, the story allows Leonard to articulate key points of difference and homogeneity defining himself, the farm, Biodynamics and the Biodynamic wheat network. Implicitly, Leonard is drawing on wider politics concerning the environment, health and longevity for humans and nonhumans, and labouring to present conventional practices as problematic whilst Biodynamics, and his own practices, as a resolution (Davies, 2002). Problematisation, then, is not merely about establishing associations but a core aspect of the ongoing reconstruction, reproduction and expansion of (actor-)networks. Much as, Goodman (1999) states, if networks are to persist 'they must foil efforts by competing collectives to translate and enrol their constituent entities' (p. 27). Subsequently, this equates to foiling attempts to being problematized themselves and the effect of 'disempowerment' of various actants.

Such oscillation, the ongoing problematisation, is integral to the reproduction (maintained existence) and expansion of (actor-)networks. Even if the network does not expand as such, through the enrolment of new actants, it is always working to. As stabilisation is an effect

of density, the more association and actants within the network, the more belief there is in the network, the more stable it becomes. Certainly, then, it is necessary that entities remain in circulation so as to (re)construct and shape association. Consequently the order and security, or stability, of networks of associations 'are not static phenomena, but mobile' (Brown & Capdevila, 1999, p. 41) and the social a circulating entity (Latour, 2005). Thus notions of stability are the effect of constant translation, the reproduction of associations, of identities, things, knowledges and practices, around a 'problem' creating homologies as well as Other. Thereby perceived stability and continuity are the effects of persistent action, interaction, movement and change.

Certification & National Trails

Finally, having tested developed a 'competitive' variety the seed breeding station gives way to national certification testing. Certification is part of European Union legislation which states that it is only legal to market seed varieties that have been tested and certified. As such the Department for Environment, Food and Rural Affairs (DEFRA) states that:

'*Seed of the main agricultural and vegetable species must be officially certified as having met certain quality standards before it is marketed. Seed certification is the process of certifying that these quality standards are met*'

(Department for Envrionment, Food and Rural Affairs, 2015)

In the UK this national certification is the responsibility of the HGCA[21], who conduct field trials across various UK locations. Whilst the HGCA conducts 'research' and engages in 'knowledge transfer', ultimately what they do is regulate the market, thus in truth if a new variety developed by a seed breeder doesn't make it through their trials and on to the Recommended List then it has failed, and it will cease to exist.

'If successful the variety will be added to the National List and the applicant granted Plant Breeders Rights meaning that seed can be sold and the breeder rewarded for the

[21] The HGCA is the cereals and oilseed division of the Agriculture and Horticulture Development Board (AHDB) which is itself 'a statutory levy board, funded by farmers, growers and others in the supply chain and managed as an independent organisation (independent of both commercial industry and of Government)' (AHDB, 2015). The objective of the AHDB is to make British agriculture and horticulture industries 'more competitive and sustainable through factual, evidence-based advice, information and activity' (ibid). Their activities include governmental lobbying as the AHDB works to ensure 'that proper account is taken of Government priorities for agriculture and the agri-food industry' (ibid). The HGCA's main activity is research and knowledge transfer, their 'Investing in Innovation' research and knowledge transfer strategy focuses on Increasing yield, Optimising inputs, Increasing crop value and 'Preparing the industry' (whatever that may mean).

considerable effort and resources they have invested in creating and supporting the new variety'

(HGCA, 2014)

Certification in the UK, then, means entry into the HGCA's Recommended List, referred to in everyday conversation as 'the farmer's guide' and elsewhere as the 'National list', which outlines all the certified, and thus the only legitimate (in both a legal and normative sense), agricultural seeds available in the UK. Producing the Recommended List is 'a year-round project which involves the sowing and managing of trials throughout the UK, analysing data and producing reports' (HGCA, 2014). For the HGCA to certify a new variety of wheat, the plant/seed must undergo three years of 'National list testing'. In order for the variety to qualify and become certified it must be proven to be 'morphologically distinct and genetically uniform and stable' (HGCA, 2014). Whilst in the field and laboratory tests the variety 'must prove its value for cultivation and use'.

Finally the new varieties are tested (in collaboration with end-users) to establish whether it 'has a balance of features likely to give an economic benefit to the industry' (HGCA, 2014). Whilst, Selection criteria can be changed in response to new challenges, such as the rise of new diseases, climate change and pests, tests are based on a variety's 'performance both in the field (agronomic features such as yield, straw strength and disease resistance) and in terms of quality such as specific weight and suitability for the end-user' (NABIM, 2015). Furthermore, potential varieties are 'compared to varieties that have a track record in a market segment' (NABIM, 2015). At the time of the research (2012-2013) this chronicling (of certified seeds) averaged at forty winter wheat varieties and around thirty spring wheat varieties.

In achieving certification, then, the wheat seed has traversed a web of government regulatory tests and bureaucracy as well as in-house Seed Breeding Station specifications, selections and tests. Once certified the Seed Breeding Station can maintain the rights to the variety or sell them on. No matter the decision undertaken, the next stage is multiplication that is the production of enough seed to enter the marketplace. Following this the seed 'enters' the market, however, its classifications and legitimisations don't end there. Wheat is additional classified 'for purpose' by the National Association of British and Irish Millers (NABIM, 2015). Here the wheat varieties are classified as belonging to Groups one through four: Group 1 varieties have proven to 'produce consistent milling and baking performance'. Group 2 'have bread-making potential but are not suited to all grists'. Group

3 pertains to 'varieties that are soft and suited to making biscuit, cake and other flours'. Group 4 are varieties considered good only as 'feed wheats' (NABIM, 2015). At least half of the wheat varieties on the UK Recommended List are used by flour millers and as such the NABIM produce a 'Wheat Guide' annually.

Moments of Translation: Interessement

The second phase of translation is that of 'interessement', that is the piquing of interest, to lure, seduce and intrigue actants not yet a part of the network. For Callon (1986a) interessement is the working to interpose potential allied actants and their current, competing, defining associations and current networks. In order to do so, to interest other actors, interessement is to build devices which can be placed between them and all other entities' attempting to define their identities otherwise (Callon, 1986a, p. 205). The Seed Breeding Station works to create a seed that may be enrolled into the certified seed network, the governing bodies must be seduced, convinced of the homologies and compliances of the seed. As such the qualities of the seed must be distanced from problematic characteristics, weaknesses regarding disease, for example, and aligned with analogous and favoured ones, such as long stems and resilience or large volumes of starch. Indeed, the potential seed must 'persuade the humans' it pertains to the expected characteristics to be qualified as certified (Hitchings, 2003:105).

> *'A interests B by cutting or weakening all the links between B and the invisible (or at times quite visible) group of other entities C, D, E etc. who may want to link themselves to B. The properties of and identity of B … are consolidated and/or redefined during the process of interessement. B is a 'result' of the association which links it to A. This link disassociates B from all the C, D, and E's (if they exist) that attempt to give it another definition. We call this elementary relationship which begins to shape and consolidate the social link the triangle of interessement.'*
>
> (Callon, 1986a, p. 205)

Interessement, then, is an interruption, attempting to break weak ties and reshape interests and identities, imposed via innumerable devices, strategies and mechanisms. Most apparent of these are 'texts and conversations', particularly at the Watermill within the BOB wheat network, in their brazen attempts 'lure' (Callon, 1986a) human actants. However, other acts of interessement are more subtle, such as seed germination, climatic conditions seduce the seed to send out shoots and roots, or yeast actively transformation of flour to bread dough. Whilst the harvesting of the grain, interrupting the course of nature if you will, is of course a further act of interessement. Furthermore, the Biodynamic rituals

together with other knowledge-practices and discourses all are acts of interessement. The devices of interessement attempt to interrupt all potential competing definitional associations and to construct a system of alliances, with increased density comes increased authority and weight to the truth of the matter. Thus there are several forms of interessement and interessement devices: The semiotic or discursive (texts, conversations, assigned meanings), the material (knowledge-practices and the literal materiality of actants -that is a form of agency) and spatial, that is to say those that produce a physical disassociation such as (akin to the removing Scallops and protecting them from predators) (Callon, 1986a).

Fundamentally, interessement, then, is attempting to impose, though the deployment of various mechanism, meaning and definition upon 'new' actants. It is about redefining these new actants and ensuring their appropriation of this new framing and perspective. If accepted interessement has succeeded in interesting and locking new allies, associations into place (Callon, 1986a). Thereby, interessement is the materialisation of the semiotics of problematisation, it is the actions and interactions by which an entity attempts to impose and stabilise the identity of the other actors as defined in the problematisation.

Returning to the seed, at this point the seed breeder, or cooperative, has a stock of 'Basic seed' ('C0'), as the Breeders have already cultivated 'Breeder's seed' and 'Pre-basic' seed for trials. Following on from 'C0' there can only be two more generations of seed cultivated (Finch, Samuel & Lane, 2014:271), and they are classified as Certified first generation seed 'C1' and Certified second generation seed 'C2'. Certified second generation seed is the category of seed bought by Leonard (and James), and more broadly across commercial farming. Undoubtedly 'C2' is more economically viable, as there is more seed stock available and is thus cheaper than 'C1', despite 'C1' being consider more genetically vital and pure than 'C2'. Significantly, it is from the 'Breeder's seed', then, all the further generations spring forth, in a cycle of sowing, cultivation and harvesting. From Seed Breeding Stations that cultivate seeds in what might be considered a 'convention plus' manner, using not only germination applications, artificial fertilisers, pesticides and herbicides but genetic techniques.

Seedlings: Seed Merchant

Each variety, each batch of seed drilled, grain milled and the resulting flour baked with at the Watermill can be traced back to Seedlings, the seed distributor used by both Leonard and James our two BD farmers. Seedlings is a small family run firm, based in the Midlands

(deep in the countryside), that specialise in agricultural seed and grain. The firm works[22] as a merchant, a middleman, between the seed breeders (and/or cooperatives) and cereal farmers, buying, often multiplying and selling numerous varieties of cereal seeds. In purchasing the wheat seed there are three routes of commerce available to Seedlings, the first is to buy the Rights to a new wheat plant variety and work to multiply the Basic, Pre-basic or 'C0' seed stock, sell the seeds and collect royalties on Farm Saved Seed. When the Rights to a variety are acquired what is bought is the licence to use of the intellectual property which 'allows royalties to be collected when a protected variety is produced and sold as certified seed, or when it is used as farm-saved seed' (BSPB, 2015) .In addition to the entire stock of seed. Yet, at this stage (Pre-Basic, Basic or 'C0') the seed is not 'market worthy', firstly there is not enough of the seed to 'put it on the market' and secondly it is not of the expected, desired even, classification, 'C2'. However these two 'market ready' qualities come hand in hand, in 'multiplying' the seed stock for volume the seed passes through to the 'C2' generation classification over two growing years. The second is to buy a batch of either 'C0' or 'C1' multiply and cultivate 'C2' generations seeds and pay royalties to the owner of the Rights to the wheat plant variety. Finally, the third option is for Seedlings to buy and sell batches of 'C2' seeds in a straight forward commercial exchange.

Importantly, Seedlings distribute both 'conventional', cultivated using standard artificial treatments, and 'organic' cereal seed. The 'conventional' seed can be bought, if necessary multiplied, and sold on at any stage, whereas the 'organic' seed varieties that found their way onto our two Biodynamic farms were acquired at the 'Basic seed' or 'C0' stage. This original batch of Certified, 'C0', seed is sown and cultivated by a contracted farmer over the 'growing year'. In the case of Winter seed this is from October/November to August and with Spring seed from February/March to August, and so not at all a calendar year, multiplying the seed by one to twenty (1:20 that is a 2000 percent increase in volume). The seed harvested at this point is classified as 'C1', that is Certified first generation. The 'C1' harvested seed is then cultivated, often by a different contracted farmer, and the seed harvested is the 'C2' seed distributed for commercial arable farming.

Seed cultivation is a premium contract, as it requires more specialised and careful work, and far more attention than the production of grain. This is particularly so if the cultivation

[22] This firm describes itself as 'a sales and marketing company of agricultural seeds' that processes 'a wide range of grain and seed species both conventionally and organically, which are marketed to wholesale and retail customers throughout the UK'.

is organic as oppose to 'conventional', as more physical work, rouging[23], is required in the place of application of pesticides and herbicides. Following the harvest of both 'C1' and 'C2' the seed is transported 'back' to the processing plant, less than a mile from Seedlings headquarters, where it is cleaned, bagged and stored ready for distribution. In some instances the seed is coated with a germination treatment, turning them a vivid pink in colour, however this is not the case with the (now) 'C2 Organic' seed. From there the seed is shipped out again and in the case of the 'C2' it is transported to the BD farms, bringing us back to the point at which the seed would arrive at the farm gate.

Moments of Translation: Enrolment

Whilst interessement is the materialisation of problematisation, enrolment is the realisation of interessement. This third moment is where interrelated roles and functions, homologies and convergences are stabilised, mutually defined and accepted (Goodman, 1999: 27). The certification of the seed, the sowing of the C2 organic seed into the earth of the Biodynamic farm, these are moments whereby the identity, the function, the role and the situation are in harmony, (momentarily) stable and accepted as the order of things. Importantly, whilst enrolment is a process 'by which a set of interrelated roles is defined and attributed to actors who accept them' (Callon, 1986a, p. 206) this is not an implication, nor exclusion, of pre-established roles. Certainly, across the seeds of the BOB wheat there is persistent translation, an endless co-production of actants, of overlapping networks, of definitions of actants-networks, their roles and interactions, all long before the seed finds its way to the Biodynamic farm gate.

Certainly, then, enrolment is a collection of 'multilateral negotiations, trials of strength and tricks that accompany the interessements and enable them to succeed' and as such 'if the scallops are to be enrolled, they must first be willing to anchor themselves to the collectors' (Callon, 1986a, p. 2006). The cutting of former ties and adherence to new is successful interessement, which itself is enrolment. Importantly though, enrolment is not permanently secured, the assemblage of a network is dynamic, living, and changing, under persistent and constant reproduction. No 'matter how constraining the trapping device', that is despite the conviction of the argument or the reshaping through socio-material practice, 'success is never assured' as seeds may fail to germinate or to perform certifiable qualities, they may fail to interest arable farmers and so and so forth. Moreover, as Callon (1986a, pp. 206-207) suggests, like in a fairy tale there are many enemies that attempt to thwart the reproduction and thereby the existence of the network (Callon & Law, 1982). Certainly,

[23] 'Rouging' is a process of weeding that is done by hand in organic crops.

there are other competing networks attempting to extend, by enrolling, and stabilise. Here these take the form of other Seed Breeding Stations and (potential/certified) wheat varieties as well as various others such as 'natural' enemies the likes of pests, disease and weeds. Furthermore, in the case of the Biodynamic and organic 'natural' actants such as unfavourable weather or ground conditions are the network's own actants failing to act as required by the network, traitors performing treason.

Magister Case Study

In tracing the wheat the Magister winter wheat grain can be taken as a brief case study. Within the BD farm-Watermill complex there were four batches of Magister wheat grain, a batch from either farm harvested the previous summer (2012), being milled from January 2013 till December 2013. As well as the batches of grain from both farms, cultivated 2012-2013, harvested in the August of 2013 before arriving at the Watermill November 2013 and finally entering the mill (being milled from) January 2014. The majority of the BD wheat grain harvested at Station Road farm in August 2013 sprang forth from the Magister 'C2' Organic wheat seed drilled in early November 2012.

Magister was bred specifically for organic cultivation, and suitable for bread making, over several years by a German commercial seed breeder. The long and complex seed breeding process, started with traditional cross fertilisation techniques, done by hand with tweezers in this instance. From here, year on year, is a narrowing down of the tremendous possibilities using a combination of traditional and modern techniques. Once the trials moved from inside the breeding station to field trials, the seed was transported to South America where the remaining trial and selection stages were undertaken. Finally, after approximately ten years in development Magister was submitted for German certification trials in 2005.

The submission of new wheat plant varieties to certification trials is the decisive moment in the development of the variety and the commercial breeder's financial return, with success opening up the possibility for return on investment and profits. Certified and classified for purpose as 'E8' via the German Institutions in 2007 Magister ranks as superior classification for purpose to the NABIM Group 1 (equivalent to the German Class 'A'). As such Magister was considered to be a 'very high quality milling wheat' as well as later proving to be a 'profitable variety'. Subsequent to certification the commercial seed breeder was awarded with Plant Breeder's Rights, intellectual property rights, to the Magister winter wheat variety. Maintaining the rights to Magister the breeder then released to the International markets via a German seed collective. As such the Magister wheat

seeds arrived at Station Road farm via Seedlings who, in the autumn of 2009, bought a batch of Magister Certified seed (paying royalties as opposed to buy the seed variety as property) from the German collective. Subsequently, Seedlings contracted out two generations of cultivations and multiplication: 2009-2010 C0-C1 and 2010-2011 C1-C2. The 2009-2010 C-C1 cultivation-multiplications took place at a conventional farm in Salisbury. Whilst the following year, 2010-2011, saw the C1-C2 cultivation-multiplication, and simultaneously its 'organification', of the Magister seed on an organic cereal farm in Shrewsbury.

Following each harvest of the seed (C0-C1, C1-C2) it was transported back to the processing plant near Seedlings headquarters. Finally in 2011-2012 both farms then cultivated this 'C2' organic seed, harvesting the grain milled, that I milled and observed being milled at the Watermill from January 2013 till December 2013. This same batch of 'C2' organic seed cultivated in Shrewsbury (2010-2011) then fulfilled the seed orders for both James and Leonard drilled in 2012 also, thus the crop harvested in 2013 (the harvest I was present for).

Moments of Translation: Mobilisation

Finally, the fourth moment of translation for Callon (1986a) is that of mobilisation. Mobilisation is the transformation of enrolment into 'active support' (Goodman, 1999, p. 27). The performing of the relationships, interactions, as delimited by the network, or simply the externalisation and expression of the network. Mobilisation here is the ongoing sowing of the seed, for each sowing represents the successful translation of the networks overlapping at this node of multiple dimensions that is the seed. Later mobilisation takes the form of milling, baking, flour acquisition and eating however here the acquisition and sowing of C2 organic seed is the realisation of the translation from C1 conventional to C2 organic. As such the ongoing existence, the reproduction of the network is the manifestation of mobilisation. Indeed even this thesis is a complete translation, a mobilisation, as expression of the network (Law & Urry, 2004). Mobilisation, then, is the culmination of the translation process, a successful translation. That being the true enrolment of an actant as demonstrated by their support, perpetuating the network in their performing of the network and their attributed role: Seed being performed as seed, grain as grain and flour as flour, objectified, externalised.

Selecting Seed at the Biodynamic Farm

In summary, the grain harvested on the BD farms sprung from seed harvested the year previous, cultivated organically, which itself emerged from C1 seed, cultivated

conventionally and harvested the year before that. Simultaneously, whilst the Biodynamic wheat grain is being harvested the preceding generations ('C0', 'C1' and 'C2 Organic' seed) from which it springs forth from (in effect) are being harvested across three farms. These harvests work to fulfil contracts with Seedlings, which in turn completes its contract to supply seeds to our farms. *Prior* to all this stands the Seed Breeding Station and a web of Capital, legislation and regulation. The objective in seed breeding is to develop a possible future variety of wheat that is unique in some way and fits the design brief, here that means having qualities suitable for organic cultivation and bread making. The seed breeding station, then, work to mimic (translations of) 'nature' by first cross fertilising different wheat varieties and then simulating the seasons. Throughout the subsequent years, the multiple seed performances not only works to mimic nature, but to improve upon it, to speed it up and increase nature's efficacy through the application of Agronomy and thereby 'standard' artificial fertilisers, pesticides, fungicides.

All this lead to the Watermill, the Biodynamic stone-ground flour and the 'end use' of the wheat, the 'end use' and end status (Biodynamic) being key informant qualities in the design of the seed. Before, however, addressing the ongoing journeying of the wheat as it leaves the BD farm for the Watermill in the next chapter I wish to include some final observations regarding the wheat seed. Whilst there have been many years and much work put in to the seed before it arrives at the farm gate the deliberations in selecting a seed by our farmers must not be neglected, after all just as the seed didn't just materialise at the gate nor was the variety of wheat left to serendipity.

Prior to the seed entering the BD farms Leonard and James work to select the varieties and volumes of wheat seed they will drill in the winter and spring (decisions underpinned by a vast quantity of information gathered over time). Across the year Leonard and James observe their crops, judging its resilience against pests and disease, monitoring its ability to crowd out weeds (or not), watching its progress in terms of its growth, its height its structure, its strength and eventually the yield and quality of the grain it is producing. This monitoring and gathering of information is vital, as the yield and the quality are directly equitable to economic returns. Furthermore, it is believed that varieties lose their vitality, potency and purity, due to genetic deterioration over generations, leading to declines in yield and quality. Moreover, if it is a new variety these monitoring inform whether it would be productive to stay with this variety for a further year.

In addition to their own observations Leonard and James utilise a number of other sources and resources in their seed deliberations. Critical in the decision making process is the

HGCA Recommended List, providing 'information on yield and quality performance, agronomic features and market options for recommended varieties to assist growers with variety selection' (HGCA, 2015). It is in essence a catalogue of seeds, with tabularised key features for easy comparison as well as in-depth descriptions of the qualities of the certified cereal seed. The catalogue also provides information on the 'Cereal Markets', such as the Future Pricing Index, as well as details regarding regional soil qualities and applied agronomy.

The HGCA Recommended List is brought together with advertising literature, leaflets and pamphlets, provided by the seed distributor. The HGCA Recommended List and the merchant's leaflets are then used in conjunction with Leonard's and James' knowledge regarding the specificities of their land, climate and cultivation techniques (BD) as well as the qualities required of wheat grain for stone milling and bread making. This is further integrated with each of their observations regarding their crops past and present, as well as knowledges, of whether a particular variety is still vital, performing, yielding, coming through various forms of interaction (in-person, internet, forums, conferences etc.) with other cereal and Biodynamic farmers. Taking all these vectors into account Leonard and James select a winter and spring variety that best suits their conclusions, their growing objectives and the end use at the Watermill, where our attention will turn to next.

To Conclude

The story of the social life of BOB wheat narrated here come tells of something that is simultaneously real, material, and semiotic, a thing that is in constant motion and persistent co-production. BOB wheat is never BOB wheat 'out there', it is a relentlessly morphing assemblage of actants working to reproduce a particular pattern of associations, a particular collective dynamic. This persistent flux is the process of translation, the 'struggles and negotiations to define what is problematic and what is not' (Callon, 1980) and assemble interactions and relationships around this. Translation means that what is received by one actant is not what is received by the next, as actants, carriers or messengers (Serres, 1993/1995) always translate.

Fundamentally, the process of translation, as a mechanism by which situations, actants-networks and interactions are defined, is deeply intertwined with the effect of power and actantiality. Certainly to qualify as actants, as a source of action, subject-objects must be the facilitators of translation. Meaning that they are required to translate, transform, cause change within and give movement (trajectory) to the object of action (whilst that which

appears as passive, absent or silent, in its being carried is active in that it affects the recipient). Without translation there is no expansion, no reproduction, no momentum or circulation or trajectory, without translation there is no social life, only stagnation and death. If the Seed Breeding Station fails to successfully translate, and mobilise the (certified) seed, there will ultimately be no Seed Breeding Station, the network will collapse. More than that given its inability to construct a certified seed the Seed Breeding Station has not performed as such so the network is only as such in name only. Furthermore, the circulations of translation as the creation of convergence are reflected in broader objectives of the network. The seed breeding station driven by Capital and competition problematizes 'nature', mobilises money, rational science and technological hybridity to improve on 'nature' whilst navigating agri-food legislation, trails for certification and Market 'demand' in order to transform wheat seed (re)construction into surplus value and therein capital accumulation.

Whilst the process of translation, then, is that of creating convergences and homologies by relating things that were previously different (Brown & Capdevila, 1999, p. 32) some convergences may be drawn through precisely that, actant's differences. Difference is the foundation of alliances, such as those in a metabolic symbiotic relationship wherein different qualities are reciprocally required from one another. Moreover, in a world understood through a binary logic it is the difference that fundamental constitutes one in the reflection of the other. Indeed, translations start to 'play different roles - but also to imply different roles for the actors round about it' (Law, 1997, p. 3). The constitution of difference as a point of convergence is at the heart of the next chapter. Here the storying turns to narrate the social life of BOB wheat as it continues through a series of transformations and translations at the Watermill and beyond, that draw on both symbiotic relationships and a broader (bio)politics.

Chapter 5 Drawing Out the Network Part 3: The Multiplicity of Network Effects

Introduction

The previous chapters of *Drawing Out the Network* have focused on the social life of BOB wheat in its cultivation, and seed generation *prior* to its transformation into flour. Moreover, these chapters unpack the heterogeneous assemblages of the BOB wheat actor-network. Tracing a network that is made up of nature, culture, humans, nonhumans (plants, technologies etc.), knowledges and practices all grounded at specific sites. Furthermore, we have explored the processes of translation by which these associations are (re)constructed, enacted, and the network potentially stabilised and expanded, revealing a series of negotiations, or a 'chain of translations' (Law, 1997). A story of persistent fluctuations recreating the wheat, the network and the other actants anew. Moreover, that the network, the actants are only as such when performing, or being enacted as such (Law, 2007; Mol, 2002). Here the attention turns to the Watermill, where the BOB wheat grain is transformed several times over in various way through different mechanisms into flours and breads*[24]. The Watermill formed the point from which the research set out from and the following and tracing of BOB wheat began. This chapter, then, begins with the Watermill, following the BOB wheat through the different realms of the Mill and the Tearoom, whilst exploring how different types of translations enact different objects, how translations leading to the authoring of network effects. The final chapter of this section narrates the inward and

Figure 30 The Watermill Water-Wheel

[24] Bread*: Whilst bread is the foremost use of the flour it is far from the only use, and thus 'Bread*' is being used to represent this multiplicity, the asterisk is here to remind the reader that there is always more than bread.

outward flows at the Watermill via the Classroom, Shop, Mill House and Office and beyond.

The Watermill

The Watermill[25] is an eighteenth century two wheeled water powered stone mill, restored in the early seventies by the proprietors[26], a married couple whom came of age in the sixties, firmly entrenched in the left wing politics and socio-ecological movements flourishing at that time. The Watermill is a seven acre site consisting of several fields, woodlands, a beck (which is a small tributary to the river Eden falling from Cross Fell) and a half mile long mill race[27]. At the heart of the site stands the Watermill terrace consisting of: The first barn, housing two grain silos, the mill, the mill house and a second barn, now converted into a Tearoom, come shop on the ground floor as well as a classroom on the first floor (Figure 2). The primary activity of the Watermill[28] is to grind wheat, rye, barley and spelt grain, cultivated across the two British Biodynamic farms, into flour. The Watermill as a holding is also home to chickens, goats and sheep that are kept for eggs, milk and wool respectively, as well as geese and ducks. Although the geese and ducks are not 'kept' as such, they just make the place their home along with many other mostly invisible wild animals. The Watermill Biodynamic gardens are cultivated to grow fruit and vegetables for use in the house and the Tearoom as well as trees, harvested for the log burners and cast iron ranges. The fields are used as grazing pastures for the goat(s) and sheep, with a fraction closet to the terrace being sectioned off for composting, and using anew, a large percentage of the waste from across the Watermill. The compost mound is very popular with the chickens who regularly investigate its surface contents.

The Watermill is segmented into six spaces, the mill, house, office, Tearoom, classroom and the holding. Each space pertains to a different realm of activity that are both, as a consequence of the architecture and the relational flows of the activities, demarcated and overlapping as well as interconnected. The mill is the beating heart of the Watermill, the activities of the mill underpin all that goes on throughout all the other spaces. It is here that the grain comes in and flour goes out, where the grain is transformed into the flour that is the life blood of the Watermill, supporting the other enterprises. However, in the order of things wheat grain first enters the Watermill via the house.

[25] The Watermill is an encompassing noun making reference to the entire site and all the activities therein.
[26] Proprietors at the time of the research, it has since been sold on.
[27] Mill race is a 'channel carrying the swift current of water that drives a mill wheel' (Dictionaries, 2016).
[28] The Watermill is a registered with the Traditional Corn Millers Guild

The house is nestled between the mill and the converted barn housing the Tearoom, mill shop and classroom. Notably, the mill and house are so proximal to one another that when the waterwheel, and subsequently the mill stones, are running too fast, creating an almighty rumbling and trembling, that the china falls off the walls and mantelpiece (incidentally alerting the proprietors to issues in the mill). Such proximity is symbolic of the symbiotic relationship between the activities of the mill and the house, the interconnectedness of the life of the wheat and the lives of the Watermill proprietors, Noel and Annabel. Each year following the summer harvest four small samples, around 5 kilograms of each of the spring and winter wheat grain are received in the house from each of the two Biodynamic farmers, two from each, via the post. Noel and Annabel use these samples to scrutinise the quality of the wheat grain as well as to establish what type of grist[29] will work best when it comes to milling the grain over the course of the coming year.

Figure 31 The Mill Terrace

This grain analysis is conducted in the house kitchen, the hub of the home with large windows looking out over the beck and woodlands just beyond. The first of these evaluations is a moisture test (see the 'Singing Wheat' ethnographic excerpt in Chapter 7) to establish that the wheat grains are not husks. This is important as husks do not hold much by the way of the starch that is flour and would thus lead to the production of only the 'lower quality' by-products of wheat milling (bran, semolina, middlings). Having established that the wheat grain is of sufficient *quality* to mill, analysis turns to the *qualities*, or characteristics, of the flour that will be unearthed by grinding the grain. A small amount of each wheat variety, enough to make a loaf of bread (which Noel and Annabel have

[29] Grist by dictionary definition is a noun for ground grain or a quality of grain to be ground. However, here grist is used to denote the combining of grains, in terms of varieties and origin, so as to engender the optimum quality flour. Certain some batches of grain are good only for bolting and thus white flour whilst other varieties work best combined together.

established very keenly over the years), is, in turn, poured into an antique coffee grinder and hand ground down into '100% flour' (truly whole wheat grain flour).

This hand milled flour is then transformed, through the techniques specific to the Watermill, into loaves of bread (a detailed account follows in chapter 8). These loaves are then scrutinised, compared and contrasted in the kitchen before being taken around the Watermill, tasted, assessed and discussed by and with (most) the staff. In doing so the loaves and the grists are conspicuously negotiated and established (good through to bad). Discussions primarily form around the depth of flavour and in mouth texture, followed by the loaves appearance (whether they looks like a 'good' loaf, are the right shape, size and colour). Some wheat grains have exceptionally 'hard' outer-casings (bran layer) which fail to break down leaving 'ugly', 'foreign', looking fragments of bran in the flour. Such things, it is considered, would raise questions in the minds of consumers about the 'purity' and 'quality' of the flour. Furthermore, this can affect the texture a little, but the foremost concern is that it will appear as Other to the (ill-informed) consumer's eye. Such a batch of wheat grain it is concluded should only be milled and used for 'Un-Bleached White Flour' ('UBW'), as this flour is 'boltered' flour separating out the components of the whole flour.

Having tested each variety singularly the experimentation begins afresh as the different varieties are brought together in various combinations, various grists. Once again comparing and contrasting the various qualities of the loaves produced and sampled against one another as well as against the 'pure' flour of the isolated varieties. What emerges from this is a consensus about which grists, whether it be a combination of the varieties or single grain, will be best when the new grain goes into milling.

With the quality of the grain established at the Watermill and qualified for use by National laboratories, the first lot of grain is transported in the late autumn to early winter. In 2013 the first transportation came in on the 7th November. Arriving at the Watermill gate just after 9am the difficult task of backing the bulk transporter up the lane began. The transporter is very nearly the full width of the lane and to make things more difficult the lane turns quite acutely to the left as you reach the nearest corner of the Watermill terrace. It takes over ten minutes of edging forwards and backwards for the transporter-driver to make its way up the lane to the far end of the Watermill terrace to the barn housing the empty square grain bin. Later in conversation with the bulk transporter driver/operator he informs me that he has been doing this 'drop' for ten years. In the early year it took a great deal longer to get up to the barn, ten minutes is a good time.

Figure 32 Backing up the drive, the first wheat grain delivery, November 2013.

Whilst we are in conversation the grain is being blown from the bulk transporter into the 'square grain bin', a wooden framed storage bin in the furthest aspect of the terrace, adjacent to the mill, where it will be stored until milling. Importantly, this new grain will not be milled immediately, it is given time, allowing the grain to 'ripen' and mature,

enhancing the flavour of the grain and thus the flour. Certainly, at the very earliest, as this also depends on the rate of milling and sales of flour, grain enter the mill is around the Christmas of the same year as harvesting. This resting also allows for the grain to balance, if a little dry or moist the grain has time to settle in advance of milling. Most interestingly, this practice, of leaving the grain to rest before milling, was passed on from Leonard's father, Station Road Farm, to the Watermill proprietors when they first made the cross over to Biodynamic wheat grain.

Figure 33 Grain being blown into the 'Square Grain Bin'.

The Mill: Wheat Grain In, Wheat Flour Out

Finally, shortly after Christmas, the grain enters the Mill. The grain is transformed into flour via two mill stones, one fixed and one driven by the *force* of water conducted through a system of channels, wheels, pulleys, ropes, chains, shafts, cogs and levers. Yet, let us not forget, the miller, because all else in place without the miller to manage the order of things there is no guarantee this mill will be a mill and transform wheat grain into flour. Whilst this is so, without the magnificent constellation of things that make up the mill and enact the grain the miller cannot be as such either. The daily life of the mill, then, is characterised by first a ferrying of grain from one place to another, then the transformation of grain into flour, as well as bran, semolina and 'middlings', and finally the transportation of the flour *et al.* from one place to another. Some days the flour *et al.* will, in addition, be mixed with other components or boltered (sieved) down into further components.

Starting from where we left off, having secured the grain in storage bins, it requires displacing, putting in motion the processes that make up the mill. As such the first task of the day is to move the wheat grain and wheat grain alone, from the grain store in to the hopper that feeds the stones. This is a job that can be done solo, if there is enough grain in the storage bins, otherwise it requires two people. On this occasion, with it being autumn and prior to the November delivery, the grain is low and I become the second hand at work. I follow Clive, the main miller (Noel is considered the Master Miller, whereas Clive is the employed full time to Mill conducting the majority of the milling) up the steep wooden stair case to the first floor of the mill. We negotiated a path through the stacked bags of Bran, in orange and white 25 kg porridge oat bags, and a small gate putting us behind the barrier with the machines.

Translations as Externalisations: Network Effects

The wheat grain is violently transformed into flour via a complex, nature-culture assemblage (the running beck, gravity, and technical or 'cultural' system of the water-wheels, channels, gates, pulleys, ropes, chains, shafts, cogs, belts, levers, stones, flues, sieves together with miller and fluxes of weather/climate). Whilst the miller appears to be at the helm, apparently managing the order of things, this may be seen otherwise as reactive, responsive to the agency of the other entities that come together to constitute the Mill. Certainly, it is through no direct force of the miller that the runner stone is oscillating on the floor above. The miller performs associations with ropes, chains and bolts, in turn these actants enact their associations with leavers and cogs, translating the small force of the miller for their selves. The oscillations of the runner stone, then, are the effect of these performed associations, a translation of forces that enacts the Mill.

The Mill is an effect of the successful translation of an assemblage of nature and culture, associations of 'quasi-objects, quasi-subjects' (Goodman, 1999, p. 25), however the Mill is only as such if it is performing, if it is milling. As such, the Mill is made manifest in its transforming of the grain into flour and it is in this translation that the Mill becomes both actant-network in its own right and an actant in the BOB wheat network. Performing translations is to work to reconstruct the network and thus translations become both an expression, the objective externalisation, of the network and an effect of the network. Moreover, the performing and enactment of translations work to simultaneously enact the actant(-network), in the image of the network. Clive in pulling on ropes, listening to the Mill, feeling the flour and so on is made to be a miller, an identity which is an effect of these associations, and a living body in-turn (Haraway, 1991).

Clive moves swiftly round the hard metal edges of the winnower[30], ducking under the auger[31], and opens up the far end of the bolter[32] exposing a belt, two wheels and a shaft that disappears between the floorboards. Clive tussles with the belt briefly before it comes free of the wheels and moves back across to the far side of the winnower. Fitting the belt to two wheels on the winnower we are ready to 'start' it up. Using ropes and chains we lower one gate on the mill race and open another. In doing so the water is channelled down the race toward the smaller of the two water wheels, the forces of water and gravity work to incite the smaller water wheel into oscillations. The wheel sets of a chain of movement, rotating a shaft which turns cogs and more shafts and more cogs which in turn, turn more wheels and eventually the belt Clive just fitted to the winnower, thereby powering the winnower. The winnower rattles away loudly as Clive heads diagonally across the floor, through a small slatted door in to the adjoining space. I position myself between the barrier and the winnower beneath two large electrical switches: one for the auger moving grain from the grain store (where Clive is heading) to the winnower in front of me, and the other being for the auger moving grain from the tray at the base of the winnower to the hopper on my right on the mill-house adjoining wall above the stones. I wait whilst Clive climbs into the 'square' grain bin (on other occasions it was the 'round bin'), upon hearing a shout of readiness, I turn on the first augur. Hidden from view Clive is shovelling grain towards the mouth of the first auger and slowly grain is heading up the Archimedes screw, traversing the space between Clive and I, between the grain bin and the winnower. Grain finally starts pouring into the top of the winnower and before long, having been shaken, sieved and separated from Other, non-grain entities, 'clean' grain is flowing out again at the bottom, quickly piling up in the small rectangular tray. I turn on the second auger, leading from the tray to the hopper above the stones, and start shovelling and dragging the 'clean' grain away from its drop point towards the both the mouth of the auger. The first floor of the Mill is full of industrial noise. The noise of the winnower, the chorus of augers and thousands of grains of wheat hitting metal, wood and plastic is soft but deafening, like a hard waterfall. Keeping an eye on both hoppers, I work to fill the hopper above the stones

30 Winnower: A cumbersome piece of technology which uses air currents and sieves to clean wheat grain, separating chaff and other bodies out from the grain.

31 Auger: An Archimedes screw encased in a plastic pipe, electrically powered, that works to move, in this instance, grain from one place to another.

32 Bolter: A long cylindrical sieve used to separate 100% whole wheat flour into white flour, middlings, semolina and bran.

and the tray beneath the winnower, one full hopper will last a day of milling whilst a full tray will feed the hopper for the next few days.

So, whilst Clive is shovelling grain in the grain bin, to feed the auger leading to the winnower, the auger is pushing (displacing) the grain across the space between, into the winnower. The winnower, a complex technological arrangement, works to 'clean' the grain, whilst the water, wheels, cogs and shafts are powering the winnower. Subsequently, the grain is being forced through the winnower and into the tray at its feet, and mine in fact. Then I am moving the grain from the mouth of the winnower in the tray to the other end to feed the auger leading to the hopper, and that auger is transporting the cleaned grain to the hopper, where the grain finally rests (for now), piling up in the hopper above the stones ready for the days milling.

Figure 34 Peering Down into the Square Grain

Figure 36 The Termination of the Race

Figure 35 The inner faces of the French Burr mill stones. Image courtesy of Andrew Turner.

Every now and then Clive calls out to see where we are up to, to make sure everything is OK, that there is not grain pouring on to the floor because I've lost track of the hoppers.

As the second hand, I halt the augers (the Winnower however continues to rattle away), by hitting two power stop buttons, and call back with reassurances and indications of how much has been done. There follows a quick exchange establishing how much more grain is required before resuming. Eventually having judged there to be enough 'clean' grain for milling for the next two to three days the task is wrapped up, the whole process taking around twenty minutes. Having restored peace and order to the Mill we are ready to remove Nigel[33] and 'start' the mill.

At the heart of the milling process are the two circular French Burr stones[34] on the first floor of the Mill, weighing over half a tonne each they are set in the corner closest to house and back wall, that which faces to the mill race. The bottom of the two, the 'bed stone', is fixed whilst the top stone, the 'runner stone', is the one that rotates, powered by the harnessing of the beck. The inside surfaces of the stones are 'dressed', patterned cuts into the stones formally addressed as 'lands' and 'furrows' (Figure 6). When the runner stone oscillates the cuts and flats grind the grain and channel it from the centre, the 'eye', where the grain is fed into from the hopper, to the outer edges. As the grain is forced to move, by the flow of grain behind it, the grain is propelled through the narrowest gap between the stones crushing the outer layers, starch and wheat germ together, breaking down the harder layers, releasing the starch and ingraining the wheat germ oil throughout. A large wooden framework, the 'vat' or 'tun', encases the stones and contains the flour that spills out of the edges of the stones, channelling it to a flue that drops to the ground floor of the Mill.

The oscillation of the runner stone is induced by a system of wheels, shafts, cogs, levers, gears and belts that are in turn put into motion by the water forced down the mill race from the beck. The beck, a 'natural' formation that 'rises' from the peat bogs at the 3000ft peak of Pennines nine miles from the Watermill, is the Mill's source of power/force. The half mile long mill race 'feeds off the beck' upstream, channelling approximately a million gallons of water a day. The water flow is manipulated, to some extent, via a number of sluice gates down the race, in attempt to manage the water flow and force as it passes 'over' the wheel and through the Mill before returning to the beck below. In channelling the force of the water over the wheel, the runner stone as a consequence of a chain of associations from the wheel through the Mill is powered.

[33] Nigel: A small gate set in place at the end of each working day to prevent grain etc. falling into the stones during inactivity.

[34] Interestingly, these stones are not whole pieces, they are sections held together by a metal band.

To ‘start’ the Mill and begin milling first the miller works to open one sluice gates and close two so that the water is directed down the full course of the race to feed the wheel. This is done from within the Mill using a series of chains, ropes and pulleys, opening the first sluice gate takes place on the first floor behind the machines and stones. A shaft the width of a solid tree trunk is wound round using two series of cogs and levers, this works to wind in a rope which in turn, through pulleys, lifts the first sluice gate allowing the full flow of water in the race to travel forward. Whilst the first gate to close requires the releasing of a chain on the ground floor, on the far left wall (furthest from the house) above the bolter flues. This closes a trapdoor on the race as does the third sluice gate. Which until this point remained opened, as the last release allowing the water to leave the mill race just before the wheel. When the miller is ready on the ground floor, in front of the pit, this final gate in the mill is closed by releasing a rope. This gate is of particular importance as it is the foremost gate used in trying to regulate the speed of the running stone by managing the volume of water reaching the wheel. By closing the gate the water is allowed to complete its journey meeting the uppermost part of the waterwheel and begin filling the buckets. When there is sufficient weight of water in the buckets the wheel, by the nature of gravity, begins to turn, in the lower half of the oscillation the buckets empty and the water runs away under the house and back into the beck. From here the wheel will keep revolving under the weight, the force of water and gravity until the water is diverted away from the race and wheel through the opening and closing of sluice gates.

Figures 37 The Termination of the Mill Race, Sluice Gates in the 'Off Position'

As the water wheel turns it drives a shaft that goes right through the wall into the Mill just below the ground floor. This drives the toothed ‘pit wheel’ that ‘rotates the power through 90 degrees’ and meshes with the ‘crown wheel’. Together these very large gear cogs drive the upright oak main shaft adorned by the ‘spur wheel’, a cast iron wheel with Applewood teeth. The ‘spur wheel’ cogs interlink with the, smaller, ‘stone-nut’ (the last gear in the sequence) that drives the vertical ‘spindle’ that runs up to the stones on the first floor and powers the runner stone.

Up on the first floor, the hopper, newly filled with grain, stands above the stones and with Nigel removed from the stones eye the route is clear for the grain to pour in to the stones.

Once the runner stone begins to move the 'Miller's Damsel' is incited to action, constantly knocking the chute, or 'shoe', from the hopper ensuring the grain flow steadily and evenly down into the eye of the stones. Thus it is the pace of the oscillation of the runner stone that, to some extent, dictates the rate at which the grain drip feeds into the stones via the hopper. The grain takes just a few seconds to pass from the eye as wholegrain to the edge of the stones ground and transformed to flour. Once ground and at the edge of the stones, the flour drops away down a chute to the ground floor by the pit (where the pit wheel and the gears etc. that are the core of the Mill are housed).

The force of the Mill race, of the water, fluxes regularly and at times very quickly, with changes in the weather. If the water table is up, if it rains, the race may flow fast and hard, whilst if it has been dry it is often slow, soft and intermittent. But it is not easily detected as the flow of the water is subject to multifarious forces from its rising some nine miles away. This fluxing in turn informs the nature, or temperament, of the Mill on a daily basis. Some days, once set, the Mill will run smoothly, evenly without adjustment whilst other days it requires constant attention and readjustment to ensure even milling despite the capriciousness of the Mill throughout the day. The Mill running pace of the Mill, the force of the water, is managed to some extent by the miller through the sluices gates, which can be open/closed to varying degrees, including two manual gates distal to the Mill, one at the mouth of the race[35] and the other about a third of the way down the race[36]. Yet, it is not just the most direct of weather events that affects the nature of the Mill, more subtle climatic conditions such as the temperature and humidity works to affect change both the qualities of the stones and the grain. The grain too, before temperature and humidity, is a factor in the temperament of the mill as grains vary in their softness/hardness as well as in their oil content. Thus some grains are harder and cause more friction, slow the runner stone and thereby require more force, a higher pace, to be ground. Whilst some grain /flours are stickier, due either to humidity and moisture or higher oil content, and clog up the stones creating a false signal. It appears as though more friction is required because the Mill slows, however what is needed is slightly less friction and slower oscillations in order to allow the sticker flour to run through and clear out of the stones without clogging.

[35] This first the sluice gate feeding the mill race is open at all time except for in the event of heavy rains and/or flood warnings.

[36] From the weir (the point where the mill race meets the beck) there is a system of gates and barriers that direct the flow of the water all of which function as both a means of flood protection and managing the Mill.

Figure 38 The Pit

Whilst the pace of the runner stone is primarily managed via the regulation of the flow of water, that is the resultant oscillations of the waterwheel, the space between the runner stone and the bed stone may be altered also. Here a smaller gap creates higher friction, which is needed for harder grains, but this slows the pace of the runner stone and thus a higher force from the waterwheel is needed to mill the harder grains to fine quality. The space through which the grain passes needs to be balanced with the force to enact a pace that transforms the grain into fine, high quality, flours. As such there are many adjustments and manipulated performed by the Master Miller in response to the conditions of the grain, the weather, the Mill. He works to adjust the relationships between the various aspects of the chain, checking and rechecking the quality, the feel of the flour pouring from the first floor into the 100% sacks. By reducing or increasing the water flow over the wheel, lifting or lowering the stone the pace at which the runner stone turns adapted to suit the conditions of the grain. Whilst this appears simple setting the Mill to achieve a fine high quality flour as a result of the grains transformation through this assemblage of technologies is by no means a simple or easily achieved task. Milling high quality flour, requires a deft ability to hear the Mill, to feel the flour, to hold in mind the conditions of both the climate and the grain as well as what might, or is happening, in terms of the weather both locally and at the peak of the Pennines. It is a fine tuning to the contingent, capricious daily conditions that is achieved relationally with some rather obstinate associates. Indeed, despite at first glance this appearing to be 'Man' assimilated control over 'Nature', this simply is not the case. 'Man' here is constantly managing and renegotiating his relationship with 'Nature'.

The chute running from the stones on the first floor, forks just below the celling on the ground floor with one prong continuing directly down and splitting again to feed two 25kg paper sacks bagging '100%' flour. The second prong diverts a percentage of flour off at an

angle to a sieve that knocks back and forth, the sieve, again driven by the water/wheel, separates the bran (15%) from the rest of the flour (85%). The now 85% flour is then channelled in to a 25kg paper sack, whilst the other 15% bran falls to the floor and at the end of the day is swept up and fed to the chickens. Clive tries to coordinate the sacks using plain brown purpose bought sacks for 100% and using coloured sacks, that are being recycled having been emptied of the goods that arrived in them (porridge oats, malted barley and so on) for the 85%. Many of the sacks have been used so often that they are silky and soft around the top where the sacks are grasped, twisted to close off and carried over and over again.

At this point there are a number of routes the flours *et al*. in their 25 kg sacks, although the actual weight of the full sack depends on whether it contains 100% flour, 85% flour or other, may take. Some of the 100% flour will be bolstered, separating it into UBW, middlings, semolina and bran via a cylindrical sieve. Whilst a relatively small percentage of the 85% and 100% flours will be mixed with other components, such as seeds and malted barley, to create speciality flours (developed as a means by which less desirable and profitable products of milling flour -bran, semolina, middlings- may be sold, and at higher premium also). A degree more of the 85% and 100% flours will be mixed with bicarbonate of soda and tartar to make up 'self-raising' flours. Whilst the UBW, by far the most popular of the produce and the product of the second process of bolstering, goes on to be mixed, in accordance with the law, with calcium carbonate (otherwise known as chalk and the fortification of flour). Furthermore, as mentioned above, particular batches of wheat grain may be deemed only suitable for bolting, as the grain is too hard and the husk fails to break down sufficiently in milling and thus requires the bran removing completely.

Whilst the milling of the grain, transforming it into flour(s), is the most fundamental activity of the Mill it does not require committed constant attention (although it is constantly monitored as it is always in mind, the Mill is always being listened to, checked on and adjusted regularly) and ultimately milling produces more work than it itself takes. The resulting flour(s) need bagging, packing, labelling and delivering, together constituting the majority of the working activity in the Mill. Certainly, the preparation of the flour for distribution is a time heavy process as each bag must be date stamped, filled, weighed, have the weight corrected, then the bag opening must be folded and sealed shut with sellotape. All this is done by hand using small scoops and counter top scales for the 1.5 kilogram and 3 kilogram bags. The larger, 6, 12, 20, 25 kilogram, bags are hand labelled and dated before filling, using a very much larger scoop and a floor scale, and

sewing up. Then any larger batches of the 1.5kg flours going out for distribution need to be packed again into brown sacks in batches of six. Each week there are local deliveries, National collections and single orders to make up as well as ensuring the Mill Shop and Tearoom Kitchen are well stocked. Furthermore, Neil and Clive, although mostly Clive, often give visitors, that arrive daily, tours of the Mill explaining the processes of milling and how the mill functions. However, the majority of the Mill labourers' day is spent physically preparing the flour for distribution.

From the bagging and packing in the Mill, the various flours find themselves either in use across the Watermill (in the classroom as well as the house and tearoom kitchens), being sold in the mill shop, at markets and other events, delivered to households and retailers (independent health food shops, cooperatives as well as a supermarket) as well as caterers (restaurants, bakeries, cafes, B&Bs, hotels etc.). At times flours are exchanged, for other food things, with other 'local' organic, and other, not so local, Biodynamic producers. On other occasions the flours are gifted, to for example good customers or charitable bread or baking ventures.

Moments of Translation: Interference, Displacement & Mutation

Translation, then, is concerned with manifesting associations, connectedness, between that which were previously different (Brown & Capdevila, 1999). There are several technologies through which this may be achieved, namely, semiotic convergences, physical displacements (across time and space), material displacements (configurative interferences) and mutations (metabolic and more, almost metaphysical in their invisibility).

Semiotic convergences are the framings and definitions of a (actor-)network, regarding situations, identities, actions and interactions which are 'imposed' (Callon, et al., 1986, p. xvii) or actively accepted (Mol, 1998) by those constituent entities and in new associations. These socio-cultural convergences are shifts in the semiotic ordering of significations, interests and concerns (Brown & Capdevila, 1999, p. 33), acts 'of invention brought about through combining and mixing varied elements' (Brown, 2002, p. 6). Such discursive technologies enact particular forms and contexts, such as the distinction between seeds and grains, alternative and conventional, production and consumption and so on (Law & Urry, 2004), these semiotic translations, framings, become pertinent in the discussions of Chapters 7 and 8. Moreover, translations then maybe considered distortions, and are even at 'risk of potential distortion', but as formative in the (re)constructions of actant-networks

are ‘a necessary risk which must be taken to communicate at all’ (Serres, 1993/1995, p. 26).

Physical displacements are disassociation (Callon, 1986a, p. 9) across time and space, here the objects of translation move around but hold their shape, such as when the harvested grain is transported from the Biodynamic farm to the Watermill. However, such disassociations are fundamentally interwoven with the semiotic, as in such instances of the object remains intact whilst the material reality around it shifts and thereby inducts the object into a new socio-cultural setting. As such these immutable mobiles (Latour, 1987) remain materially unchanged but are located in entirely new socio-spatial contexts rendering them as something else, incorporated into a new set of associations.

The technologies of translation go deeper than semiotic and physical displacements with interruptions at the material level. Configurative material interferences are that of socio-material knowledge-practices working to transform materiality thereby translate (Mol, 2002, pp. 88-89). These material interference enacts by altering. The Mill is a technology of interference reordering the materiality of the grain, making its component parts sit alongside one another in a new configuration, whilst reframing it as flour, more than that as local, organic, Biodynamic (alternative), traditionally stone ground flour.

Socio-material knowledge-practices, whilst materially reorganising and a semiotic reframing, are also grounded at specific sites thereby often encapsulating all technologies of translation. Moreover, these technologies of translation and subsequent enactments through performance as socio-cultural knowledge-practices are numerous, innumerable even. For every set of assemblages, tools and technologies, ideas and logics, techniques, subject-objects there are different translations and thus different enactments of actors, networks and their effects, indeed different realities as will be discussed in more depth in Chapter 7.

Yet, in the case of BOB wheat there is a need to expand upon these technologies of translation in order to account for other means and ways by which a food production-consumption network, and the actant(-networks) therein, come to be (re)constructed and expressed. Namely, the transformation of the ‘seed’ into the plant, flour into bread, bread into energy which are neither translation as semiotic displacement nor translation as socio-material interference. Much like in translation as semiotic displacement there are heterogeneous practices ‘always already absent, and we are left only with traces distilled into symbols and abstracted from the rich and multiple worlds in which they emerged’ (Nimmo, 2011, p. 113). This is a symbiotic metabolic chain, a live translation sparking

mutation that elides between acute performances and transformations requires recognition. Translation as mutation, then, seeks to take account of the forms of translation beyond semiotics and socio-material practice. Mutation that occur in the wheat seed after sowing, in the wheat plant across its life (seed-plant-grain cycle), like that which occurs after mixing yeast, flour and warm water or that which turns dough into bread.

The Tearoom: Flour in Bread Out

The flours form the basis of most of the commodities and comestibles produced, sold and served in the Tearoom. It is in the Tearoom that the wheat grain now translated and transformed into flours is converted into scones, cakes, quiches as well as sauces and dressings amongst other goods, but most importantly bread. My time in the Tearoom spanned the later winter and early spring months. Each morning I walked bristly through the cold wintery air, making my way down the lane, to begin, always with, the lighting of the log fire. Clive had shown me how to prepare and light the fire, lining the bottom with coals so that they become the base of the fire. The Tearoom was run by six women in total, with a general manager, a second in command, a weekend manager and three Tearoom assistants. Whilst Annabel held the commanding position, much like Noel in the Mill, she was not all that present in the day to day running of the Tearoom.

Figure 39 The Tearoom Cake

At any one time, then, there was one individual assuming the role of the manager and another as the assistant, a hierarchy that designated what work that individual would be undertaking that day. The hierarchy is organised around experience, with more experience comes a greater knowledge of the methods and practices of baking, preparing and organising in the style of the Tearoom. As such, each manager works to teach, passing down to the apprentice (the assistant) Tearoom knowledge and practices. Each day little 'tips' and 'techniques' regarding baking were shared, as well as directives on how things are done at the Watermill or in the Tearoom. Of the upmost standing was Sarah, the

Tearoom Manager, followed by Katie, who has long been employed there, Bess, the weekend Tearoom Manager and then there are several other Tearoom Assistants who work with little regularity. Subsequently, on any given day, there would be either Sarah, Katie or Bess acting as Manager the Tearoom.

Each day, whilst I lit the fire, the day's Tearoom manager would be turning on the water boiler, lighting the double breasted gas oven and preparing to bake and the Tearoom assistant would be cleaning the toilets, then collecting vegetables and fruit from the stores. Leaving the chairs on the tables for a couple of hours until opening, at 10am, the really work of the Tearoom commences with the baking of scones, usually by the Tearoom manager. The Tearoom kitchen, demarcated from the dining area by a cake display cabinet and till area (Figure 39), takes up the furthest fifth of the room, nearest to the Watermill house. The kitchen area has three designated spaces, invisibly drawn, with the left hand work surface, which is overlooked by a small window out on to the Watermill lane, being the baking area (this is where all the work with flour is carried out) and usually occupied by the Manager of the day. All other work, such as vegetable preparation for salads and soup, is done at the right hand work surface and running between the two, across the back-wall, stands the double breasted oven, the dishwasher, sink and a small surface spaced used for stacking dirty dishes.

Occasionally, the assistant is permitted to bake something, and these times worked to reveal explicitly the process and workings underpinning the baking, the central activity, of the Tearoom. Indeed, baking and the decisions underlying what to bake, when and how were so normative to the Managers that it had become silent and invisible. Whereas assistants being taught the ways discussed, questioned, checked and negotiated their ways through these tasks. One particular morning Kerry, a part-time Tearoom assistant and quite new to the staff (despite having been there three years), was standing addressing the left hand work surface when I arrived, a little later than usual, her position and the time (8:25 am) indicating that she is readying herself to begin baking the scones. In the order of the day, the daily fresh batch of scones are always the first task to be undertaken and completed (the bread, cakes, pastries and biscuits have a longer shelf life, remaining fresh for 48 hours, whilst scones do not last more than 12 hours hence their daily bake), in part due to the demand for them being as such that they need to be ready for when the Tearoom doors open at 10 am.

Each day a conscious decision is made as to the flavour, Kerry's discussion with Bess highlighted that this decision makes account of several considerations, including the

flavour of the day previous, and perhaps the same day the previous week, what flavour was last baked by the baker and what the baker would like to bake. Having decided, or perhaps better negotiated, to bake spiced sultana scones Kerry begins by pouring sultanas and orange juice in to a pan and placing the pan on the hob over a gentle flame. My position in the Tearoom was rarely elevated to Tearoom assistant, I was seen for the most part as an observer and was most certainly never invited to bake. Furthermore, the baking of the scones was rarely given over by the Manager to the Assistant, Kerry remarked regarding her being the baker:

''I've gone up in the world… it's better doing the baking (bread and scones) than the salads… you get pretty bored of doing the salads''.

Certainly, the day previous, Bess had done the baking whilst Kerry prepared the salads and so on. Having put the sultanas on the hob to soften in the orange juice Kerry's attention turns to combining the dry ingredients (which varies a little depending on the scone flavour), '85% Self Raising Flour', sugar as well as nutmeg, cinnamon and mixed spice, in a large ceramic bowl. Next Kerry flours a rectangular wooden board in preparation for shaping the dough and butters the oven tray ready. Once the sultanas have softened, this takes only a few minutes, they are drained and mixed along with the other wet ingredients (butter, milk and eggs but just enough to create a binding dough) with the dry. Across the weeks in the Tearoom the delicacy of scone baking was repeatedly articulated, as 'good' scones require as little 'working' as possible to achieve a soft, crumbly and risen scone. The more the dough is handled and worked the tougher and flatter the scone will become. The combining of the wet ingredients and the shaping of the dough was a nerve racking moment, more than that for some it was an apparent source of anxiety.

Turning the dough out onto the floured board Kerry uses a blue scraper to gently pat down the ball to the height of the cutter. Then she firmly cuts into the dough and places the cut outs on the buttered tray for the oven. Having cut four scones the remaining dough is gently rolled into a ball and patted down again, from which one further scone is cut. This scone is always the 'runt', always flatter and tougher and never perfect. The final remnants of the dough are balled together and placed in the corner of the baking tray. This mini scone will not rise at all as it bakes due to it being overworked, but it is baked as a nibbled for the manager and/or assistant. Finally, the scones go into the right-hand side of the double oven.

Most interestingly there are no timers in the Tearoom kitchen and although the individual baking or cooking may take note of the time when putting something in the oven, on the

hob, or in the proving oven, knowing when something is ready is known and established in very corporeal and sensorial ways. Observing this was initially mystifying, they seemingly had an intuition, a subconscious sense, of when all manner of things where 'ready'. Certainly, it became clear that a timer would have no place in the Tearoom as no one batch of scones, loaf of bread or cake is the same, they rise differently, some are heavier and wetter than others, some are lighter whilst others are darker and thus observing their tone is not enough either. Knowing this is particularly tricky in the case of the scones because, unlike other baked goods where briefly opening the oven door is not so risky, letting any heat out of the oven before the scones are ready will cause them to sink and become heavy, and thus ruin the scones. Knowing when they are ready, then, is something that is 'felt'. The ways of knowing are articulated in discussions behind the counter, described as a feeling, a sense of how long they have been in and need to be in, calculated on past experience. This feeling is bolstered by senses, how the dough felt (heavy, wet, light, dry) when working with it, the climate of the Tearoom (the longer the oven is on the warmer both the oven and the room become) and finally the smells emerging from the oven and floating on the air.

For Kerry this is a difficult task. Regularly over 20-25 minutes she draws Bess in to discussions of when the scones might be ready, how to know if they are and the factors that might affect the timings required to achieve the perfect bake. Their conversation on this is organised around comparisons to other bakes Kerry has done as well as drawing on examples from the recent past that she has witnessed. Whilst the scones bake, and the this on/off discussion takes place, Kerry (although usually the Manager), goes about cleaning down, preparing for and beginning the next routine daily task, bread making and baking. The bread is produced by combining flour with a 'sponge', put together and left to ferment the night prior just before closing at around five o'clock. There are usually between three and five sponges made up, in volumes, depending on the popularity of that loaf, with the average daily production of twelve loaves. Flour is added to the sponge slowly so as to ensure that the dough remains 'alive'. Too much flour leads to a stiff dough and works to knock more air out of the sponge then needs be, both of which in turn lead to a dry heavy loaf. The flour and sponge are initially gently folded together, then when the dough has formed, holding together and although slightly sticky coming away from the bowl, it is

turned out onto a floured board to be kneaded (the bread making technique is specific to the Watermill is addressed in-depth in Chapter 8).

The dough in the Watermill method is something to be cultivated and is handled with affection, it is brought together carefully and kneaded gently for a few minutes. An approach entirely opposing the conventional wisdom of bread making that dictates a minimum of twenty minutes kneading, wherein the kneading technique is hard and aggressive. All the while through the preparation of the first dough the baker, Kerry in this instance, is mindful of the scones that are in the oven. Eventually, Kerry and Bess agree that given the pleasant sweet earthy aroma filling the Tearoom and that they had been in the oven a solid twenty minutes the time is right to open the oven door and remove the scones. Having taken a minute to assess the quality of the scones Kerry returns to kneading and shaping the dough.

There are several types of flours (100%, 85%, UBW, Miller's Magic, Granarious, Harvest, Special Blend and Four Grain) each producing a distinct loaf as well as a selection of loaves that can be produced by adding other ingredients, fruits, seeds and savouries such as onion, herbs and cheeses. Daily UBW, 100% and either savoury cheese or Granarious are produced whilst a fourth, although not always made, varies. Each flour, dough and thus batch of loaves (as well as each loaf in terms of proving and baking) requires different time frames, processes and techniques as well as different combinations of ingredients and proportions of water and yeast. However, once kneaded and shaped all loaves are placed into an oiled 1lb baking tray and into left-hand side of the oven, the proving oven which is on a very low heat with a tray of water on the bottom, so as to prove the loaves.

Figure 40 Bread making and baking

The preparation of doughs, proving and baking begin to overlap once the first batch is in the proving oven. Much like with the Mill and the oven in the Tearoom is something that the Manager and at times the Assistant is persistently mindful of whilst working, balancing other overlapping tasks. After around thirty minutes has passed Kerry, begins to make regular checks on the proving loaves, convening with Bess in assessing whether the bread is ready to come out of the proving oven and into the baking oven. Usually this checking and assessing is conducted quietly, with the Manager/baker naturally flowing through the routine, feeling, sensing, knowing or simply as part of the routine moving from folding or kneading to checking and transferring proved loaves to the baking oven and baked loaves to the cooling tray.

With Kerry baking there is constant looking to Bess for guidance and throughout Bess, as the higher authority, conveys key features and ways of knowing if loaves are proved or baked. With the dough this comes down to the height of the rise, too little and the loaf will be heavy, too much and there will large air holes in the loaf, but once again proving is not a standard process and the different loaves/flours require different proving times. Once it is agreed that the loaves are ready they are transferred across to the right-hand side of the oven for baking. Again after around thirty minute Kerry begins regular checks on the loaves baking in the oven, discussing with Bess as to how identify a well baked loaf, which is judged by touch (texture of the crust), sight (the tone of the bread), sound (tapping on the breads based a hollow sound indicates its readiness) and smell, ‘you have to feel your way’.

Scones and bread are followed by other contingent and necessary preparations, and once set up for the day other cooking tasks can be undertaken in readiness for the coming days. Together the Manager and Assistant discuss and negotiate what needs to be done, when. Often there is an exchange of ideas as to what might be best: cake or fruit loaf, tomato soup or a roast vegetable soup, to do a bake today or tomorrow and so on. Having figuring out what will be needed (according to probable sales and food shelf life as well as any specials orders) the remainder of the day, then, is a juggling act between baking (pies, quiches, biscuits or cake) and the cooking of vegetables and fruit for soups, side salads, jams, marmalade and chutneys, as well as serving Tearoom customers and preparing their orders. In amongst that, there are straight sales from the mill shop, patrons wanting to have tours, enquiries in person and on the phone (regarding courses, special orders and baking with the mill flour). Furthermore, there are regulars that are given extra attention as well as there being staff food to prepare, paperwork, and other forms of planning, timetabling and preparations, plus the washing up. So whilst the Tearoom may be quiet (during the winter months days pass with only two or three people visit the mill) there is nearly always some baking or food preparation, paperwork or planning to be done.

Whilst they work the three of us discussed the work of the Tearoom, which was not uncommon as much of the talk in the Tearoom revolved around baking, cooking and the tasks at hand. Often this discussion would become task orientated and I became an observer, rather than a participant, whilst the Manager and Assistant negotiated the tasks of the day, discussing the techniques required in baking different goods, usually those being baked at the time or at least those bakes that were being planned, as well as the qualities of the batters, doughs and flours, bakes and flavours. Often they invited each other to assess bakes, soups, salads wherein each would taste, smell, touch and observe the aesthetics of the comestible in preparation. Woven into these negotiations and conversations was a sharing of advice and teachings regarding recipes, flavours, techniques and tips regarding not just the ingredients, their combination but the technologies used as well as broader considerations such as timings and the climatic conditions of the Tearoom.

Certainly, there is a distinct and layered ordering to the tasks and processes of the Tearoom. The daily primary tasks are, first, the baking of the scones, partially overlapping with the making and baking of bread which follows. Next in line are the regular but not daily, secondary, bakes such as cakes, biscuits and pastries, both sweet and savoury. Whilst simultaneously on the other side of the kitchen fruits and vegetables are prepared, mixed and cooked in producing soups and salads. These daily task vary a little in terms of the

specificities of the thing: the scone flavour, and thus the ingredients and nature of the (baking of) scone, changes daily. Whilst some loaves are baked daily the speciality loaves vary in their production. Yet, the salads that are in need of preparation are in persistent flux and the soup flavours change almost daily but this is entirely dependent on how well the soup is selling and the vegetables available. These tasks occupy the Manager and Assistant for the morning, and usually the completion of the primary tasks segues quite seamlessly into the Tearoom's busiest few hours, between 11:30 and 15:00.

Within each of the tasks there is a specific order, a process, through which the food thing is brought together and produced. Within each of these processes are different knowledges, skills and practices requiring different bodily practices as well as a degree of foresight in judging what needs to done in order to produce the thing, in addition to the practicalities of what should be made when (for example if something is running low, run out or is nearing its use by date or last of its freshness), what ingredients are available, how long each stage of the process will take, the overall production time. This excludes further considerations such as what day of the week it is, how many customers they are expecting, any events, school trips or courses that may be on, bespoke orders for cakes and loaves. For example, soup and bread which appears a simple offering is a deeply complex set of orderings set into practice. Making the bread requires 18 hours and begins at 5pm the day prior to the fresh loaf being presented to the table. Whilst ideally the vegetables for the soup are sweated off gently for a few hours over the course of the afternoon in the day prior also. This sweating is of the upmost importance, the longer and slower the vegetables have the deeper and sweeter the flavour of the soup. However, it is acceptable that whilst the bread dough proves between 9 and 10 am, the vegetables for the soup may be set to sweat then instead. In this case whilst the Manger makes and bakes the daily scones and then the bread the Assistant must set to preparing and sweating the vegetables as soon as possible.

When the Tearoom is quiet Kerry and Bess talk whilst their bodies work away on baking and cooking tasks: cutting, peeling, chopping, slicing, crushing, roasting, sweating, broiling, boiling, simmering, straining, squeezing, blitzing, glugging, sloshing, mixing, tasting, testing, salting and sweetening. The feeling, the atmosphere, and talk in the Tearoom is very different to that of the Mill, the Tearoom is the social hub of the Watermill. The conversation, when the Tearoom is quiet, is a combination of anecdotes recounting

recent events in their lives, ranging from amusing tales to personal, emotional subjects and back out again to popular culture, generally orientated around food, baking and the environment. When customers are in the exchanges between the girls are less 'social' and more 'formal', limited to talk of what needs to be done, whom is doing what or no conversation at all.

Figure 41 Juggling a large tea, soup and bread order

Certainly the Tearoom is warm and inviting with people regularly commenting on how comforting and relaxing it is. The actual aesthetics (the decoration and furnishings) of the Tearoom have not changed for many years and this too is welcomed, with customers appreciating the familiarity. Annabel speaks of the Tearoom atmosphere as being the effect of the Biodynamic practices and principles, the "BDness of the place", being deployed here. Indeed, the constant baking and presence of the log burner contribute, with at least once in the day someone will say, upon entering the Tearoom, something to the effect of 'ooh it smells lovely in here' or 'isn't it lovely and warm in here'.

The Watermill, then, is a place full of activity, interaction and translation. Moreover it is a site of connections, drawing all that constitutes the BOB wheat together in tearing the BOB wheat asunder. The Watermill is where the BOB wheat grain is transformed several times over in various way through different mechanisms into the flours and breads* that speak of the alterity of the network, perhaps even speak for the network. In the next chapter the following continues, moving with the BOB wheat as it is flows out and is consumed beyond the Watermill.

Chapter 6 Drawing Out the Network Part 4: BOB Wheats Flowing In and Out

Figure 42 Watermill Recipes

Introduction

The tracing and following of the BOB wheat so far has journeyed through is cultivation on the Biodynamic farm, its transformations and delineations across the Seed Breeding Station, in certification and multiplication as well as its complex life at the Watermill. We have seen the BOB wheat move through forms of production and consumption, even its consumption in further production, through cultures and social contexts as well as through technologies new and old. Here, in this final chapter drawing out the social life of BOB wheat, the narration turns to its flows moving out and beyond the Watermill.

Classroom: Bread Making and Baking

The classroom, above the Tearoom, is where both adults and school children are taught about the wheat, the Watermill flour and how to bake bread in the Watermill fashion. The school children bread making and baking education is a miniature version of the longer adult courses and as such instead of producing a couple of loaves each they make a small bread bun each, decorated with patterned cuts or seeds. The central feature of the classroom is a large solid wood dining table arranged with wooden chopping boards, ceramic bowls and bags of flour. The room is set out perpendicular to doorway, with chairs laid out in a semi-circle around facing the table, window and chair that Annabel occupies. With its wooden features and furniture, white-washed masonry, traditional chimney style range cooker, and sprawling rug the classroom is warm and welcoming, as is Annabel. The small room buzzes with energy as people begin to enter and settle down in seats ready for the

course or class to begin, although with the school groups this buzz verges on the chaotic as opposed to the calm.

Each bread making and baking session follows the same pattern. Annabel begins by introducing grains, passing round bowls of Oats, Barley, Rye, Spelt, heritage Wheat and contemporary Wheat (see Figure 15), discussing the origin and uses of each grain. Certainly this is more of a discussion on the courses, than the narration from Annabel to the students on the school trips, with many of the adults attending the courses knowing a great deal about bread and agriculture. This introduction sets the tone for the remainder of the course as a site of shared learning, experimentation and most importantly discussion. Whilst Annabel's warm and patient manner is well received by the school children who seem to relish the encouragement to smell and touch the grains. The lesson in grain moves swiftly into talk of flour, for which Annabel has prepared two bags of flour, the first is a 'local' conventional 'wholewheat' flour and the second, a bag of the Watermill's 100% flour.

Figure 43 Lessons in Grain

In talking about flour Annabel begins by drawing direct comparsions between the conventional bag of flour and the Watermill flour (which is central to the discussing to come in chapters 8 and 9). This adversarial approach is organised around notions regarding the *quality* of the flours and their artificiality. Throughout the remaining bread making and baking the benefits, in terms of human and environmental, ecological, health and vitality, of consuming the Watermill flour and baking bread in the Watermill way are repeated. Annabel goes on to discuss all the various Watermill flours as well as the conventional flour. In doing so the flours are handed around one by one, and handfulls are taken and felt, smelt and even tasted by some. Annabel talks smoothly about what each

flour is, what it consists of, how to bake with them, what kind of loaf they produce, the effects of the varying elements in the flours. With the educational visits this aspect is limited to just the conventional flour and the Watermills two main flours UBW and 100%. Naturally, the lesson swiftly moves over to the Watermill bread making knowledge-practices and imbuing the students with appropriate bodily techniques for producing a loaf of bread.

Ensuring Network Effects: Obligatory Passage Points

Both the making and consuming of bread*, then, is a mobilisation of the associations, the enactment and performance of active support. Importantly, successful translation functions as a feedback mechanism (re)establishing those defining the situation as both spokesperson and obligatory passage point (OPP). OPPs being nodes that fundamentally shape and define the actant-network and all therein. Constituent entities, communications and associations are required to pass through this critical collective in the assembling of the actor-network. The most apparent OPPs within the BOB wheat network take the form of the Seed Breeding Station that enact the seed, National Trials that certify the seed, the organification of the seed and Biodynamic grain enactment, the Mill transforming grain to flours and the Watermill performing the alterity of the BOB wheat there are others no less important. These OPPs work to manage the network building, controlling the shape of the network, ensuring that the interests, the objective effects of the network, and are recognised/realised (Latour, 2005).

An OPP being a particular 'critical' assemblage within the network through which all entities must pass through in the on-going constitution of the (actor-)network. It is a 'node' that channels all interests into one direction, establishing 'what counts' as legitimate, including practices, interactions, knowledges, possibilities and identities. Moreover OPPs work, through specific translations and transformations, to manifest network stability and durability. Whereby the network, its constituent entities and realities are made seemingly irreversible, apparently solid. In their working to manage food networks such OPPs have in their extending of the network the 'potential to dominate others' (Goodman, 1999, p. 26). Certainly within food networks science and technology assume a dominant position with innovation functioning to enrol further actor-networks, or 'quasi-objects', thus working to extend the assemblage. Yet the 'consensus and the alliances which it implies can be contested at any moment' as translation 'becomes treason' (Callon, 1986a, p. 15). Subsequently, specific actants/assemblages, spokesperson/intermediary, become functionally indispensable to the network. These 'critical' assemblages, by affecting the

circulation (ongoing production) of the network and thereby the behaviour, associations and activity of the network/actants, then certainly action at a distance (Latour, 2005).

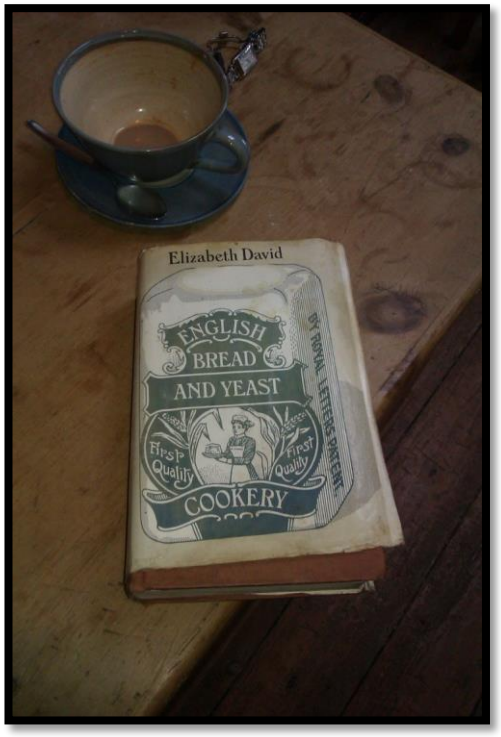


Figure 44 Real Bread Making Techniques

Having examined and analysed the various flours, each student is given the opportunity to select the flour they wish to bake with (during the late morning coffee break Annabel, but in the instances of my observing/participating in the courses I, collect together the requested flours). Prior to the break, Annabel moves through to beginning to articulate and demonstrate the Watermill bread-making technique. Whilst the demonstration dough proves the students replicate the stages. Working round the table each mixes, kneads, rests, shapes and decorates, aiming to perform the same actions and interactions as Annabel. In the midst of all this activity the proving loaf from the demonstration is monitored by Annabel, drawing the classes' attention to it when it is judge to be ready to bake and moving into discussing how to recognise a sufficiently proved loaf. The inspires questions about over-proving leading Annabel into sharing techniques for 'recovering' over-proved loaves as well as over floured (dry and stiff) doughs. The cessation of the discussion sees the demonstration loaf being placing in the oven above a tray of water.

Figure 45 Shaping the Dough

Once all the doughs are shaped they too are placed by the oven to prove and a short discussion, led by the students and their questions, ensues. Often this is a mixture of questions regarding techniques, oven temperatures, timings and recipes, problems they have experienced in making bread in the past as well as other questions arising from knowledges and practices presented in the popular cooking shows (or to be more precise the 'facts' and techniques presented and demonstrated on *The Great British Bake Off* and in the subsequent celebrity cookery books). Noel and Annabel speak of the "bake off effect", having experienced an impressive increase in the numbers attending the bread making and baking courses since its flagship series and handling questions with regards to that which is articulated on the programme and in the books. The discussion also regularly routes back to 'wholefoods', 'real' foods, healthy diets and lifestyles, Annabel weaving these ideas in with the beneficial qualities of the Watermill flour and bread making technique.

When the conversation wraps up Annabel directs the students to the Mill for a tour, most often with Clive, before they return to the Tearoom for a lunch of soup and bread, including the cheese and onion loaf from the demonstration which arrives at the table fresh from the oven upstairs. The afternoon is occupied with a second bake and education in how to recognised a perfectly baked loaf and further discussions regarding bread making techniques, to which Annabel pays homage to Elizabeth Davies, ingredients and the quality there of, pertaining to organics and Biodynamics in addition to the broader contextual issues of agriculture, environmental damage and human health. Come the end of the day, all students have two fresh loaves in their arms and usually a bag of flour or two. No notes

are given out, and few make notes, but the basic principles of the Watermill bread baking technique are printed on all the 1.5 kilogram bags of flour.

Externalisation of the BOB Wheat Network: Bread* as Manifest Translation

Significantly, in each course the demonstration of the bread-making enacts a bread, a savoury UBW cheese and onion loaf for the adults and small brown rolls for children, that is served as part of the student's lunch. Bread* is intractable from association with humans, nonhumans and socio-technical objects. No matter how simple the bread the dough requires flour mixed with a liquid, a raising agent and heat, vessel or plate made of metal or earthenware. Without interaction of multifarious human, non-human (flour, water, yeast, salt), social (semiotics, discourses and cultures) and material (socio-technical objects and practices as well as heat) entities the enactment of Bread*, its realisation, is utterly impossible. The materialisation of BOB bread requires quite exact associations with specific entities, to whit there needs to be an absence of other very specific entities (Bingham & Lavau, 2012; Roe, 2006a). Whilst other breads are equally precise and complex, flat breads do not necessarily require yeast, other risen breads raising agents such as bicarbonate soda, enriched breads utilise sugar, whilst some cakes require yeast. Other comestibles such as pastry do not require such esoteric knowledge-practices in using the BOB wheat flour as bring together, and the interaction between, the entities remains 'stable'.

BOB wheat bread is a very particular set of entities and associations, speaking broadly the transformation of flour to bread requires the bringing together of flour with water, yeast, salt, humidity, shaping tools and then heat. As will be discussed in more detail in the flowing chapters 'conventional' bread is produced in a somewhat abrupt and violent manner using the Chorleywood Bread Process, and whilst this still brings about the desired mutation of the network that makes up the dough into bread, it is a far cry from the process and practices of the BOB wheat network. Not only is the loaf a successful translation it is the externalisation, or material manifestation, of several things at once: the Watermill knowledge-practices, a web of socio-political discourses (alterity, quality, real, natural), but most importantly the BOB wheat network (in both its purified alterity and its complex entirety). Furthermore, the consumption of the bread* is both a literal and semiotic internalisation. More than that, for some in consuming the loaf they are conspicuously externalising their commensurable identity, being a contributing entity within this network and through this act of translation both enact themselves and the network, perpetuating

both, securing the ongoing reconstruction of both (these ideas of internalisation and externalisation will be discussed further in chapter 8).

The Watermill Biodynamic Holding

The holding is deeply interwoven in the everyday life of the Watermill, the grains and flours that find their way to the Mill floor are swept out and greedily consumed by the hens, geese and ducks (as well as other birds, shrew, mice and creatures of the dusky hours). The chicken's eggs are used in cooking and baking in both the Tearoom and the mill house. Whilst the goat's milk is used in the mill house also (its use in the Tearoom is prohibited by law). The sheep's wool, after being treated, is knitted by Annabel and the end products are sold in the mill shop. Waste produce from the house and Tearoom is composted and, although enjoyed by the chickens, used to fertilise the gardens producing Biodynamic fruit, vegetables and nuts. Which are in turn used and consumed in both the house and the Tearoom. Apples from the gardens are eaten almost daily by Noel and Annabel, shared after soup and bread at lunch time. Moreover, the various fruits and vegetables are, in the autumn and winter months, used to make huge quantities of jams, marmalade and chutneys used and consumed throughout the coming year in both the house and Tearoom. Not all are successful, quince turnout to be a frightful experiment in the winter of my residency.

Figure 46 The Watermill Chickens

The holding works to bind the Watermill to landscape in which it is situated, inextricably connecting it with forms of 'nature' beyond the beck being harvested for the mill race in order to power the stones for milling. It works to make the Watermill, to some extent, a closed system, with a degree of self-sufficiency and ecological balance, in keeping with

the principles of Biodynamics. Furthermore, the holding is the romantic, idyllic backdrop to the Mill and Tearoom, the windows of the Tearoom and the mill house kitchen becoming pastoral landscapes depicting perfect nature.

Figure 47 Idyllic Milieu

Tracing the Grain, Flour and Bread: The Office and Administrator

The office, rather fittingly, sits at the front of the house between the living quarters and the Tearoom (on the other side of the living quarters is the mill). Here the logistics of the incoming grain and outgoing flour et al and all the bureaucracy therein is managed. Handling purchase and sales accounts, online business, events, marketing and advertising as well as the other regulated, enforced and voluntary paper trails regarding infrastructural commodities such as water, electricity, gas and taxes as well as certification expectations for organic, Biodynamic, including traceability, in addition to health and safety (Guthman, 2014). The administrator, Alice, literally and metaphorically sits between the Mill and the Tearoom as well as between the outside world, just beyond the front door (adjacent to the office), and Noel and Annabel in the mill house (beyond and behind the office). One of the key administrative tasks at the Watermill is the completion of this traceability, an auditing practice of inscription (Lockie, 2006a) that will be explored further in chapter 8.

The Leaking Watermill: Beyond the Mill

Figure 48 The Table Replete with Flours

To now the social life of the British Organic Biodynamic wheat has been traced through its emergence as a seed, into its cultivation as grain, through to its transformation into flour and subsequent mutation into bread and other comestibles at the Watermill. Yet, the flour *et al.*, all the different aspects of the grain, travel out far and beyond the Watermill, entering the 'market place' they are purchased, appropriated, consumed and at times wasted or composted. From the Watermill the flour *et al*. undertakes a journey in to households, artisanal production, spaces of redistributed or in to the local organic community. The flour et al.'s arrival at its destination may come via being purchased directly, and in-person, from the Watermill shop, ordered on-line or called in and then delivered either by courier, at any time to any place (for a while they had regular consumers in Canada) or by the Watermill on one of its three monthly rounds.

The Watermill Shop

Woven into the fabric of the Tearoom is the Mill Shop, the tables and chairs are flanked by a large table top display of the Watermill flours (Figure 48) and the counter display of both seemingly wholesome and indulgent baked goods. Whilst the far wall is edged with two dressers, one hosting the range of by-products of milling in small polythene bags (bran, semolina) as well as other local goods, including the honey cultivated on Rowan Tree Farm, and handmade gifts many the handy work of Noel, Annabel and their daughters. The other dresser displays leaflets, of on-topic, local and organic food events, box schemes and other local organic producers and so on, as well as books and pamphlets detailing different recipes for the various Watermill flours. The Watermill shop continues into a small room at the far end of the Watermill Terrace (it is here where the stairs that lead up to the classroom are located), wherein a plethora of organic produce sourced through the Lunar Co-op are displayed and stored. The Watermill shop, come Tearoom, then makes up the place where in several categories of purchasers and consumers discover, seek out and select their Biodynamic Organic British (stone-ground) wheat flours. The purchaser-consumers

of the flour are categorised at the Watermill as being one of four groups. There are regulars, the long established flour purchaser-consumers, the Lunar Co-op commodity shoppers, novelty purchasers and bread-making students.

Figure 49 The Sideboard Display of Yet More Forms of BOB Wheat 'Flour'

The Regulars

The regulars are long established flour purchaser-consumers whom regularly visit the Watermill to buy flour, and often make it a leisure trip having tea or a coffee and something to eat in the Tearoom. These individuals are well known, if only by face, to many if not all of the Tearoom staff, Mill workers and proprietors. In turn these particular consumers know the names of the staff and, in the course of their visit, have familiar, polite and yet warm interaction that goes beyond the simple market exchange (with conversations generally forming around baking and the making of bread as well as asking after Noel and Annabel). Within this there are also a small number of regulars who call in their orders and have them delivered. Generally these individuals are more distal to the Watermill and occasionally, having called ahead with their order, make the trip to the Watermill.

Noel and Annabel introduced me to one of their long standing and local regulars Linda, a svelte bespectacled middle aged lady with short dark hair edged with grey. Living just a couple of miles, as the crow flies, from the Watermill, Linda (and her family) have been visiting and buying from the Watermill for ten years, discovering the Watermill and its flour when they first moved to the area. The discovery of the Watermill was led by a desire, largely driven by her husband, to consume 'quality' foods, more specifically to consume local and organic foods not just for the nutritional and health benefits but in order to support the local community. Over the past decade Linda has been a dedicated purchaser-appropriator and consumer of the Watermill flours, using it in making all her bread, pastries, cakes, biscuits and sauces. Shortly after welcoming me in Linda, whilst making us a pot of

tea, pointed to the oven warming offerings of homemade cheese scones and mince pies, both made using the Watermill's white flour (UBW). Given the proximity to Christmas I opted for the festive homemade mince pie, immediately prompting a discussion of the 'qualities' of the Watermill flour.

Linda spoke about how the Watermill flour is different to conventional or even other organic flours to work with. Speaking about how the flour as dough or a batter handles differently, with the flour seeming a little 'shorter' making it more difficult to make dough hold together. Going on to how in making pastry and bread, to a conventional aesthetic, was not possible as the bread doesn't rise as much and the tone of the white flour in pastries ''always seems grey''. Which Linda explained ''doesn't look that nice", subsequently she often uses conventional white flour in pastry when cooking for guests because ''you want people to look at your food and want to eat, not to wonder why it's that colour''. Whilst she considers the Watermill flours to not be 'strong enough' to make a "good" loaf, in terms of its rise and texture it being too short and dense. Linda's solution to this is to mix the Watermill flour with the local, industrially milled 'strong' North American, conventional wheat flour so vehemently opposed to by Noel and Annabel) for bread making. This was not the last time I would hear of 'cutting' the Watermill flour with a conventional 'strong' flour in order to achieve a more conventional looking and lighter loaf than the Watermill flour alone, through their own bread making techniques, can achieve.

Figure 50 The Mill shop

Having said that Linda immediately highlighted that she continues to use the Watermill flour, in spite of its less than perfect aesthetics, because it is "better for you'' than conventional flours and it has a "richer" flavour. Sparking Linda into outlining how she uses only the Watermill flour in the bases for sauces and alike because it makes a richer and smoother sauce: "you can feel the difference in the texture of the sauce than cornflour …although it requires a little more attention than cornflour". Beyond her regular appropriation and consumption of the flour visiting the Watermill Mill has come to be an 'event' also. Replacing a routine with guests she had long since established in her former

town, now taking her guests on a short walk to the Watermill via public footpaths through the fields and woods and there part-taking in lunch or afternoon tea.

Internalisation of the Network: Translations Embodied, Symbiotic Relations

Importantly, in the production-consumption of the BOB wheat we can speak of symbiotic metabolic relationships (Stassart & Whatmore, 2003; Goodman, 1999) first within 'nature', whereby the wheat plant consumes the nutrients from the earth and reciprocally fortifies the earth in its death. Second within 'culture', in the transforming of wheat grain into flour then bread and consumed, a double metabolic relationship at the farm with bread* fuelling the farming activities (Goodman, 1999). The ability of 'food' to act on the human body, and grant agency, is experienced corporeally on a daily basis (Goodman, 1999; Guthman, 2011; Valentine, 2002). This symbiotic relationship between humans and the nonhumans, socio-culturally made to be 'food' (Evans & Miele, 2012), means that the network, the translations, are literally internalised, consumed. Furthermore, it exemplifies the discussion of actantiality, as being granted or granting activity, and subsequently, BOB wheat is no longer just inanimate nature but is participant in the reconstruction of myriad entities, networks, knowledge-practices, technologies, 'nature', nutrients, human labour, the semiotic and cosmic.

Internalising the Network: Embodied Socio-Material Practices

Not a single BOB wheat baker I encountered used a timer, there is an innate sense of timing, whilst the baker maybe aware of the time that a loaf went into the oven there is a 'gut' sense about when to check the loaf, when it might be ready. Second, there is a reliance on oven smells, the baker's olfactory senses, bread that is nearing readiness fills the kitchen/tearoom with a slightly sweet malt earthen smell that is both familiar and comforting. Subtle but related to this the humidity of the kitchen, when a loaf is nearly ready the warmth and air of the kitchen feels drier. Thirdly, bakers turn to their sight, observing the loaf, the colour of the crust, which should be deep but not 'caught'. Fourth, the baker turns to auditory and texture feedback, tapping on the bottom of the loaf. The solidity of the base structure (the more crisp or resilient the more likely it is ready) and the sound made by tapping the bottom (all bakers are looking for a hollow noise, as the lower the moisture content the more hollow the sound and the more likely it is actualised as bread) give indications as to whether the bread has been achieved yet. Although, it is worth noting that prior to this tapping, the loaf must be removed from the tin, the ability to do so is in itself a feedback mechanism as to its breadiness.

As such bakers are totally reliant on their feedback mechanisms and experience in interpreting the messages from the bread as to whether it is communicating that it is now a successful (complete) mutation. If these skills, these senses, are not developed enough the baker may break the network as such by failing to enact bread. That is by failing to identify when the dough has mutated successfully and fully into bread. However, its complexity and difficulties, is made more so with the instability of the qualities of the BOB wheat flours, the different flours used in the baking of different loaves in addition to the degrees of variations regarding different ovens, baking equipment, water quality, the climate or weather on that particular day in that geographical space/place. Furthermore baking times vary according to the size, shape, the type of loaf (whether it is 'cut' with any other flour, or filled with seeds etc.) and other unpredictable qualities of the bread-making network, such as the human actant, the performance of the practices and so on.

The Lunar Co-op Commodity Shoppers

The Lunar Co-op commodity shoppers are often also local regulars but with less interest in the Watermill flours. Their visits to the Watermill are concerned with acquiring everyday food stuffs that are 'ethical' (Fair Trade, Organic) and their purchasing these goods from the Watermill is a concern to buy 'local'. The Watermill stands as the local 'wholefoods' or 'ethical' option, where they may shop for their organic, and/or fair trade herbs, salt, sugar, coffee, tea, pulses, seeds, nuts, dried fruits and much more besides. These individuals are fewer in number than other types of customers yet their arrival and presence at the Watermill has a marked impact on the milieu of the Tearoom and Mill Shop. The calm and quiet atmosphere is momentarily shattered as they move through the two rooms loudly, almost frantically adding items to their baskets and boxes, repeatedly consulting their lists, enquiring after one thing or another. They take no time to engage in their surroundings, treating the space as not dissimilarly to a supermarket, and the Tearoom staff become uncharacteristically cool towards these customers, disliking their intrusiveness and disregard for the others in the Tearoom.

Novelty purchasers

The Watermill attracts many tourists on a daily basis coming to look around the Mill and engage in 'authentic' experience of traditional or artisanal craft, depending on whether the interest is in engineering, milling or baking. Often tourists purchase a bag of flour or two, perhaps together with other novelty, gift items. Certainly, those that arrive at the Watermill on 'Food Safaris' are more likely than most to leave with bags of flour. However, unlike with the regulars it is unknown as to whether the flour actually gets used and consumed.

Figure 51 Flour bagged, packed and ready for dispatch

Notably, it was not unusual for the Watermill to receive telephone enquiries regarding the use of flour that has gone beyond its 'Best Before' date.

Bread-making students

Bread-making students are not entirely different from the novelty purchasers, with the purchasing of the Watermill flour by the students materialising over the course of the day. Although the students are never directly prompted to purchase flour the entire day is about how to make bread using the Watermill flour and Watermill methods. Furthermore, the perceived benefits and qualities of the flour, constructed in opposition to 'conventional' flours, are regularly articulated throughout the day. In effect problematizing other flours and selling the solution. With initial apparent success given that the vast majority of the students do purchase some flour however few become established, regular, consumers.

Flour Dispatches for Artisanal Production & Redistribution

The flour dispatches for artisanal production and redistribution make up the largest part of the flour's outward journeying with the Watermill running three delivery runs each month, covering the entirety of Cumbria and even passing over into North Yorkshire. These flour consignments are for the most part to stockist for redistribution, a network which is comprised of independent whole food and health stores, tourist orientated local produce shops, often attached to 'attractions', and a supermarket chain.

The Redistribution Network is broader than those stockists that the Watermill dispatches flour to directly with the Lunar Co-op redistributing the Watermill flour as a wholesaler to independent whole/health food stores, cafes and so on across the UK. Moreover, the Lunar Co-op uses a popular online retailer as a distribution tool. Its sale and distribution through the online retailer was 'discovered' by the Watermill during my time with them. Certainly, they had no idea it was being sold on through this popular site and would not have chosen to do so. Yet they didn't challenge Lunar Co-op.

Alongside the deliveries to stockists the Watermill also dispatches flour to 'craft' bakeries, cafes, restaurants and hotels for artisanal production. Here the Watermill flour is transformed into a multiplicity of food stuffs, bread, scones, cakes, buns as well as sweet and savoury pastry dishes. These 'artisanal' producer-consumers, and their consumers, articulate parallel values to that of the Watermill, seeking out high 'quality' produce, and where possible 'local' and/ or organic. Moreover, these 'artisanal' producer-consumers themselves work to produce 'real', 'traditional', 'authentic', 'home-made', 'whole', 'fresh' and again 'quality' foodstuffs. The Watermill's monthly consignments to these artisanal producer-consumers are, for the most part, regular orders, delivering particular flours in set quantities and volumes.

Often the connection between the Watermill and the artisanal producer-consumer is a long standing exchange relationship. Jackson, a long established artisanal producer-consumer, was raised in a village not far from the Watermill recalls the Watermill's restoration. His mother, like the Watermill proprietors, was an advocate of the organic and wholefoods movement and often took him there from its opening day. Growing up in this milieu and experiencing the early risings of what became The Little Bakery[37] (a market stall that was a pasting board layered with half burnt and half raw loaves of bread made from the Watermill flour using techniques taught by Annabel) were clearly formative. Jackson from an early aged baked and in his youth started a micro bakery which has grown into a well-established, and merited, Cumbrian enterprise. For Jackson the use of the Watermill flour is about producing bread with a depth of flavour and texture. However, like many of the other artisanal producer-consumers Jackson 'cuts' the Watermill flour with a locally milled conventional North American wheat flour. Jackson, in chorus with other artisanal producers, contends that the Watermill flour is low in proteins (Noel and Annabel do not disagree with, but they do argue the protein in the Watermill wheat grain/flour is of a different quality to that of conventional wheat), lowering the gluten content, as well as being high in bran which means the loaves often, in comparison to conventional loaves, appear stunted. Indeed, the majority of the artisanal producer-consumers compromise in order to achieve an aesthetically appealing loaf by 'cutting' the Watermill flour. Furthermore, Jackson and others, speak of this 'cutting' as a technique by which these

[37] The Little Bakery is a large organic bakery established in the early eighties, initially using the Watermill kitchen as a bake house, going on for many years to use the Watermill flour. Some ten years ago the founder sold up to a corporate organisation, a decision which has proved controversial amongst those invested in 'local' organic produce connected to the Watermill.

producer-consumers attempt to circumnavigate the 'unpredictability' of the Watermill flour, which at times fails to rise at all.

Figure 52 The 'Cut' Loaf of the Artisanal Bake House

For other artisanal producer-consumers the qualities (or characteristics) of the Watermill flour are advantageous, easily raising short, moist, textured and deeply flavoured scones, pastries, biscuits and cakes. Significantly, some of these long established exchange relationships have been inherited; the Wholefoods cafe of a nearby Lake District town has been running many years and has been using the Watermill flour since its inception despite a change of proprietorship. The new cafe proprietor (formerly an employee under the previous ownership) continued to use the Watermill flour, her decision being based on the "excellent quality of scones" resulting from the flour, which are "always complimented by the customers". Over time the new proprietor, Noel and Annabel have come to develop a more informal relationship. Since finishing the research the proprietors of the Watermill sold the Watermill onto a new family and as such this inheritance would now characterise the entirety of any ongoing relationships.

Figure 53 The 'Un-Cut' Cheese Scone of a Wholefood Cafe

Local Organic Community

The relationship between the Watermill and the artisanal producer-consumers forms part of the web of relationships and connections that are thought of as the local organic community. These are relationships of solidarity and reciprocity, with commitment to using (where possible), stocking and advertising one and

others produce. Jackson, for example, is involved in organising various 'Local' food events, does regular bread-making demonstrations and writes a bread related column in a regional lifestyle glossy. The Watermill is featured in these events and asked to provide flour for the bread making demonstrations, which of course they do so for free. However, there is a minor fissure between Jackson's values and the Watermill's, made manifest in his 'cutting' of the Watermill flour.

The network of relationships that constitute the local organic community is also made explicit in the Watermill Tearoom. The Tearoom is most certainly the social hub of the Watermill, its warmth draws everyone in. It is where the Watermill staff eat, drink and talk, as well as where former staff, regulars and locals come to 'catch up' and chat. It is where Annabel and Alice (the Administrator) retreat to they want a tea break and to get the latest Watermill news. But the Tearoom is much more than that, it is a manifest site of interconnections. It is here in the Tearoom that the network of associations that the Watermill is embedded in is explicitly displayed and reconstructed through a multitude of interactions.

Whilst there are many regulars there is one particular couple that have 'supported' the Watermill from its very first days and are much loved by the Tearoom staff, Noel and Annabel. They have their own table, for which a personalised handmade '*reserve for…'* sign has been made and is placed upon, by the cake cabinet and come in every Saturday morning at 11:30am. Each week their visit begins with coffee before having quiche with salads, occasionally this is swapped for something else by one or the other but rarely, and finishing with a sweet treat from the cabinet. Their visit is leisurely, spending around two hours chatting between themselves and the people of the Watermill, reading the day's edition of the Guardian or a Monthly glossy. Occasionally before leaving they purchase flour, eggs or other organic goods from the Mill Shop to use in food preparations at home in the neighbouring village. Their weekly visit draws together, and draws out, the web of relationships that converge at the Watermill. The coffee they drink is sourced through the Lunar Co-op, from which deliveries of organic and fair trade food goods from across the UK and around the world arrive weekly. Furthermore, the Lunar Co-op, with UK wide distribution, retails the Watermill flour, and subsequently the weekly delivery double's up as a weekly pick up also. Whilst the quiche and salad on a plate draws the Watermill together with Fred & Wilsons Box Scheme and Rowan Tree Farm, as well as The Cheese Farm, a mutual connection between the Watermill and Rowan Tree Farm, in addition to the Biodynamic farms .

Figure 54 Quiche and salad, a web of relations

The quiche (pictured) tells the entire story: Fred & Wilsons are responsible for the lettuce, carrot and beetroot salads as well as the mushrooms in the quiche and the red peppers in the lentils. Whilst the honey in the carrot salad originates from bee hives on Rowan Tree Farm (although the owner-producer is not Marion but a woman that in exchange for honey houses her bees and hives on the farm) and Marion uses only the Watermill flour in her baking and educational activities. The eggs making up the quiche are directly from the Watermill chickens, who feed on the Biodynamic wheat grain and bran as well as the compost heap. Of course the flour is the Watermill's, which is the transformed Biodynamic grain from the two Biodynamic farms. In addition, the quiche is topped with organic cheese, produced at The Cheese Farm in Dumfries, just north of the Border where the pigs are fed Biodynamic bran sourced from the Watermill. Whilst, The Cheese Farm retails the Watermill flours as well as Rowan Tree Farm geese, over the winter months, in their Farm shop and Butchery. Finally, the butter and milk in the quiche are both British and organic, sourced through the Lunar Co-op along with the lentils, olives, rice, herbs and spices from more distance places.

Figure 55 The Cheese Farm Display of BOB Wheat Flour

Additionally, the regular consumers of the Watermill flours and Tearoom form a link in this 'local' organic community, with many being customers of Fred & Wilson's and Rowan Tree Farm also. More common is subscription to regular fruit and vegetable

delivers from Fred and Wilsons than Rowan Tree Farm meats. However, many are aware of the Farm, Marion and her educational work, with many of the schools and colleges in the region regularly undertaking educational visits there. Indeed, the Watermill, Rowan Tree Farm and Fred & Wilsons form part of a 'local' organic food producers collective that work together to educate the public and promote local organic food production-consumption. This means that in addition to buying goods from one another Rowan Tree Farm, for example, uses the Watermill flour as part of the educational programme they run. As such Rowan Tree Farm and the local organic community also form part of the Watermill flours circulation and on-going social life, being appropriated, discussed and consumed.

Certainly, the relationship between Marion, Noel and Annabel is one formed around mutual values and interests, both parties believing in support local ventures of the same ethics and objectives. As such on occasion Marion visits the Tearoom and from time to time Noel and Annabel gift flour to Rowan Tree Farm. Importantly, one of the key activities of Rowan Tree Farm is education, with daily school trips arriving to learn about food, its origins and cooking. One these days the children are shown around the farm and then go on to prepare their lunch time meal together. During which the connections are drawn back to what they have been shown around the farm. Whilst preparing the ingredients for the meal the origin of each item is discussed: with the vegetables this is a combination of Rowan Tree Farm and Fred & Wilsons, the meat is Rowan Tree Farm beasts and the flour (which makes the scones they consume during their morning break, the pastry casing or crumble topping on their dessert and the thicken agent in the meal's sauces) is from the Watermill. The children, and the accompanying adults, are taught of the benefits of producing and consuming organic and local foods, and told to pass it on to their parents.

Figure 56 The 'Beasts' of Rowan Tree Farm

Nodes of Multiple Dimensions: Difference Converging Networks

The objective of these four chapters has been to sketch out that which was encountered in the field, and build a picture of the flows, entities and trajectories of the social life of BOB wheat. In doing so, an 'actor-network story' that speaks of heterogeneous networks wherein actants 'of all kinds, social, technical and natural are made and play out their lives' (Law, 1997, p. 3) has been outlined. What is narrated here is a social life constituted by a series of transformations. Tracing-following the social life of the wheat, in a flat sequential order, it *begins* life as a mixture of DNA and genes in the form of a seed that has the potential to be a new breed of wheat, a new variety and thus a new source of capital for a seed breeder. Here the wheat is persistently seed, seed goes in the ground, so to speak, and whilst a wheat plant springs forth it is the carrier of further seed. The wheat remains seed through its trials, certification, marketing, and (re)distribution all the way to the Biodynamic farm gate. Once again the seed goes in the ground and a wheat plant springs forth, however here the wheat plant is the carrier of wheat grain, seed is transformed and translated into grain. Through the combined work of the nutrient rich earth, rain, sun, vitality and starch in the seed, Biodynamic applications (quartz, hummus, flower oils, herbs, barks and so on), cosmic forces or energies and Biodynamic farmers, the seed transforms, and is translated, into a Biodynamic wheat plant bearing Biodynamic wheat grain. The grain, as such since its harvest, is then transported to the Watermill for the next series of transformations. There the grain through the coordination of the 'bits and pieces' (Law, 1992, p. 7) that make up the Watermill, a running beck, water-wheel, cogs, shafts, stones, millers to name but a few, is transformed into Biodynamic, organic, wheat flour. Next, the flour is transported (most often via retail) to a kitchen, at the Watermill and others far beyond, where it is combined, by the baker, with other entities and via an oven put in

association with heat which incites a mutation in these entities to the production of bread*. Finally, the bread* as a recognised food thing is cut, placed on a plate and consumed by a human subject and body that translates this food, both socially and biologically. Whilst at other times the flour is combined with other stuffs, introduced to heat transforming it into cakes, scones, biscuits, pastries and so on. Once consumed the body translates this food, metabolises it, energy (miller to do milling/farmer to cultivate etc.) physical survival and reproduction.

Moreover, what is expressed is the collective, heterogeneous, contingent, capricious and at times conflicting nature of BOB wheat. Certainly in the third chapter we see that the Mill, despite first appearances, is not an overarching structure or institution, built by man subjugating nature, nor is the miller at the helm of a passive industrial technology and thereby the only true actor. The mill is a hybrid assemblage, a nature-culture that reflects the character of BOB wheat and the world around it. More than that, the social life of the Biodynamic wheat narrates something that is in persistent flux, simultaneously 'real, discursive and social' (Latour, 1993: 64). Something that must refuses to be conceived of in the singular as the inanimate natural kernel, or ear so familiar in our imaginations, subject to human mastery.

The BOB wheat is a point of convergence, simultaneously forming part of and stitching together a number of overlapping, interwoven, actant-networks traversing the supposed division of nature and culture, production and consumption, alternative and conventional, social and economic and so on (this is at the heart of the discussion that follow in chapters 7 and 8). Sewn together via various translations, each network different, each technology of translation different, each producing different effects, not just in shaping the network and all therein but of knowledge, hierarchy and power (Law, 1992).

Whilst translation is about enacting convergences and homologies connectedness, translations and convergences may not necessarily be enacted through the production of sameness, difference can be a result of translation also (Mol, 2002, p. 83; Law, 1992). Moreover, some convergences may be drawn through precisely the actants' differences as 'divisions, although complex and provisional' are connected by 'channels or passages that run between them' (Brown, 2002, pp. 1-2). Difference is the foundation of alliances, such as those in a metabolic symbiotic relationship, different qualities are reciprocally required from one another. Moreover, in a world understood through a binary logic it is the difference that fundamentally constitutes one in the reflection of the other. Translations start to 'play different roles - but also to imply different roles for the actors round about it'

(Law, 1997:3). The constitution of difference as a point of convergence is at the heart of the next chapter. From here the storying turns to narrate the social life of BOB wheat as it continues through a series of transformations and translations at the Watermill and beyond, that draw on both symbiotic relationships and a broader (bio)politics.

Chapter 7 A Patchwork of Multiple Wheats

Figure 57 A Hand Full of 'Seed', a Handful of 'Grain', Hands Full of Caryopsis

Introduction

The story of the social life of BOB wheat so far has unpacked a constellation of interrelated, heterogeneous, socio-material, performative actants and associations. Tracing and following through fourteen years (or twenty if you take account of the years doubled up at the Seed Breeding Station) from potential seed to actual loaf. A trajectory that emerges from a complex arrangement of multiple performances (translations) of the BOB wheat. This chapter works to draw out this patchwork of manifold wheat performances (Law & Mol, 1995), taking a more in-depth look at these different translations and the technologies thereof. In doing so, the aim is to generate insights into how BOB wheat is shaped 'both in the sense of what it is composed of, and how it is composed' (Bingham & Lavau, 2012, p. 1590). The focus will be upon the key translations that converge upon the wheat kernel, formally categorised as a caryopsis.

The caryopsis is the wheat plant's (Triticum aestivum (OGTR, 2008)) fruit and seed (Figure 57). That is, both the reproductive structure of the plant (made up of embryo, endosperm and starch - the food reserve necessary for germination) and the potential food thing (flour). Thus the caryopsis is both the BOB wheats' reproductive technology (Hatting, 2012) and a vital nutritional resource for human consumption, with flour being derived

directly from the starch. Most significantly the caryopsis is both seed and grain, they are material the same single object, the same network of entities assembled in the same configuration excepting in semiotics (Law & Singleton, 2005; Mol, 2002). That is they are only different in name and their socio-cultural enactment. Wheat grain and wheat seed are, as caryopsis, materially inseparable. If you sow wheat 'grain' a plant will spring forth and on the other hand, if you stoneground wheat 'seed' the effect will be to enact (transform it into) wheat flour. Later in the BOB wheat social life the various entities in association that constitute the caryopsis are torn asunder and reconfigured, via the Watermill, into BOB wheat flours. Yet, it remains the same collection of material entities, flour is the caryopsis reorganised. This material continuity of the caryopsis, works to highlight the manifest translations and network effects, (re)constructed through various socio-material knowledge-practices, interferences, displacements and mutations (De Laet & Mol, 2000), of the BOB wheat network.

Subsequently, the caryopsis comes to be understood as a single and yet plural actor(-network) which myriad performances converge upon, and in-turn the caryopsis works to co-ordinate. These performances represent the enrolment of the wheat fruit into different, changing, (actor-)networks. The objective in utilising the term 'caryopsis' here is to allow the performances, the socio-material and co-constructed nature of the various constitutions of wheat seed and grain, to come forward. Each translation projects the wheat into a different aspect of the BOB wheat network, and a new phase in its social life. The BOB wheat actor-network, then, is the effect of numerous ongoing translations, constituted by these multiple performances of wheats. Here it will be shown how these enactments do not 'simply coexist side by side' (Mol, 2002), but are related and dependent upon one another, moreover, that they spring from one another. Each version enacted representing a spiral in the Biodynamic wheat(s) trajectory, a further translation and chapter in the wheat(s) social life. Yet, not all versions are commensurable with the BOB wheat network identity and discourses, of alterity. Most certainly, here the conflicting enactments are drawn out and highlighted as a source of insecurity and instability within the network.

This chapter then, explores the continuity and conflict across these performances, whilst the following chapter demonstrates how the incongruent, that threaten the BOB wheat network, are made absent, invisible or veiled. Together these two chapters unpack the socio-material enactments and purifications of the BOB wheat network, examining how this patchwork of wheat(s) and the assemblage that is the network are made to hang together (Law & Mol, 1995). The social life of BOB wheat presents, broadly speaking,

four categories of performance or versions of the wheat (seed, grain, flour and bread*) and within each category there are a number of different enactments. Here we will be concentrating our attention on three key translations. First the realisation of the seed, second the seed's transformation from conventional to organic, and finally the translations reconfiguring from organic seed to alternative food thing (Biodynamic grain, flour, then bread*).

In turn, the focus on these key translations work to demonstrate, first how the caryopsis is the thing that traverses production-consumption, nature-culture, alternative-conventional (it being the same material thing over and over again). Second, how different knowledges, practices, technologies and cosmologies enact different versions of the wheat (that different translations produce different network effects and thereby different realities). Thirdly, that these translations, central in network formation, work to enact realities wherein some of the performances of wheat circulating within the network become intolerable. Directly conflicting with the alternative identity and thus threaten the (re)production of the BOB wheat network. This chapter will proceed by, first, setting up multiplicity in theoretical terms before moving into an empirical explication of multiplicity through the three key translations. However, it should be noted that its articulation in this way represents a snap shot of the BOB wheat network that the fieldwork captured, and should not detract from the incompleteness of network, the performance as 'a messy contingent process…an experiment that is still in progress' (Head, et al., 2012, p. 5).

The Foundations of Multiplicity

Multiplicity is a 'form of ontological radicalism' (Law & Singleton, 2005, p. 340) working to decentre the object. Emerging from ANT[38], but specifically the work of Annemarie Mol (1999; 2002) and John Law (2002; 2004), multiplicity rests on the fundamental tenet that actants actively construct their social world [39] (Callon, 1986b). Working to form relationships and forging everything through these associations. Thereby associations, actants, practices, knowledges, space, time, objects and subjectivities are all effects of the network (Law, 2002a), as are frames, theories, contexts, metaphysics and ontologies (Latour, 2005). Thus an actant does not precede their social world, as they themselves emerge, are constituted and shaped, through their associations (Michael, 2000). As such,

[38] I use the term as a general reference point and thus we should only consider the piecemeal collection of works that share the methodological approach that binds the canon a theory momentarily for the sake of this explanation of the ontological premise that underpins these works.

[39] The concepts of social worlds and realities are used interchangeably as they reflect the same thing, the world as it is experienced.

actants are ‘enacted, enabled and adapted by their associations while in their turn enacting, enabling and adapting these’ (Mol, 1998, p. 260).

For any given actant, then, there is nothing beyond the network. The actant both forms part of the network, continuing to create it, in and through its associations with other actants (Callon, et al., 1986), as the network shapes and empowers the actant. Subsequently, the social world, as an effect of ‘a web of relations’, has ‘no status, no shape and no reality outside’ its continued production (Law, 2004b, p. 2).Yet, this relational coproduction of the social world is more than a semiotics, as socio-material practice constitutes an elemental social process. Social worlds and the entities therein are persistently (re)produced through translations, socio-material practices, and the performance of associations (Law, 2004; Barad, 2003). Individual almost/not quite objects (Thrift, 1994), then, have no singular centre, no fundamental essence, as they are the product of socio-material practices. These quasi-objects must be made (Deleuze & Parnet, 1977/2002) in the process of interaction and thus ‘different versions’ result from different technologies, practices and contexts (Law, 2002; Mol, 2002).

Fundamentally, it is through assemblages of relations and practices that realities, quasi objects and quasi subjects (FitzSimmons & Goodman, 1998), are enacted and reproduced in their continual performance. Made visible so to speak, as almost/not quite objects cannot be enacted, cannot be known or made visible without some form of interposition. That is, without embedding it in a network of relations and practices (Law & Singleton, 2005). The enactment of a ‘quasi-object’, indeed of a social world, then is a manifestation of a localised ongoing socio-material performance. Moreover, it is through the interactions of entities (association and socio-material practices) that actantiality is granted (Evans & Miele, 2012).

Conventional, More than Conventional: Convergences of Multiple Wheat

Returning to the BOB wheat, wheat is only wheat when it is ‘domesticated’ (Lien, 2015; Callon, 1986a; FitzSimmons & Goodman, 1998). A plant transformed through situated socio-cultural practices of agriculture, through human-nonhuman associations, emerging as a comestible. A material entity socio-culturally defined as not merely edible but as food (Roe, 2006a; 2006b). Wheat as a self-pollinating plant, and not at all dependent upon humans or animals for the embedding of the caryopsis in its necessary assemblage (of earth, sun and water) for its reproduction, explicates the notion of seed as a social construction. Moreover, a wheat plant’s emergence in other places may be considered a

weed (Whatmore & Thorne, 1998), just as the emergence of other plants in wheat plots are considered weeds (Doody, et al., 2014; Mansfield, 2003).

Therefore, wheat and seed are things borne through socio-material knowledge practices. It is caryopsis designated as such and sown in a particular geographically and spatially bounded plot of earth. More than that, sown in accordance with the specific knowledge-practices of cultivation, rituals believed to fortify the germination of the seed and plant, of that particular socio-cultural place and time (Daugstad , et al., 2006). Which, broadly speaking involves the embedding of the 'seed' in earth (or an earth substitute) and applying substances understood to enhance the probability of growth and vitality of the plant, including managing pests, diseases and climate threats.

Over the course of the social life of the BOB wheat there are a multiplicity of forms of seed and grain enacted across the various situated sites of the Seed Breeding Station, National Trial sites, Seed Merchant sites, the Biodynamic Farm and the Watermill. Yet, within the BOB wheat network the enactment of (Biodynamic) wheat grain must follow the realisation and performances of wheat seed. The performances of seed and grain are numerous, and complicated by their division into potential and certified seed, (the latter being legally recognised as seed and legitimate seed in practice that is, the socio-materially performed seed) as well as the Biodynamic wheat grains of the Biodynamic farms, the Mill and the Watermill flour. The plethora of enactments and performances, resulting from the different activities of each site, means the caryopsis 'varies from one stage to the next' (Mol, 1999, p. 77). Subsequently, not only is there a multiplicity of wheats, there are multiple realities that are made to be socio-materially, locally, culturally and historically (Mol, 1999; 2002).

Caryopsis Version 1: More than Conventional Laboratory Wheat Seed

The potential seed is the laboratory version of caryopsis enacted and performed across the Seed Breeding Station. This particular performance is grounded in an entirely different set of socio-material circumstances and knowledge-practices to that of cereal crop cultivation, such as the Biodynamic cultivation of seed for grain at the farm. The seed breeding process is undertaken over approximately twelve years (arguably 18 years, on account of the double growing years), wherein potential seed is persistently enacted through highly complex knowledge-practices in the specific context of the laboratory (Latour & Woolgar, 1986). Not only are there no fields, but there is no sun, rain, wind, pests or diseases in the early stages of seed breeding which are undertaken in large hanger-like laboratories. The Seed Breeding Station is a strange mixture of science, nature, culture and economy, as it

seeks to develop varieties of wheat with particular traits, that 'improve upon' (Rabinow, 1991) that which is currently in the marketplace (Marsden, 1998; Callon, 1999; Wilkinson, 2006).

New versions of potential seed enacted here are not merely 'a product of clever minds' but of 'scientific work is done in new socio-material settings' (Mol, 2002, p. 60). Taking new parent plants and violently interfering (via cross fertilisation or through direct DNA manipulations) is to take new enlistments and weave together the natural and social realms (Goodman, 1999, p. 30), and enact a superabundance of new potential seeds. In the doing of which, the Seed Breeding Station plays out a very specific spatiotemporal rhythm. Everything here, as a result of the technologies deployed in the translations, runs faster than it does 'out there'. Including the processes of 'natural selection', where genetic technologies are used to weed out the 'weak', vulnerable and potentially flawed in terms of the specifics of the wheat design (Goodman & Redclift, 1991). Certainly there is no need to expose these entities to 'nature' to know if they are susceptible to pests and disease (Goodman, et al., 1987).

Moreover, the potential seed is persistently sown, produced to be examined via different investigatory techniques[40] designed to establish its potential capabilities and weaknesses (Nimmo, 2008a). Some caryopsis successfully translate, time and time again, whilst others fail, fail to be (Callon, et al., 1986). Amid these translations, at each stage the potential seed is assessed, quantified, and its qualities made manifest via inscriptions and tabularisations (Latour & Woolgar, 1986). What is made manifest here are the material potential seed and its shadow, the discursive potential seed. Explicitly within this, the myriad entities comprising the BOB wheat network (at this stage) make for 'differential success' (Hitchings, 2003:106). The qualities of the wheat plant and caryopsis, together with the techniques of cultivation, different spaces and climates, as well as other potential network actants, such as those considered pests and diseases, all making for success/failure.

The Seed Breed Station demonstrates the socio-material enactment of seed as more than simply semiotics. The unique spatial context, techniques and knowledge framings, in accordance with the objective outcome, shape the caryopsis. Moreover, these technologies of translation, together with the context in which these interactions are embedded wherein 'capital seeks to outflank nature' (Goodman, et al., 1987; Murdoch & Miele, 1999),

[40] Notably, one stage of examination transforms the potential seed into pseudo-grain, as it is milled and baked to assess the 'qualities' of caryopsis and starch as potential bread-making wheat/flour.

produce a very specific caryopsis and a very particular reality. The result of deeply scientific knowledges, complex equipment and processes (literal technologies) and practices specific to seed breeding, such as cross fertilisation (Rabinow, 1991). Here, this caryopsis is persistently more than conventional potential seed, potential seed mutating into a plant bearing further potential seed. All with their tabularised and discursive shadows, constantly updated and transcribed anew, constantly enacting a particular version of the social world. Effecting a more than conventional version of caryopsis, wheat, seed and grain, a reality of scientific economic rationalism (inductive, rational, economic), a reality of the more-than-conventional.

Caryopsis Version 2: Certified Conventional Seed

The more than conventional potential seed, thus far successfully translated and negotiated within the Seed Breeding Station, must negotiate Certification via National Trails. It must do so in order for the (re)production of the Seed Breeding Station, BOB wheat network and the wheat itself. Should the potential seed be denied certification, and thus not realised as legitimate, there can be no translation to organic, nor wheat grain. Furthermore, without successful translation to certified seed, the Seed Breeding Station fails to perform. Failure to achieve legitimate seed functions as disinvestment for the Seed Breeding Stations as the economic and temporal investment in the potential seed is nullified. More than that, there is no return on the investment due to the failure to breed (legally recognised) seed (Maplestone, 2015).

This legislative certification process as described in *Drawing Out the Network I*, forms part of a web of national, intra-national and global protocols aiming 'to ensure that seed is produced, multiplied and marketed according to predetermined standards and systems while maintaining the genetic integrity of the product' (Armstrong, 2008). Yet, this governmental matrix constitutes a major (Guthman, 2014; Go'mez Tovar, et al., 2005), yet entirely punctualized actant(-network) within the BOB wheat network (Callon, 1987). Its position, its acceptance and adherence to, governing conduct is so 'naturalised' (Goodman, 1999, p. 29) that it is virtually invisible. It is simply the process by which seeds are made, manufactured and arrive at the farm gate. Seeds simply are not seeds on the Biodynamic farms unless they are 'C2', anything other does not constitute wheat seed (Bingham & Lavau, 2012). Certification then, is a fundamental translation, a crucial moment in the social life of the BOB wheat serving to ensure the reproduction of specific actant(-networks) as well as mobilise a specific object form, an enactment of seemingly irreversible identity (Callon, 1991).

Such a fundamental translation enacting a new form calls for radically different socio-material knowledge-practices and context. Enter the sites and activities of the National Trials. National Trials seek to test, or disrupt, the seed's/ Seed Breeding Station's claims to legitimate seed status on account of the performance of particular qualities. Thus their aim is not to create or to produce a potential diversification nor to successfully network elements of 'nature' through culture-nature mutations. Their aim is to break this synergy, this association, this networking activity, that is, to disrupt the co-ordination and 'robustness' (Goodman 1999, 29). The National Trials work to observe the seed performance and contest the 'consensus and the alliances' (Callon, 1986a, pp. 218-9) of the discursive shadow enacted and submitted by the Seed Breeding Station. Here the potential seed is negotiating its function, role and identity in its performance and interaction with the National Trial, seeking to convince others of its legitimate capacities (Hitchings, 2003). With success the caryopsis, materially unchanged from its entering the National Trails as a potential seed, emerges a certified seed. A radically different quasi-object with the potential to spiral the caryopsis forward in its translation, to be translated in multifarious ways (capital, commodity, C2 seed, grain, flour, bread and so on).

(More than) Conventional to Organic: Convergences of Multiple Wheat

The enactment of the certified seed propels the caryopsis into new assemblages. The caryopsis weaves through UK and EU economic exchange markets, and the various inscriptions (as commodity, capital and monetary returns) to be spatially displaced to the Seed Merchant. Here, the seed is made to be C1 and then C2 via knowledge-practices of multiplication across the Seed Merchant sites. Most important, is the translation of C1 seed to C2 organic, the objective of the Seed Merchant network being to achieve C2 in order to manifest a marketable commodity and the surplus value therein (Guthman, 2004). Moreover, C2 (organic) seed is that which is normatively recognised as actual seed by farmers and other growers alike (Morgan & Murdoch, 2000). However, C2 (organic) seed may only emerge from C1, which is engendered on an agri-business site via conventional farming knowledge-practices and technologies (Galioto, et al., 2011; Murdoch & Miele, 1999).

Whilst conventional practices have most definitely been deployed in the enactments of the various seeds up to now, so prescriptive are these practices and technologies (Shove & Warde, 2002) that they become invisible against the background of the spectacular laboratory and contesting practices of the Seed Breeding Station and National Trial sites. The C1 seed is made manifest through strict agronomic (rational scientific agricultural)

knowledge-practices, the objective of which is to produce the highest yield of caryopsis at the lowest economic cost. Thus, in an attempt to improve upon 'nature', or even, negate and manipulate 'natures' there is a co-option of agronomic techniques, technologies and knowledges. The fields, the wheat plants, the caryopsis (C1) become nature-cultures via the bricolage of artificial fertilisers, germination aids, pesticides, fungicides as well as mechanised technologies and scientific measuring devices, together with chemical compound related equations. What emerges is a conventional C1 seed, imbued with the artificialities, and arguably impurities, of such techniques of production. Subsequently, the BOB wheat network is not entirely 'alternative', with it in actuality springing from deeply conventional practice, technologies and assemblages.

Caryopsis Version 3: Conventional Seed to Organic Seed

The C2 translation, in the BOB wheat network, is simultaneously the transformation of the caryopsis from conventional to organic. To now, the assemblage within which the caryopsis has been interacting, has worked to produce a more-than-conventional form. Here, as with certification, radically different socio-material knowledge-practices, contexts and actants are necessary to interrupt this continuity of performance. Whilst the industrial assemblage of mechanised actants and basic practices of agricultural cultivation remain in place, the caryopsis becomes entangled in additional, entirely new, knowledge-practices and entities. Wherein there is a disassociation with the scientific rationalism of conventional agronomic practices, in addition to their core actants (artificial fertilisers, germinations aids, pesticides and fungicides) (Maye & Kirwan, 2010).

Perhaps more fundamental, however, is the central form of action as inaction, to *cooperate* with nature, to allow nature to do, to be (Tovey, 1997; Kaltoft, 1999). Equally so, the literal material embedding of 'naked'[41] caryopsis in the site itself, as certified organic (Guthman, 2014) and representing a 'natural' and 'pure' environment, reframes that which emerges from the earth. As organic earth forms a symbiotic metabolic relationship with the caryopsis, the mutating and emerging plant is imbued with its organic existence, as it internalises these qualities through its association with the organic earth. These interactions, together with the organic practices of cultivation, work to enact a 'C2' seed that is borne of 'nature', pure and unadulterated by humans, culture or science, and one that is recognised as actual seed by our Biodynamic farmers. Importantly, these practices, assemblages and interactions construct a reality, if only imagined, of 'good' pastoral relations (as opposed to the inductive, rational, economic one of the more-than-

[41] The caryopsis arrives at the organic gate 'naked', without the conventional germination application.

conventional). Of benign human-nonhuman interactions imbued with moral and ethical values and virtues, with the potential for further moral and ethical actions and interactions.

Conventional to Organic to More than Organic: Convergence and Conflict Securing Alterity

There are some key distinctions between the seed performances leading up to and including 'C2 organic' seed which are important to highlight, as they reflect controversies within the social life of BOB wheat. Firstly, across these performances the caryopsis, in its manifold forms, is persistently something of exchange value. That is, a rationally produced commodity intended for market exchange and the generation of surplus value (Lyson & Guptill, 2004). Here, caryopsis circulates as capital and commodity, transforming from one to the other as it is exchanged, displaced, cultivated, mobilised and translated again (Callon, 1999). The production of C2 Organic seed reflects the Organic as industrialised and global, replicating that which it set out to oppose (Guthman, 2004). This is not to say that Biodynamic farm and Watermill are not capitalist ventures, but that the problematisation underpinning the interactions and objectives of the situated practices enacting the caryopsis are different. Subsequently, the worlds in which the caryopsis circulates, the realities within the BOB wheat network, are multiple, related and yet utterly conflicting. Antonymic and antagonistic on account of the more-than-conventional seeds that the BOB wheat network itself frames as pernicious and directly oppositional to the more-than-organic (alternative, organic plus Biodynamics) nature of its assemblage.

Secondly, and addendum to the first, is the capacity of the 'C2 organic' status to render these incommensurable forms and actants invisible. Invisible as it is only the 'C2' form that considered by the Biodynamic farmers to actually be seed, no other forms present as a possible seed. Such as it is, for the Biodynamic farmer true seed is only that which is certified, second generation (C2) and registered in the HGCA Recommended list. This limit to the conditions of reality, of what is seed and what is not, is of great significance as it speaks of a fetishization, a process of punctualisation that black boxes all other seed performances (Goodman, 1999; Callon, 1991; 1987).

Importantly, the success of achieving certification works to make invisible the very success of the Seed Breeding Station network and the potential seed therein. Just as 'when a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed the more opaque and obscure they become' (Latour, 2005). The translations and subsequent versions of the caryopsis then become reduced to standardized

practice by the Biodynamic farmers. One of selecting seeds only from the HGCA Recommended List. This 'shedding of history' (Callon, 1991, p. 152) simplifies the entire network up to this point, including the economic markets, technologies, and scientific disciplines (Goodman, 1999), to an inscription and fetished form, the'C2 Organic'. Translating it into a single node in the Biodynamic farm network, moreover in the BOB wheat network (Law, 1992). Consequently, the doings of potential and certified versions of seed, from which the actual seed performance of the Biodynamic farm and subsequent grain and flour enactments spring forth from, are made invisible.

The 'C2 Organic' seed that arrives at the Biodynamic farm gate fetishizing (Head, et al., 2012, p. 3), veiling, an entire mesh of performances, practices, objects and other BOB wheat forms. In silencing all this, approximately 12 years of a 14 year life (or 18 of 20) the C2 Organic seed becomes *the* seed and a black box waiting to be broken open and its recordings aired. The C2 Organic seed is engaged with as a discrete entity, as opposed to being perceived of as the summation of a complex assemblage of science, plants, people, technologies, earth, and so on. The 'C2 Organic' status working to make the seed functionally blank (Hetherington, 1999), affording opportunities for the Biodynamic farmer that conventional or other versions would not, and indeed could not allow.

Such is the effect of success that the punctualisation, of this substantial aspect of the social life of BOB wheat, works to veil the instability and incommensurability of these assemblages and objects. The C2 Organic seed is a miniscule fraction of the performances of seed, the only remnants of which are royalties and copyrights. However, it is marked in its capacity to allow the actualisation of seed and the emergence of the Organic Biodynamic grain. As Morgan & Murdoch (2000) suggest, for farmers to move from conventional to organic agricultural practices 'they must forget many of the practices so characteristic of the conventional chain in order to (re)learn how to farm in an ecologically benign fashion' (p. 167). Similarly the network must 'forget' the conventional versions of the caryopsis in circulation in the BOB wheat network. That which comes before 'C2 Organic seed' then becomes, must become, the shadow on the ground (Head, et al., 2012, p. 3) of the BOB wheat network.

From Organic to Alternative Food Network

The performances that make up the social life of the BOB wheat, then, consist of realities defining themselves against one another. Alternative and conventional social worlds, persistently reconstructed in binary bifurcating the world. Underpinned by a modern ontology, the primary conventional-alternative dichotomy of food networks both reflects

and perpetuates divisions between humans and nonhumans, production and consumption, nature and culture**.**

Caryopsis Version 4: From Organic to Organic Plus

Each autumn the 'C2 Organic' wheat seed arrives at Biodynamic farm gate ready for sowing. Perceived as actual seed, its 'C2 Organic' status is both performed and taken for granted (Goodman, 1999). The small white document accompanying the seed discursively enacts the C2 Organic seed, and it is this document (the shadow of the seed) that the Biodynamic farmers check in ascertaining that this seed is actually seed, aka C2 (Morgan, et al., 2010; Carter & Rosa, 1998). Here the caryopsis becomes seed in practice, performed as actual seed by 'drilling' the caryopsis in to the prepared earth. Just as in the case of organic enactments, the manifestation of a Biodynamic wheat plant and subsequent caryopsis are literally grounded in the Biodynamic certification of the earth and the farming practices.

The enactment of Biodynamic wheat grain first requires the performance of C2 Organic seed. The C2 Organic seed next becomes actant and entity in the rituals of Biodynamics combining cosmology, practice, minerals, flowers, water, manure and horns amongst many other nonhumans. Biodynamic 'brews' (Guthman, 2014) are mixed with the almost/not quite wheat grain (Thrift, 1994). Finally, in the summer, comes the moment of the grain's realisation on the farm, the harvest. All conducted with the objective of the cultivated and collected caryopsis being for consumption. The manifestation of grain, then, is not only about the knowledge-practices performing a specific version of the caryopsis but also about its imagined trajectory (Head, et al., 2012). That is the *future* network of associations within which the caryopsis will be entangled, enrolled into, and the coming versions and performances of the caryopsis. It is considered grain, because this version of the caryopsis, as it is imagined, will not find its way back into the earth to mutate into a wheat plant. No, it is imagined that the caryopsis now will go on to be stoneground into flour and then transformed into bread* which will be consumed (by humans, for the most part).

More importantly, the work that performs the seed simultaneously enacts a Biodynamic reality, that is the Biodynamic farm and farmer as well as Biodynamics as a shared social world (Law, 2004). The Biodynamic rituals performed manifest the cosmologies and ideologies that constitute Biodynamics, and are woven through the Biodynamic subject (Larssæther, 2011). Certainly, whilst different forms of the wheat are achieved 'by means of various tools in the course of a diversity of practices' (Mol, 1999, p. 77), so too are contexts that serve to create different practices. Performance and enactment are circulating

as entities (humans, beliefs, practices etc.) shifting 'between enroller and enrolled' in a perpetual 'organic process' (Hitchings, 2003, pp. 106-7) of achievement. Specifically, the manifestation of Biodynamic realities (crops, farms, farmers and knowledge-practices) are achieved in the practice of two Biodynamic rituals, BD 500 and BD501. There are eight outlined in Steiner's lectures, however it is these two ritual Preparations together with various pieces of hardware and diligent inaction (Kaltoft, 1999) that make Biodynamics a reality. Notably, in cultivating Biodynamic crops and putting together the Preparations correctly, 'inaction' is not passive. Inaction is action in Biodynamics, allowing the cosmos and nature to *act*. Although, there is, during this apparent inaction, regular monitoring of what is going on and needs to be done (Hitchings, 2003), as well as a tracking of the lunar cycle as the base rhythm of the Biodynamic farm.

Figure 58 Biodynamics in Action

C2 Organic Seed Drilling: Performing Seed Enacting a Biodynamic Reality

Sheltered from the crisp breeze, in the warmth of autumn sun, the scent of the deeply churned earth rises as I sit, watching on as the tractor weaves its way across the field. Dragging the tentacles of the seed drill behind, periodically Leonard (the tractor) disappears behind the steep gradient, with only the flight of birds giving indication of its continuing existence. Having spent much time discussing the Biodynamic practices the time has finally arrived for the application of 'Preparation BD500'. Usually, Leonard tells me, '500' is sprayed on the field between 'cultivation' (the turning of the earth) and seed drilling. But this year things are a little different as the persistent rains in the early autumn led to sodden fields. Driving over which with the quadbike trailing the spraying equipment

would have compacted the soil and ultimately led to 'more weeds' in the crops (their being better suited to such conditions). Subsequently, this year the 'Preparation 500: Horn manure' would be applied after drilling, by me.

In assembling the BD500, Leonard opens up the most curious of the sheds on the farm. Guarded by a decaying 1940s tractor, the small shed is teeming with equipment quadbike, sprayer, and other mechanical looking odds and ends, chests, shelves and worktops laden with dusty articles. Leonard begins foraging among the curiosities for the various components he requires, but is soon distracted, picking out and showing me brown glass vials with watermarked handwritten labels and opening up chests bearing cow horns and jars of ground quartz, all appertaining to the doing of Biodynamics.

Figure 59 Quartz in the Making of BD Preparations

Finally, having assembled the necessary elements for the 'BD500' I follow Leonard outside again… up on breezeblocks, there is a large metal drum contained by a green frame. From a tap in the wall below Leonard fills the drum with water and, climbing up the breezeblocks, adds the other elements. All that is left now is to stir the composition. Returning to the shed there is a jigsaw of electrical technologies, cables, timers, breakers. Leonard sets the timer to break the connection in one hour and then releases the power supply. The surge of power brings the contraption to life, as two stirring arms rotate within the drum, stirring the water and other elements, moving in one direction for a time before resting and then moving in the alternate direction.

Back outside I can hear the water swooshing round the drum, arriving at peace and then swooshing again... We talk about the farm, Biodynamics and Leonards' late father, who

built the stirring contraption from parts of disused tractors, trailers and grain dryers. Fitting together the quadbike and the sprayer, positioning the sprayer just below the stirring device, Leonard explains how I should export the 'BD500' from the drum to the sprayer. Going onto how I should go about spraying the 'BD500' on the freshly sown field, by taking a line that allows two drill rows either side and (if possible) remaining mindful of what I'm doing and why I'm doing it….

The swooshing continues for a little while more before the timer breaks the circuit and the stirrer comes to rest. As directed I emptied the 'BD500' from the drum into the sprayer, donned the oversized hi-vis coat Leonard has lent, and mount the quad… down the lane towards the newly sown field… in place at the far end of the field I begin travelling at what feels like an appropriate pace. Tracked up and down the field, trying to spray without overlap, whilst trying to calculate if I would manage to cover the entire field before reaching the end of the 'BD500', at the same time attempting to maintain a mindfulness… doing Biodynamics is a tricky business.

In the course of the highly inconspicuous agricultural practice of sowing seeds, the 'C2 organic seed' is both consumed and performed. Furthermore, the very specific knowledge-practice of Biodynamics are done, thereby inciting the processes by which Biodynamic grain are made manifest. More than that, the Biodynamic nature, the Biodynamic social world (its cosmologies, knowledges and values) are made to be, and remade through interactions with social labour (Goodman, 1999). That is, through the compiling and applying of the preparations, the evoking of cosmic forces, the emergent plant and caryopsis *become* Biodynamic wheat. It is specifically this invocation of ephemeral actants, the embedding of the caryopsis in the flow of cosmic universal forces that fundamentally shape this particular version of the caryopsis. This then, is not merely the making of a thing, it is the production of a social world. As 'at each turn in the spiral, a new translation of quasi-objects gives new impetus to the redefinition of the social body, of subjects and objects alike' (Latour, 1993, p. 109). By practicing Biodynamics, Biodynamics *become*, and the beliefs and framings of the world therein are made to be.

Caryopsis Version 5: Biodynamic Grain to Milling Grain

Cracking wheat

The air has turned dry and the dusty track is beginning to radiate the sun's warmth, Leonard is standing just beyond the gate, on the edge of the golden crop, looking long towards the woods at the furthest edge of the field. We are here to determine if the wheat is ready to be harvested, it is ripe but it may be still be damp following the evening's light

rain. Leonard explains that the wheat must be as dry as possible at the point of harvest. Dampness in the grain poses risk of decay and combustion, as well as an economic drain because he would have to run the grain dryer, which is always used as further precaution against such loss/risk, for longer. Looking back to the dusty track and pausing briefly (I'm not sure why but it strike me that he is to be feeling the air on his face) Leonard is quiet, observing. Turning back to the field he breaks off an ear of wheat and firmly rubs it between his hands letting the chaff fall away to the ground.

I am aware that Leonard is, in part, demonstrating common arable ways of knowing for my learning, so quickly, like a child, I begin to copy Leonards' actions. The chaff drifts away leaving deep harvest gold grains clustered together in both mine and Leonards' palms. Having momentarily examined the grains Leonard begins pushing the grains around with one finger whilst explaining that when the wheat is ripe and dry it cracks when bitten down on. Selecting a grain Leonard pulls his mouth wide and places it between his premolars and bites down. I copy. Biting down on the grain, it doesn't give but quickly fractures with a seemingly loud crack. Leonard drops the rest of his grains to the ground and turns back towards the sheds, the grain is ready to be harvested. I continue to eat mine as we head off to collect the combine harvester, tractor and trailer.

Grain in one place, such as the Biodynamic farm, does not necessarily make it grain in another. As the displaced caryopsis enters a new assemblage of actants and relations, at either the national laboratory or the Watermill, it must perform the qualities expected of it as grain in these new entanglements. Enrolment at the Watermill, its performance as grain, is premised on the caryopsis proving to be suitable for stone milling, bread making and human consumption (Law & Mol, 2001). The knowledge-practices through which the grain is forced to pass, whereby it must be observed as pertaining to the qualities of grain, in these two spaces (the Lab and the Watermill) are very different. The laboratories use rational scientific methods and technologies (chemicals, test tubes and other technological equipment) to dissect and measure various compounds that are perceived as making up the caryopsis. Whilst the Watermill's approach, outlined below in *Singing Wheat*, is acutely embodied in the qualitative and experiential Gothian scientific ethic of Biodynamics.

Figure 60 'G Clamp' Grain Tester of the Watermill

Singing wheat

In amongst the clutter populating the wooden surface of the kitchen table a small brown paper bag, marked 'DAPHNE', sits next to an antique coffee grinder. The uppermost third of the paper bag has the look of worn linen, crumpled and soft, whilst the body is replete with its contents. Noel strides into the kitchen, with an awkward grace befitting the compromise between his height and the low celling of the Watermill's interiors, in-hand a grey metallic box and a G clamp coupled together...Upon closer inspection the G clamp has been modified, a small plastic cup is affixed to the end of the G frame which the swivel shoe (at the end of the thread) will wind down into. Digging his hand into the paper bag Noel cups a few grains of wheat and drops them into the small plastic cup and begins to wind the thread, closing the clamp. Noel explains that the contraption is a basis electrical circuit that performs as a moister tester… the closed G clamp forms an electrical circuit, the result of which is a whistle emanating from the grey box. However, the circuit can be extended to include a conduit in the small plastic cup and, as water conducts electricity, the circuit can be used to determine how much moisture there is in wheat grain… with moisture being indicator for starch (flour) in the grain Noel is looking for a whistle to resonate. Certainly, if there is no whistle the grains are merely husks and of no use to the Watermill. On the other hand, however, too much moisture in wheat grain is rather tricky... Yet, the little circuit is quite sensitive, and the more moisture the louder and more resolute the whistle. Subsequently, filling the small plastic cup with 'DAPHNE' wheat grains, Noel works to establish the moisture levels of the grain, and if the grain is of use to the Watermill. …at the flip of the switch the room is filled with a high pitched electrical whistle....

The practices enacting grain at the Biodynamic farm and the Watermill are fundamentally different, and yet both aim to establish the caryopsis as grain, so as to maintain the network

and reciprocity of the relationships between them. Should the caryopsis fail to be established as grain, should the network fail to hold the assemblage of relationships and translate (enrol and mobilise) the caryopsis, the ongoing existence of both the Biodynamic farms and the Watermill become exceedingly precarious (Murdoch, 1997). Concomitantly, the on-going production and stability of the Biodynamic social world becomes highly precarious (and as such it is in the networks interest to establish and perform grain).

Caryopsis version 6: Biodynamic Milling Grain to Alternative Food Network

The caryopsis has been geographically and semiotically displaced multiple times and in doing so has both changed and stayed the same (De Laet & Mol, 2000). An apparent immutable mobile (Latour, 1987), that has moved around but held its shape physically in a 'relational and possibly functional manner'. Thus appearing as a more or less stable network of association (Law & Singleton, 2005, p. 5). However, the semiotic reality, the identity, status, limits of possibilities, and the material doings of the caryopsis have changed dramatically. Certainly, the shifts across geographical space are followed with enrolment into different sets of entities, relations, knowledge-practices and objectives that in turn produce different versions of the caryopsis, just as they enact different social worlds. These performances and realities have converged upon the caryopsis without affecting the material configuration of the caryopsis (excepting the initial act of the Seed Breeding Station). They seek to affect a specific version of the caryopsis, it being the 'object' in production, and social reality. Yet, the Watermill enacts versions of the caryopsis that are deeper socio-material translations, interferences that (re)shape the very materiality, the objectivity of the entities that come together in the order that is the caryopsis.

Milling, the fundamental translation here, is the simultaneous performance and destruction of grain. Whilst grain is being performed on the first floor of the Mill, BOB wheat flour (traditionally stoneground, local) is being enacted on the ground floor. These two wheats are intractable, one cannot exist without the other. Moreover, the wheat grain's destruction leads to the 'birth' of multiple actants, multiple flours, all of which were already there, just in a different order of association. The various entities that constitute the caryopsis are, in this translation, rearranged, their original ordering being torn asunder. No longer does the starch, wheat germ and so on, sit together in association with the husk, these entities are now sat alongside one another, displaced like the bits and pieces of a jigsaw. Once transformed into BOB wheat flour (100% flour) further interferences displace these entities spatially/physically and others incorporate new entities (other flours, seeds, fruits, calcium, raising agents). The spatial displacement is a literal space created between the entities,

sieving off and separating the Bran in part for 85% flour, or entirely in the constitution of UBW flour, as well as the Middlings and Semolina. Although, some flours are to be reunited, albeit in different quantities and incorporated with other, non-wheat, entities in the mixing of speciality flours such as the 'Special Blend'. Thus we have a multiplicity of flours all cut from the same caryopsis, not one but many (Strathern, 1991; Whatmore, 2006).

Clive calls me closer to scrutinise the flour myself, as he often does throughout the day. I pinch the flour and rub it between my fingers just as Clive had done, it is warm and a little gritty. Clive, turning back to the Mill, confirms 'it's a little coarse'. Adjusting a bolt Clive incites a chain reaction resulting in lowering the runner stone, to the effect of finer flour falling through the flutes.

This violent interruption in actualising the new form, the flour, is of specific importance within the BOB wheat network as it also works to enact the network as an alternative food network. Indeed, it may only become the alternative food network when there is a commodity that consumers both can both recognise and access as a food thing (Evans & Miele, 2012; Roe, 2006a). Broadly speaking, wheat grain itself is not considered a food thing, however flour and bread* are. Here the caryopsis is realised as the thing that traverses production-consumption, nature-culture, alternative-conventional, its continuity being its materiality. Yet, in its material organisation as caryopsis it may not be recognised as a food thing, moreover as an alternative food. Consequently, the transformation that is necessitated is deeply material and semiotic. Therefore, while the caryopsis is being violently transformed the BOB wheat network too is being drawn together and made manifest. Just as the social world is an effect of 'a web of relations' that has 'no status, no shape and no reality outside' its continued production (Law, 2004b, p. 2).

This socio-material displacement allows the network to be made an alternative food network, as it bridges the gap between agricultural commodity and the morally and ethically infused consumer good. More than that, this translation makes manifest a means by which the BOB wheat network, importantly including its values and ideologies, may be both externalised and internalised. Thereby the BOB wheat, in particular forms, becomes a technology of translation in itself (it is this that will be explored in the coming chapter). Milling, then, is a deep socio-material reorganisation of the wheat, enacting a form able to carry the weight of the alterity, the moral burden and ethical values of this social world. The violence at the heart of this interference makes possible the 'subversion, misuse and

re-appropriation' of enrolled actants (Akrich, 1992), and thus may work to both veil and produce an actant capable of carrying the weight of such moral and ethical values.

A Patchwork of Multiple Wheats: Convergences and Conflicts

We have seen in this chapter the caryopsis made, remade and yet remain to be the same bits and pieces (Law, 1992). The caryopsis is the continuity, relating all aspects of the social life of the BOB wheat. The same material object being the site of convergence of manifold forms circulating in the BOB wheat network, the performances of seed and grain being numerous. Made so by the heterogeneous socio-material contexts and knowledge-practices, overlapping and complex, with each version of the wheat being 'localised'. Bound to a 'specific site and situation' (Mol, 2002, p. 55) and constituting realities enacted through the very particular knowledge-practices of the Seed breeding station, Seed Merchant, Biodynamic Farm, Watermill and Kitchens.

Each represents a mobilisation and subsequent enrolment across the ever changing assemblage of actants and relations that is the BOB wheat network: A fluid, shape-shifting, and name-changing quasi-object, quasi-subject (Goodman, 1999; Law & Singleton, 2005; Thrift, 1994). With each version, its particularities of action and interaction, allowing 'for the production of each of the possible states' (Callon, 1999, p. 184). Yet, we have also seen the incommensurability of the versions circulating within the BOB wheat network. In addition to the denial of conventional performances, in the enactment of the organic, Biodynamic and alternative food network. Such moves represent a struggle against uncertainty, and the actantiality of other actants within the network, threatening to disrupt disorder or collapse the translations, relations and performances.

The social, political, economic and material translations described here are central to the (re)production of the BOB wheat network, yet each is a capricious moment. The narration of multiple wheats thus far portrays a somewhat smooth transition from one performance to another (with the exception of the indication that successful translations are not guaranteed, such as a failure to become certified seed) but this is only half of the story. Despite my intention to not impose order, the conventions of writing and describing inherently detract from the expression of instability, transience and the ephemeral nature of all the work being done. The world we live in is remade from moment to moment. Associations, performances, networks are in a persistent state of flux and thus insecurity, with success and failure possible in equal measures.

This chapter has drawn out how different knowledges, practices, technologies and cosmologies enact different versions of the wheat, and thereby different realities, as they converge on the same material object, the caryopsis. Furthermore, the caryopsis has been demonstrated to be the continuity connecting the different, at times conflicting, forms of wheats circulating in the BOB wheat network. Thus the caryopsis, it being the same material thing over and over again, is the thing that traverses production-consumption, nature-culture, alternative-conventional. Consequently, highlighting that the BOB wheat is not the 'glue holding everything together but what is being held together' (Latour, 2005).

However, where there is difference, which there is here, there is contestation, debate and politics, and where there are politics there is power (Law & Mol, 2008). The following chapter explores the means by which the incongruent performances, outlined here, are threats to the BOB wheat network that are made absent, invisible or veiled. Working to examine how some translations specifically function to (re)construct the network in the image of the alternative, purified according to a particular moral landscape. Together this and the final chapter explore the socio-material enactment and purification of the BOB wheat, and of the network. Sketching out how this particular patchwork of wheat(s) is made to hang together, that is how the BOB wheat network's efforts to stabilize alterity and expand the collective is achieved through the purification of these incommensurable versions of the wheat. Yet, that this process of purification works to persistently reconstitute modern ontological binaries, specifically the alternative-convention bifurcations of food networks. Moreover, that this purification making and manifesting alterity, is woven through the contemporary biopolitical dispositive, itself persistently circulating and remaking, Modern ontological framings of reality as well as the moral and ethical values therein.

Chapter 8 Coordination, Purification & Biopolitics: Making Alterity Manifest

Figure 61 Bits and Pieces Awaiting Translation, Being Co-Opted

Introduction

The social life of BOB wheat, as narrated to now, has outlined BOB wheat not as 'one but many' (Law, 2002; Strathern, 1991; Lien, 2015). A hybrid and changing assembly of material and semiotic, nature and culture, social, political and economic as well as human and nonhuman. Multiple versions of wheat, converging upon the caryopsis, have been storied in both their continuity and conflicting enactments of the same 'object'. The social life of the BOB wheat emerges as a series of socio-material performances that (re)construct multiple, and apparently mutually exclusive, realities. Moreover, we have seen how particular socio-material translations work to radically transform the BOB wheat, and in doing so render other forms, circulating within the network, invisible. What we see is the punctualisation of the entire web of actants, associations, knowledges-practices, and performances, or versions, of BOB wheat (of the Seed Breeding Station, National Trails and Seed Merchants) that constitute the vast majority of the social life of the BOB wheat. All reduce to a singular node within the BOB wheat network (Guthman, 2014) in the enactment and performance of 'C2 Organic' seed.

Without doubt, the successful performances of organic, Biodynamic, and ultimately the alterity of the BOB wheat network, depend upon denying performances constructed as Other (Lee & Brown, 1994); the conventional and more than conventional wheat forms.

Much like the wild wheats[42] that spring up in and around the specific spaces of cultivation, that threaten the purity of the crop; they are not made subject to cultivation but are instead made weeds, made Other, and accordingly rouged, winnowed and bolstered away, restoring the purity by deleting their presence. It is this purification that is the focus of this chapter.

The BOB wheat network works to (re)construct a binary reality of alternative-conventional food networks (Holloway, et al., 2007) and in doing so produces a conflict, it being unable to undo both the continuity of the caryopsis and the conventional (as they are made to be) performances from which alternative forms spring forth. Indeed, without these incommensurable entities and interactions the BOB wheat network would fail to be. The BOB wheat network produces social worlds, intractable from its own ongoing performance and expansion, wherein aspects of itself become utterly intolerable (Latour, 1993). These incommensurable performances jeopardise the network's identity as alternative, its speech, objectives and authenticity, and as such threatens to destabilise and debilitate the network's ongoing (re)construction. Thus in an effort for stabilisation, the radical socio-material translations and transformations of the BOB wheat work to fetishize particular forms, and thereby the constituent actant-networks of, for example, the more-than-conventional performances of the Seed Breeding Station within the BOB wheat network (Gunderson, 2014). These radical translations, working to purify the BOB wheat network, then capture and illuminate a manifestation of power. Setting frameworks of meaning (potentially seeking to shape subjectivities and govern conduct of other actor(-networks) (Alkon, 2013)) so that 'their own desired performance can take place' (Hitchings, 2003, p. 107).

The BOB wheat network works to purify, making in effect incommensurable wheats hang together through various socio-material technologies. Specifically, it is the modern conventional-alternative binary, as a mode of ordering (Law, 1994) that is fundamental to the making of the BOB wheat network as alternative food network. Creating distinctions through which the BOB wheat network frames itself as pure, natural and alternative food production-consumption assemblage. The objective of this chapter is to explore the manifestation of both this incommensurability and its subsequent purification, that is, how alterity is made to be. Furthermore, how these forms are made entirely absent, deleted from the BOB wheat network, as an alternative food network and social world. Having highlighted the fractures and incoherence in the various performances of BOB wheat in

[42] Seed producing grasses related to the plants cultivated as arable crops and specifically wheat.

the previous chapter, here we explore how these discordant versions of wheat are punctualized, veiled through simplifications and centrings.

The discussion begins by reflecting on the articulated alterity of the BOB wheat network and the various performances therein. Considering how these performances work to threaten the purity of alterity of the BOB wheat network, before moving into how they are resolved within the network. Resolution takes the form of three technologies of purification, techniques through which the BOB wheat network seeks to resolve the intolerable performances of BOB wheat: simplification, traceability and ontological purification. Importantly, we see how these technologies of purification are deployed and reconstruct modern binaries in seeking to enact a coordinated, stable, yet differentiated (thereby politicised and powerful) alternative food network. Specifically, through to how the alterity of the network, the work of purification, is secured through the rising of real bread, a fundamental translation and externalisation of the BOB wheat (Miller, 2012; Law, 2002).

Here the raising of real bread is understood as the manifestation of the BOB wheat network, specifically as an AFN. Furthermore, that real bread is made to be a moral object (Larssæther, 2011) through its entanglement with broader biopolitics discourses and 'biological bodies' (Lavis, et al., 2015, p. 11). In the contemporary biopolitical milieu 'alternative' food production-consumption, as aligned with nature, 'comes to be extolled in terms which tally with the more moralized perspective on nature' (Murdoch & Miele, 1999, p. 467). Therein real bread becomes the material objectification of an utterly natural (acultural) BOB wheat network, which may well be understood as a biopolitical technology through which the network (political, social and cultural values and understandings) may be literally internalized.

The real bread of the BOB wheat network then illuminates the ways in which the network seeks to draw on the biopolitical dispositif (Mayes, 2016) that is circulating in, around and through, this supposed AFNs (even commodify particular (bio)political discourses, moral and ethical values (Bellacasa, 2010; Popke, 2006)). This smorgasbord of socio-political discourses, organised around the bifurcation of food production-consumption networks, works to imbue the network (and its constituent entities but perhaps most importantly the related socio-material practices) with deep meaning. Moral and ethical values that function to stabilise the BOB wheat network's identity as 'alternative'.

Incommensurable Wheats: Threats to Purity, Incoherency in Alterity

Of the multiplicity of versions of wheat (caryopsis) made to be over the course of the social life of BOB wheat (Larssæther, 2011; Bingham & Lavau, 2012) there stands a stark rift, a bifurcation of performances into alternative or conventional. The framings of the BOB wheat grain and subsequent Watermill flour (as well as the imagined trajectory of the caryopsis and surrounding food scape, political-ecological imaginaries, ideas, ideologies, values and debates, circulating within the BOB wheat network) are made in opposition to that which is constructed as 'conventional'. The alternative-conventional bifurcation of food networks is absolutely integral to the BOB wheat network's identity in the contemporary capitalist milieu[43], wherein such forms of distinction become differentiation and unique sell points. A process of singularization (Callon, et al., 2002) that is simultaneously deeply normative (Goodman, et al., 2012), a distinction not only reproduced in, but around the BOB wheat network.

The performances that make up the social life of the BOB wheat consist of realities (alternative and conventional) defining themselves against one another. These social worlds and the entities therein are persistently reconstructed in duality. A bifurcation which is underpinned by a modern ontology working to artificially dichotomize the complex assemblages that make up our social worlds. The making of food networks as alternative or conventional, then, reproduces the modern order, re-making distinctions between humans and nonhumans, production and consumption, nature and culture. Such orderings manifest a/effects (Goodman, 2015; 2016), a differentiation that creates opportunity for both politics and power, through the mobilization of ideologies, moral and ethical values, and practices. The consequence of this binary framework is two-fold. First, there is a juxtaposition between so-called 'alternative' food networks with socio-political activism, built upon their positioning (and assumed political objective) as a fundamental critique of supposed 'conventional' networks. Second, in the creation of such politics, in difference, the alternative-conventional binary is a moment in which power, as the ability to define and thereby govern conduct, actions and interactions, may be manifest.

Here, conventional food networks are constructed as inherently unethical in their agronomic and industrial practices. Moreover, as pernicious and exploitative on account of their global and capitalist character (Goodman, 2004; Goodman, et al., 2012). Whilst alternative food networks are framed as natural, knowable and wholesome. In addition to,

[43] Colarry to the ontological disposition of the conceptual frame work it is presupposed here that there is an embeddedness of economic action in shifting networks or assemblages of human and nonhuman actors.

'green', sustainable and just in their (supposed) anti-capitalist exchange (DuPuis & Goodman, 2005). This creative framing of food networks produces several a/effects, both played through and (re)constructing the contemporary biopolitical dispositif (Foucault, 1997/2004; Mayes, 2016; Nadesan, 2008). Central to which is the construction of conflict, of incommensurable and intolerable versions of the BOB wheat. That is, versions of caryopsis that manifest the interrelation and blurring of the separation, the discretion of the alternative.

Yet, the performances of wheats across the social life of the BOB wheat network reveal a network full of actants, objects, subjects and performances that blur the demarcation and undermine the purity of the alterity of BOB wheat network, as well as the conventional-alternative conceptualisation of food networks more broadly. Whilst AFNs are popularly portrayed, assumed even, as operating within different logics to that of conventional networks, they rarely meet the ideals of farming in nature's image (Soule & Piper, 1992; Guthman, 2014). With a plethora of actants and overlapping networks disrupting the conventional-alternative divide the threats to purity are numerous. The industrial agricultural complex with the tractors, combine harvesters, grain dryers, and so on that run on diesel/oil for one. The capitalist (wage-labour) relationships that run throughout for another (Allen, et al., 2003). Not to mention the redistribution through supermarkets and a popular online retailor.

The binary performance, then, manifests versions of BOB wheat that threaten to destabilise the network, as it besmears the integrity of the alterity of the network. Fundamentally, the network in working to enact itself as Other, as alternative, creates its own contradictions (by failing to acknowledge the conventional and more-than-conventional realities). Subsequently, there is need for the alterity of the network to be made stable and continuous in order for its authenticity as Other to the conventional to be maintained. The BOB wheat network seeks to purify its assemblage of relationships and actants, whilst simultaneously struggling to problematize, through the explication of the 'punctualized, routine corporeal practices' (Goodman, 1999) of conventional networks.

In an effort to secure actants' participation in the assemblages, that is to say consumers in an alternative food network, 'heterogeneous engineers seek to 'black box' existing networks' (Latour, 1987; Bingham & Lavau, 2012), thereby 'closing controversies' (Latour & Woolgar, 1986). Here, the conventional performance of BOB wheat are veiled, punctualized in the performance of C2 organic seed. Any opening of food networks' black boxes, and punctualized networks, may well work to 'disrupt the co-ordination and

'robustness' … on all registers' (Goodman, 1999, p. 29). Revealing 'conventional' performances undermines the alterity of BOB wheat and threatens its ongoing (re)production. Much like the 'moments of acute politicization' that are food scares and scandals, wherein food networks 'and the social worlds built around these relational ties, collapse in disarray' (Goodman, 1999, p. 28).

The co-ordination of the multiple wheats, then, is absolutely fundamental, as the problematisation of particular performances threatens the identity of subsequent ones, and the network. Exposed, these conflicting realities, would tear asunder the alterity, moreover the assemblages of the BOB wheat network. An un-packing of these punctualized nodes, veiled networks, makes the bits and pieces that make up the actor-networks entirely present, and opens the network up to scrutiny that exposes like an autopsy. Coordination, then, 'encounters problems when uncertainties about that states of the world… increase' (Callon, 1999, p. 184). Coordination, purification, is about securing and delimiting the possible. Demarcating the possible actions or outcomes, through an imagined trajectory of the BOB wheat (Law & Singleton, 2005).

Fundamentally, there are two categories of performances of wheat within the network that, from this binary perspective, corrupt the purity of alterity. First are the various performances and enactments of caryopsis up to that of 'C2 Organic' seed. Those being conventional as well as more-than-conventional performances, outlined in the previous chapter. The second category of disruption is in the actualisation of bread, where beyond the Watermill, a technique of 'cutting' raises bread* that is less than pure. Problematic as bread* is the externalisation, realisation, and mode of internalisation of the BOB wheat network as an alternative food network.

Enacting Pure Alterity: Co-ordinating Multiple Incommensurable Wheat

We have seen that the 'conventional' performances, actants and assemblages of the seed are made invisible through the realisation of the 'C2 Organic' seed. Functioning to punctualize a web of laboratories, potential seeds, technologies, genetics, artificials and agronomy, and thereby confers a degree of stability, by bounding off that which has come to make the C2 Organic seed into being. This punctualization affords a 'functional blankness' (Hetherington, 1999) through which the Biodynamic wheat plant, caryopsis, and Biodynamic grain may emerge. Yet, this is just one means by which purification is established and there are further technologies by which the BOB wheat network is strategically purified. The coordination of the multiple incommensurable wheat

performances are undertaken through technologies of purification that work to centre, simplify or ontologically absolve.

These technologies of purification work to make absent complex contradictions and in doing so purify the order of things, the alterity of the BOB wheat network. These technologies are modes of ordering (Law, 1994), framings that function to stabilise the identity of the BOB wheat network. Whilst for the sake of presentation these three technologies must be made discrete, it is however a falsehood to draw them apart as they overlap, intertwine and mutually construct and support one another. Together these technologies function to socio-materially reconstitute the BOB wheat network as they perform the network in harmony manifesting a unified object.

Technologies of Purification 1: Simplifications, British Organic Biodynamic Wheat

Biodynamic farming is a form of agriculture that is not particularly popular or well known in the UK. As such, the term and identity of the network as Biodynamic presents something of a problem (Higgins, et al., 2008). For the Watermill, labelling the stoneground flour as Biodynamic is problematic as the general British public (potential and even existing consumers) do not know what the term represents. Subsequently, those individual human actants the Watermill is looking to enrol into the BOB wheat network are unable to translate the ethical and moral value of the term. Placing the identity/alterity, and thereby stability, of the network under threat, as the knowledge-practices and performances that imbue the greatest symbolic and semiotic weight are lost in translation in its inscription as Biodynamic. The Biodynamic identity of the network, then, is a moot signifier, failing to communicate the alterity of the food network.

Thus the Watermill, and the Biodynamic network more broadly, work to make the BOB wheat identity (and its concomitant morals, values, ethics and knowledge- practices) intelligible through an intermediary signifier. Something that works to interpose, and thereby translate the Biodynamic-ness, in order that potential consumers (potential new actants) in the network can know the Watermill flour, the BOB wheat. That is, recognise it as alternative and as a *quality* food thing (Watts, et al., 2005; Ponte & Gibbon, 2005). In this the Watermill (re)turns to 'Organic', simplifying the identity by appropriating a seemingly universally understood symbol. For example, the online shop website states:

'All of us here at the Watermill welcome you to our website. We mill lots of organic and Biodynamic stoneground FLOURS but there's much more...'

'Welcome to The Watermill Online Shop, specialising in organic stoneground flours'

Here 'Organic' is positioned in advance of Biodynamic [44], and whilst this is commensurable with lay explanation of Biodynamic as organic plus, Biodynamics are consider to be practices of cultivation that go beyond mere organic practices. The deployment of 'Organic' is by no means inappropriate, it is homage to social life of both the Watermill, which was organic before it was Biodynamic, as well as the wheat. However, Biodynamics are held to be a deeper shade of green, a more profoundly ecological, ethical and moral network. It being Biodynamic arguably has greater value both socially, in terms of its moral and ethical weight, and economically, as a higher *quality* product (Callon, et al., 2002). Yet, given the relative obscurity of what it means to be Biodynamic in the British popular imagination, the positioning of 'Organic' works to communicate the network's alterity through the simplification (Callon, 1987). Albeit at a cost, with the BOB wheat Biodynamic values being diminished in the translation.

Returning to the website statement, the positioning of Biodynamic between 'Organic' and 'stoneground FLOURS' is a very literal representation of the BOB wheat network (organic seed - Biodynamic grain - stoneground flour). Such a presentation works to consolidate the alterity, making the flour three times alternative (Organic, Biodynamic and Stoneground), three times a *quality* product. As Harvey et al (2004) usefully articulates *quality* 'is one of those words with unfailingly positive connotations' (p. 1). Important to the process of simplification being undertaken here, the term *quality* tightly weaves together enmeshes the objective material reality (attributes) of the flour and the normative comprehension of *quality*, creating a 'presumptive judgement that is positive' (*ibid*).

Reflecting the processes of simplification being outlined here, reducing Biodynamic to Organic, Harvey *et al* (2004) qualify that 'the capacity of 'quality' (as an abstract noun) for recommendation is blanket, yet implicitly there is always contained a reference to some particular attribute or attributes' (p. 1). Indeed, here we see *quality* as communicated through the articulation of specific intelligible attributes of the flour (as organic, local, traditionally stoneground product). Moreover, in line with Ponte & Gibbon's (2005) suggestion, these attributes are classified as such according to the ease with which the quality can be ascertained. That is to say that the Biodynamic attribute is of a lower normative ranking to Organic which is easily understood as a quality attribute. To which we may add three categories of attributes (search, experience and credence[45]), that pertain

[44] In spite of the Watermill proprietor's commitment to Biodynamics and their feeling that organics do not go far enough in terms of ecological rebalancing and the Watermill being a Biodynamic holding itself.
[45] Search attributes are qualities of the product can be verified at the time of purchase. Experience attributes are those that can only be established after the transaction has taken place, in the

to the flour itself, in terms of its aesthetics (appearance, taste, and absence of taints) as well as the BOB wheat's cultivation and the flours' milling processes (production), which relate to the authenticity of alterity. That is to say the environmental and socio-economic conditions of cultivation (Ponte & Gibbon, 2005). Furthermore, these attributes are produced in binary, citing for example 'the quality 'fresh' precludes the quality frozen' (Harvey, et al., 2004, p. 2), as well as working to veil other attributes which may undermine the *quality* attributes, or indeed alterity. Thus that which is articulated as the attribute of *quality* is relevant to contextual advantages, for the 'food producers or advocates' (*ibid*). Perhaps, the three fold quality attribute functions to counter any diminished ethical and moral weight in the reduction from Biodynamic to more normative understanding of the value of the flour.

Simplification then, is a technology both of translation and purification. Working to translate and delimit the possibilities of what Biodynamics might be to potential new human actants (new website visitors, potential new consumers) who will most likely have little comprehension of what the term Biodynamic is making reference to. Certainly, this may be understood as a manifestation of 'market agencement' (Le Velly & Dufeu, 2016) on the part of the BOB wheat network. That is the creation of a market for the flour made manifest through the hybrid assemblage of the Watermill, and more broadly the network itself. Most importantly, such simplifications based on supposed attributes of *quality* rule out the possibility that the BOB wheat has any shadow of the conventional. Certainly, in discussions across the Watermill (with consumers/customers, students and tourists) the flour, and the BOB wheat's cultivation, quickly becomes 'Organic' as opposed to Biodynamic. Yet, in conversations with, and between, Biodynamic farmers, the Watermill proprietors and staff as well as known others from the Biodynamic community, the wheat is Biodynamic as opposed to 'Organic'. The difference in language dividing the two interactions is clearly demonstrative of the 'Organic' simplification and its manifestation as a technology of translation.

As a socio-technology of simplification, then, the term 'Organic' works to circumvent, veil even, these complexities (Law, 2004b; 1992). Making it knowable via the creation of another reality, another version of the wheat. It simplifies the complex multiplicities of the wheats circulating in the network by subduing the Biodynamic identity and limiting the other (possible) realities. Creating just one knowable reality, the present, the 'Organic'.

consumption of the thing. Whilst credence attributes, Ponte & Gibbon (2005) suggest are subjective qualities, based on trust.

The use of 'organic' as the key identifier, then, functions as a mastery of time and space, as all the social life of the BOB wheat, all the inextricable spaces, places, times and wheats are reduced to just one imagined trajectory. Wheat grain produced (locally and) organically that makes its way to the Watermill where it is stoneground into flour. Just as Law (2002) tells us, simplifications are not given in the order of things, this is not a true reflection of the network making only very limited and specific versions of the wheat knowable. In this way 'Organic' is a homogenising force, drawing together the multiplicity of the forms of BOB wheat.

Furthermore, the deployment of 'Organic' is not merely concerned to translate something unknown into a knowable subject-object, to understand that the flour is not merely 'local' and /or 'traditionally stoneground'. It is strategic in that it seeks to adhere the BOB wheat to a whole host of ideologies, values and ethics 'artfully performed into being' (Law, 2003, p. 6) via the specific practices of 'alternative' cultivation. Deploying 'organic', then, is to draw heavily on biopolitical[46]-ecological imaginaries (Goodman, 2004; Heynen, et al., 2006). Whilst a great many individuals may not be aware of what organic cultivation actually involves, the grand moral and ethical discourses woven through it are ubiquitous. Drawing on such discourses is to draw on cognitive competencies which constantly shape 'supply and demand' (Callon, et al., 2002). Being 'organic' draws on discourses around environmental and ecological degradation and climate change as well as animal welfare, New Age spirituality and contemporary health, thus drawing on particular ethical and moral value sets (Goodman, 2000), including those tied up with notions of 'local' (Marsden & Arce, 1995) and 'natural' movements (Miele & Pinducciu, 2001) food which themselves are woven in with organic (Guthman, 2002). Certainly, qualifying the BOB wheat as economic good, as opposed to product[47], means adding to its production and circulation 'the mobilization of necessarily rare resources' (Callon, et al., 2002, p. 197). Here we may suggest those biopolitically cohesive (alternative) qualities to be those 'rare

[46] Contemporary biopolitical concerns to manage and regulation of biological life and vitality imminently inscribe food production-consumption as biopolitical (Nally, 2010). Moreover, food networks and their constituent food things are an utterly fundamental aspect of the biopolitical dispositif contemporary Western societies (Mayes, 2016; Nadesan, 2008). With individual human nutrition and diet, health and vitality (Thacker, 2011) as well as biodefence at the level of the population (Lang, 2010; Kirwan & Maye, 2013), all being intractable from food, its cultivation, provisioning and consumption. The symbiotic metabolic relationship (Goodman, 1999) that cuts through human and nonhuman lives, the co-dependent nature of our vitality and indeed ongoing existence, draws socio-material food practice in and through this biopolitical matrix. Subsequently the 'enduring metabolic intimacies between human and nonhuman bodies' (Stassart & Whatmore, 2003, p. 450) are problematizing through food production-consumption networks.

[47] Callon et al (2002) Make the distinction between products and goods, the product being a sequence of transformations whereas the good 'corresponds to a state, to a result or, more precisely, to a moment in that never-ending process' (P. 197).

resources' which explain 'why it is in demand and why, being wanted as such, it is traded' (Callon, et al., 2002, p. 197). Moreover, these are attributes that impose a degree of stabilization to the BOB wheat as an economic good, and as a network too.

So far the discussion has pointed towards the commodification of an already existing mesh/mess (Law, 1994) of value discourses, with the reduction of the BOB wheat to 'organic'. In order to make its (deeper) 'Green' values intelligible, to translated, whilst catching an array of value laden moral and discourses (subaltern) concerning socio-material food and eating practice (and much more), the network is simplified. Furthermore, in doing so it works to limit the possibilities of the BOB wheat, it cannot be conventional because it is organic, and the two are mutually exclusive and diametrically opposed. Thus, fore fronting the 'Organic' quality works to create questions about other flours, other wheats. Problematizing other wheats, flours and breads*. Fundamentally, we see an enactment of a biopolitics articulated from (apparently opposing) ethical principles[48].

Organic, then, becomes a biopolitically performative marketing tool (Solér, et al., 2017), illustrating the deep interrelations not just between the economic and the political, but the 'natural' and the 'social'. Indeed, the certification trials and governance of biodynamic/organic certification (Demeter/Soil Association) represent obligatory passage points the BOB wheat (and other 'alternative' food things) that want to participate in alternative/Quality food production-consumption markets (Krzywoszynska, 2015). Moreover, markets written through with moralised and biopolitical discourses, wherein transactions cannot take place unless there is certainty around the alternative credentials and qualities of the food-thing (Caliskan & Callon, 2010).

Reflecting the co-constructed and interwoven nature of (bio)politics and economics (Callon, 2007), we can see how the construction of convention food networks as problematic, then, draws the BOB wheat network into association with a multitude of prefigurative political (Winter, 2004) and 'Green' socio-political movements/networks (Goodman, et al., 2012). Specifically, the BOB wheat network frames its opposition against conventional industrial bread production, arguably a 'tactical ethics' (Herman (2010, 2012) in the attempt to draw on a biopoliticised and moralised market. The significance of this biopoliticisation lies in the mundane, everyday nature of wheat and bread in human lives. Certainly, bread itself has historically acted as a (bio)political

[48] Goodman (1999) suggests this biopolitics is articulated from ethical principles 'whose ontological foundations are diametrically opposed' to modern ontological bifurcations (page); however, the apparent relationality of such ethics remains modern, it is merely an inversion.

technology (Bobrow-Strain, 2012), on account of its intermediary position, deep cultural symbolism and symbiotic associations with humans[49]. Moreover, it is the shared metabolism at the heart of food production-consumption networks that not only form the basis for their consumption, as moral and ethical, but also for imbuing uncertainty (Lamine, 2005) in conventional food things.

The biopolitical dispositif, then, is an 'enabling network' (Mayes, 2016, p. 17), made up of socio-material practices, discourses, and settings, that works to make (individual) food production-consumption inseparable to (supposed) Anthropocene induced climate change and/or environmental and ecological degradation. Moreover, manifesting individual consumers as responsible and directly culpable in (individual and population) human health (Foucault, 1997/2004; Thacker, 2011). This web of discourses functions as a technology of translation, making one 'see and speak' through the frames of knowledge. As such it delimits possible social worlds with mobilisation, and there in power, through education (and politicisation) as 'lines of force …that proceed from one unique point to another'. Which in turn allow subjectivity 'to come into being or makes it possible' (Deleuze, 1992, pp. 159-161). The biopolitical market, then becomes a collective device allowing a negotiation/ compromise on the value given to the good being produced and distributed (Callon & Muniesa, 2005).

The making of conventional food production-consumption as objectionable is facilitated, then, by the contemporary socio-political milieu. Drawing together a governance of the body, the human population (Nadesan, 2008; Goodman, 2015) and 'more-than-human' ethical concerns (Whatmore, 2006). Establishing itself as alternative food network through the re-articulation of the modern binary and a methodological erasure of culture, the BOB wheat network seeks to enact a differentiated network. One that is imbued with heavy moral values, entangled with notions of right and wrong, through a commodification of the biopolitical dispositif. So weighty that not consuming ethical foods has become a kind of 'trope of un-care' demonstrative of a lack of 'political economic sensibilities' (Goodman, 2015, p. 216).

49Bread has been a central actant in a great deal of socio-cultural, economic and political strategies bread, famously instigated what became the French Revolution of 1789 (The Federation of Bakers, 2013). Whilst in the early twentieth century Britain, bread became a central symbol in the British Free Trade and Tariff Reform battles (Trentmann, 2008). More recently, the Egyptian Revolution petition was 'bread, freedom and social justice' (Tadros, 2012). Although less grandiose, the real BOB wheat bread functions as a technology whereby the BOB wheat network attempts to intervene and govern the optimisation and maintenance of the health and vitality of the population in multifarious ways.

'Organic' as a technology of purification becomes legendary, a key, communicating myriad messages (Serres, 1993/1995, p. 9). Yet, its simplification works to multiply, as its translation as 'Organic' connects the BOB wheat to a plethora of socio-cultural networks. Subsequently, this simplification is central in maintaining the networks and associations that both the Watermill and the BOB wheat network are embedded within. However, most importantly, by simplifying the BOB wheat to 'Organic' there is an explicit effort to manifest a social distance from the conventional. As such, 'Organic' works to simplify, purifying the network by making it homogenous, thus veiling the complexity and heterogeneity of the BOB wheat network.

Figure 62 Inscription, Socio-Material Practice, Translating BOB Wheat

Technologies of Purification 2: Traceability

The wheat grain arriving at the Watermill, and thus the subsequent flour and breads* are certified as Biodynamic and organic by Demeter and the Soil Association respectively. Importantly, within the European Union all produce destined for human consumption and labelled 'organic' must be regulated by a certifying body and be fully traceable. Traceability as a record of the trajectory of the commodity through time and across geographic space, alluding to the assemblage of relationships and practices of production it has been embedded in. The log, ideally, allows the commodity's (social) life to be traced and thus evidence its organic, and (in addition) biodynamic status. In practice this takes the form of various inscriptions, with batch numbers and ledgers, for example; the grain that arrives at the Watermill has a batch number given by our Biodynamic farmers, within their records this batch number is cross referenced with the batch number attributed to the tonne of seed from which it originates. The batch number on the seed is generated by the

seed merchant, where it is again crossed referenced with the coding/batch numbers allocated to the pre-C2 seed procured from either other merchants or directly from breeders.

Traceability then is an inscription, a quantification, which creates shadows on the ground, semiotic versions of the wheat. As such, traceability is in itself, on the ground, invisible despite its emergence from socio-material practices and associations. It is the objectification of the ephemeral, a semiotic tracing of the trajectory of the wheat. Much like across the social life of the potential seeds, organic traceability tabularises the performances of organic caryopsis. Indeed, at the Watermill traceability amounts to (supposed) numerical inscriptions of the flour and one Excel Spreadsheet, of which there is a paper version in the Mill and an electronic version in the office . Thus it is through these practices of inscription (Nimmo, 2008a) that BOB wheat is made tractable (Guthman, 1998; Goodman, 2004). Its organic and Biodynamic heritage is made visible through the spreadsheet, yet the performing of this presence creates absence.

Most importantly, the practice of traceability is entirely underpinned by notions of visibility, openness, and public access; it is a practice purporting to support public knowledge regarding the origins of their foods. As such traceability performs as a 'virtual panopticon' (Law, 2003, p. 5), apparently making the social life of BOB wheat entirely visible, entirely knowable. However, as Law (2003) contends, spreadsheets are calculative systems that work in specific ways 'tending to create some possibilities and delete others' (p. 5). As traceability is translated into a calculative system the wheat is quantified, thus homogenising the multiple performances of wheats circulating in the BOB wheat network. Traceability then may be understood as a technology of homogenisation, framing and performing BOB wheat in a particular way (Lockie, 2006a). Indeed, the records held at the Watermill pertain only to the Biodynamic farm and the 'C2 Organic' seed, which is itself only visible on paper. As such a plethora of supposed conventional versions of the wheat circulating within the BOB wheat network are marginalised. By employing metrics, technologies, laws, and other measures (Callon, 1998), processes of organic qualification that include traceability work to establish the *qualities* of the BOB wheat, and at the same time position it within the 'alternative' (biopolitical and morally infused) market.

Traceability, then, is a presentation, an enactment, of an imagined trajectory; this isn't to say that it is not real but that it is not a true tracing as it fails to present large swathes of the social life of BOB Wheat. It is the effect of a set of performing relations that enact a 'homogeneous, unambiguous, quantitative, summary form of visibility' (Law, 2003, p. 6).

Consequently, the apparent visibility and openness of the BOB wheat network, moreover the subtle claim to lifting the veil that 'conventional' food networks operate behind, works to generate particular presences and absences by centring the multiple wheats into a spreadsheet. Traceability then acts a placeholder, an enactment of BOB wheat, a semiotic representation of the BOB wheat that presents it as one unified and homogenous object. Traceability, then, 'embodies and enacts a series of relations, which tend to reflect and reproduce specific social and technical agendas' (Law, 2003, p. 5).

As a technology of purification traceability centres the BOB wheat network through inscriptions that pronounce the organic and Biodynamic versions of the wheat. Building on the simplification of the organic, the traceability makes these specific versions visible. Moreover, traceability centres the performances of wheat, orders the complex and disparate plethora of wheats, by drawing them together. Socio-technologies of centring, then, working to perform 'more or less complex series of relations which juxtapose values and perform operations to produce a centre' (Law, 2003, p. 6). The gaze of traceability (to borrow from Foucault (1963/1989) briefly), then, creates a central performance around which all others may be organised, those least commensurable set furthest from the centre; marginalised from the picture, hidden under the picture frame.

Certainly, traceability is a key actant in the supposed transparency and defetishizing work of alternative food networks (Gunderson, 2014); something upon which a claim to trust and truth is made (Thorsøe & Kjeldsen, 2015). The efficacy of this technology is evidenced in the complete unawareness of the conventional performances circulating in BOB wheat network. Indeed, the work of the Seed Breeding Station, National Trials and Seed Merchants simply does not form part of this auditing (Nimmo, 2008a), and thus is not represented in the traceable inscriptions, nor do they form part of the imagined BOB wheat network. This *apparent* [50] unawareness of the conventional performances of wheat circulating within the network, means that attempts to define the network as alternative may not necessarily be explicit attempts to covet known potentially de-stabilising and

[50] I use italics here as, whilst the Watermill proprietors as key network spokespersons may indeed not have known certainly of these performances, they did not seek to know either. They were happy to not know and to accept the 'C2 organic' status and Biodynamic enactments as enough; almost as though it was better that they did not 'know'. I make this statement on the basis of their reactions to being made aware of this conventional foundation of their 'alternative' commodity, which was to never speak of it again. This reaction stands in complete contrast to all else I learnt and informed both the BD farmers and Watermill proprietors (et al); which was readily shared and talked about, eve published in their newsletter.

undermining entities within the network. However, it remains that there is an overt strategy to establish the alterity of the BOB wheat.

Technologies of Purification 3: The Ontological Purification

'Stories are part of ordering, for we create them to make sense of our circumstances, to re-weave the human fabric. And as we create and recreate our stories we make and remake both the facts of which they tell, and ourselves. So it is that we seek to order, and reorder, our surroundings'

(Law, 1994, p. 52)

The technologies of purification, in centring and simplifying, have worked to marginalise, make absent, and diminish the complexities of the various wheats circulating in the BOB wheat network. Indeed, together the Organic intermediary and traceability, along with the very success of the Seed networks working to punctualize them, entirely veil all that came before the C2 organic seed. Yet, these technologies pale in significance compared to the final form of purification, ontological purification. Ontological purifications are technologies of socio-material knowledge-practices and discursive orderings that don't simply work to coordinate the plethora of wheats by veiling conflicting performances. These technologies functions to shape reality, shaping not just the BOB wheat network and all its concomitant entities but the world around it. Through the ascription of a very specific object and network identities, technologies of ontological purification work to define situations, shaping realities, the context within which the wheats are circulating.

Ontological purification, then, delimits possible worlds, possible realities, it outlines the shape of the reality; it shapes how we 'see' and understand the world, what is truth, what is real, what limits to possibility are. These practices and discourses seek to coordinate the multiple versions of wheat by not merely making absent incommensurable performances, but deleting them entirely. They seek to make BOB wheat a discrete, alternative, social world and in doing so construct its binary opposite, the conventional food network. In effect they seek to perpetuate the modern binary logic, the way in which the world is understood, and the subsequent normative alternative-conventional framework through which food networks are conceptualised. Yet, this is done by maintaining that the humans and nonhumans, nature and culture are deeply intertwined, a logic which is not understood or respected by conventional networks, who believe in a mastery over nature. Such practices and discourses work to (re)shape a world wherein there exists a bifurcation of food production-consumption networks.

This is how the story goes:

Food networks are ubiquitously categorised as being either 'conventional' or 'alternative' in character (as discussed in chapter 1). The general contention being that AFNs have emerged in response to the glaring and multifaceted contradictions of the unsustainable industrial food system and the exploitative trading relations embedded in the global supply chains that support its growth and (expanded) reproduction' (Goodman, et al., 2012, p. 4). However, the idea that this represents a change 'out there' marginalises the possibility of a shift in things 'in there', that is to say in knowledge, thought and perception, in ontology - aka the regime of truth (Foucault, 2008). Certainly, there is the suggestion that over the past thirty to forty years there has been a 'discursive and material development of such 'spaces of possibility' (Goodman, et al., 2012, p. 3). Thus whilst 'alternative' food networks may appear as new (Conrad, 2001), it is an indication in a change in the possible social worlds, the possible forms and assemblages. Indeed, the shape of contemporary food production-consumption networks and the egress of the alternative-conventional binary are heavily rooted by (post) war biopolitical concerns for sustaining the population and the deepening of the rationalisation of agriculture therein (Griffin, 1979). These (post) war concerns resulted in the wide spread mechanisation and industrialisation of British agriculture and, most importantly, simultaneously the emergence of the organic movement (both organised around notions of self-sufficient long term food provisioning).

As Conrad (2001) suggests, if 'organic methods have existed for centuries, the organic movement could begin only once an alternative to them existed' (p. 17). Subsequently, there is a simultaneous birth (Latour, 1993, p. 13) of both conventional and alternative networks, despite neither network being discrete nor pure. Significantly, this is the context in which Biodynamic agriculture in Britain emerges. The alternative-conventional binary, then, is rooted in Modernist ontology, as it is underpinned by the rationalisation of agriculture and food production-consumption networks more broadly.

Rationalisation here sees the dominance of agronomy, rational scientific knowledge-practice, and its products (artificials) as well as the mechanisation and industrialisation of agricultural practices. These socio-material shifts are guided by the idea that a mastery of nature is both possible and desirable. Subsequently, there is a separation of nature and culture, of mythologies, god(s) and science, and ultimately between production and consumption as the farm became factory (ref), shifting from cultivation to production. The rationalisation of agriculture is the enactment of the Modern world, it performs the modern ontology. Moreover, it functions as a 'disciplinary technology of ontological purification'

(Nimmo, 2008a, p. 272) performing the purifications of nature-cultures, humans-nonhumans and so on. Indeed, as Nimmo (2008a) argues, 'rationalisation is able to accomplish the work of purification because it is a potent force for the reshaping of practice in accordance with the relations between abstractions; it pivots upon the ontological correction of the actual' (p. 273).

Indeed, as Law (1994) suggests, 'the machinery and the social relations of the lab all go together. They all perform and embody modes of ordering. They're inextricably entwined. There is no possibility of separating them out at all' (P.141). Thus rationalisation and industrialisation of agriculture, underpinned by scientific rationalism, works to (re)construct the Modern world. The Modern social world is (re)produced via two sets of practices 'which must remain distinct if they are to remain effective' (Latour, 1993, p. 10). The first are practices of translation that 'create mixtures between entirely new types of beings, hybrids of nature and culture' (*ibid*). The second is the purification that creates 'two entirely distinct ontological zones: that of human beings on the one hand; and that of nonhumans on the other' (*ibid*).

Within the BOB wheat network these Modern practices, ontological binaries and the purification of the social order, are entrenched in the industrialisation and rationalisation of both the 'conventional' performances of seed. Moreover, we see the binary enactment in bread, and the bread making processes of the BOB wheat network. Indeed, the BOB wheat network, as an AFN, raises real bread as opposed to standard conventional loaves, conceived as 'no time bread' within the network. The 1960s saw the creation and mass implementation of the Chorleywood Bread Process (CBP) and subsequently the mass production of standard uniform loaves. Certainly, in a world shaped by rationalisation and purity of order it is essential that the 'product conform to a fixed standard if its mass consumption was to be effectively organised' (Nimmo, 2008a, p. 278). Moreover, the purification of the social order is manifestly produced via the CBP as discourses around purity, hygiene and cleanliness are bound together with industrial baking (Bobrow-Strain, 2008); where bread is leaven in sterile environments by machines, rarely making contact with human hands. Yet, as will be discussed shortly, the alterity of BOB wheat, of real bread, is made manifest in opposition to the qualities of rational bread, both semiotically and in the socio-material practices of raising bread.

Primarily, then, alterity is enacted through the knowledge-practices of the mode of cultivation, that is not just in terms of agriculture but of the cultivation of bread too. Through these discourses and practices the wheats circulating in the BOB wheat network

are made ‘alternative’, creating a quasi-object quasi-subject that is exclusive to and in opposition to ‘conventional’ food networks. Such orderings are an extension of simplification, yet they go beyond simplification and centring in their coordinating of the multiple versions of wheat, as rather than attempting to reduce and make the wheat knowable, familiar, they attempt to define the wheat in its entirety, thus working to delete the multiplicity, the complexity, of the wheats. This is a (whole) dominant categorisation that inconspicuously makes performances not merely invisible but impossible, erased. It works to establish a regime of truth, ‘an operation used to define individual agents which are clearly distinct and disassociated from one another’ (Callon, 1999, p. 188.).

Purification here, then, works to characterise conventional networks as a mastery of nature through agronomy, scientific rationalism and the industrialisation of ‘cultivation’. Subsequently, ‘conventional’ food production-consumption is conceptually purified of nonhumans and made utterly human (Latour, 1993), whilst, AFNs are caricatured as purely natural (*ibid*), purified of human input. Not only, then, do these technologies work to make the BOB wheat Other, coordinating the multiple version by making the conventional wheats an impossibility within the network, but they seek to reproduce a particular reality wherein there exist these two mutually exclusive types of food networks.

The making of BOB wheat actor-network as distinct entity is more than the construction of a reality where in food networks are bifurcated and oppositional; it is about the shaping of the social world, the limits of possibility and subjectivities. Ontological purifications work to command as above so below, ordering the way in which individuals understand the world, what is possible, what is real. It is concerned to reproduce the purity of order and a perception of the world where in complexities and mixings are not acceptable; there is nature and there is culture. However, subjectivities are slippery and without object, without materiality the on-going internalisation of theses framings become dangerously tenuous. Indeed, in a social world where the material is actual and the metaphysical is imaginary, and not at all ‘real’, it is fundamental that the purity and alterity of the network is made manifest. This objectification and externalisation of the BOB wheat network is realised in bread; which most importantly may be *literally* internalised.

Alterity Made Manifest: Making Bread, Objectifying Purity, Engendering Biopolitics

The cultivation and actualisation of bread forms a second category of performance, to that of conventional seed, which threatens the purity of alterity. The actualisation of less than pure (real) bread beyond the Watermill, here ‘cutting’ techniques are used in the making

of bread, is of great significance, as it is a manifestation of the deep interweaving of the supposed conventional and alternative. Indeed, the rising of bread functions as the culmination of the network, is the ultimate performance and full realisation of the BOB wheat network. Moreover, the material-relational of bread, as the intermediary in the symbiotic wheat-human relationship, works to externalise the network. This material objectification of the network is then consumed; a literal internalisation of the network (its cosmology, values, ethics, practices and knowledges). As such 'cut' breads threaten the integrity of the BOB wheat network as a manifest mixing of conventional and alternative; and thus a literal internalisation of a less than pure, less than alternative, bread which consequently weakens the network (cosmology, values, ethics, practices and knowledges).

The ideal performances of bread then work to reproduce and objectify the ontological order, discussed above, working to ensure the ongoing translation through internalisation of the BOB wheat network. As such this second category of threats to purity is potentially more risky, as it has the capacity to be more destabilising than other performances; where exposure of the conventional nature of the social life of the wheat, of the vast majority of the versions of wheat circulating in the network, may be shrugged off as simply the order of things and the importance of the organic and Biodynamic cultivation together with the traditional milling being loaded, thus deflecting away from this contradiction

The enactment of bread across the Watermill is 'pure', using only their stoneground BOB wheat flour and their bread making techniques. Beyond that however, in consumer's kitchens (commercial and household) the practice of 'cutting' adulterates the rising loaf. 'Cutting' being where the BOB wheat flour is mixed with 'conventional' 'strong' flour (which is more often than not the North American one milled locally). Those that practice 'cutting' are concerned to produce Breads* that meet social and cultural expectations, for example, the BOB wheat is lower in proteins and heavier in fibre and as such produce a 'stunted' and 'heavy' bread loaf, particularly the 100% BOB wheat flour. Consequently, the esoteric bread-making knowledge-practices of the Watermill reflect the nature of the flour with much longer fermentation times than usual discourses of bread making suggest. However, the loaves that spring forth from BOB wheat flour and the Watermill method remain *unconventional* in their look and texture. Conventional socio-cultural expectations of what a 'good' bread loaf looks like are so strong, so normative that commercial enterprises work to produce a more leaven loaf by 'cutting'.

Whilst the BOB wheat Breads* texture and flavour is cited over and over again as the main reason, particularly in commercial acquisition, and consumption, for use in produce, its

inability to realise an attractive loaf shape and lightness is the repeated underpinning logic behind 'cutting'. By 'cutting' the best of both worlds is achieved, depth of flavour, good texture and a greater rise in the loaf with the accompanying greater degree of lightness to the loaf. Unsurprisingly, given the objectives of such capitalist enterprises (despite their commitment to 'local' produce their ethics/values are not of the Watermill) they are not concerned with environmental or just value laden practices. Arguably they are commodifying the 'local' and juxtaposed notion of 'quality' of these contemporary discourses in conjunction with discourses regarding Artisanal practices. These commercial consumers of BOB wheat flour, those working with the flour to manifest commodities, that is, commercially exchange goods (such as bakeries, tearooms and cafes, restaurants) all practice 'cutting'.

'cutting it means we get a fullness of flavour in the bread …and a loaf that looks good… the (Watermill) flour is very flavoursome and provides excellent texture [mouth-feel] but it doesn't produce an attractive loaf and here we are producing all round beautiful breads'

Steve, Artisanal Baker

BOB wheat flour produces Bread* that is not befitting of socio-cultural expectations of what a 'good loaf', 'perfect pastry' and so on look like.

'it always looks a little dark, a little grey, instead of the white and gold colours of normal pastry. It's fine for me and my family but if I'm cooking for guests I won't use that flour'

Lesley Interviewee

Whilst there is a clear sensory distinction between the Watermill pure loaves and the commercial cut loaves, the network functions to extend this, bolstering the alterity and purity. Building on the sensory, work to thwart the threat of these cut loaves creates a further binary distinction, that of real and artificial bread. Consequently, the indeterminate nature of the cut breads leads to their being discounted as artificial for the sake of the integrity of the BOB wheat network. This real-artificial bread binary is an extension of the alternative-conventional bifurcation of food networks, however this is very much more tangible, building on the nature verses cultural dichotomy of the Modern ontology. Artificial bread is broadly commercial, industrially (CBP) produced, made using roller-milled North American wheat flour loaves and purchased through supermarkets (that is eighty percent of the bread produced in the UK today). The loaves, most of which are white, will be uniform in shape and size: tall, rectangular and soft, and the only

distinguishing features will be packaging and added fortifications. It is the quick rising of the bread specifically, the artificial leavening, that underpins its impurity and unnaturalness. Certainly, artificial bread is considered to be 'no time' bread, taking as little as just 3.5 HRS to transform flour in to a sliced loaf, compared to the minimum seventeen hours of the Watermill technique.

Subsequently, the leavening of these socio-materially, and visibly, different loaves more than enacts the ontological purification, the alternative-conventional division. It is made real, externalised and objectified in each loaf, aesthetically and experientially (taste, texture) discernible. Real bread in the BOB wheat network is that which is leaven using the Watermill method, although there is some flexibility to include other traditional, slow fermentation, bread making practices. Furthermore, real bread is that which is risen with the traditionally milled BOB wheat flours and lovingly crafted, nourished as it is cultivated, not beaten and kneaded into compliancy. This care is fundamental, as one must not take ones anger out in the dough because it makes for bad bread. The bread treated in such ways is imbued with negative energies, which detract from its qualities. Such cultivation of loaves is considered natural, with all natural ingredients and the allowing of nature to do its thing at its own pace. This 'real' bread is considered 'the human food', as a 'sun-charged' food it is imbued with the goodness and the wisdom inherent in the soul-being of the cosmos and specifically promotes 'creative, artist and imaginative thinking', nourishing the spirit, soul and body (Hauschka, 1967/2002).

Real bread starts with the Biodynamic wheat flour, organic yeast and warm water being brought together to form a 'sponge'. The next stage is to transform the gruel-like consistency of the sponge into dough. After resting, the dough is to be quickly and gently kneaded, then 'shaped' and placed in/on (depending on the bread being made) the vessel in/on which it will be placed in the oven. Unlike artificial breads the dough is given time to prove (here proving is a fundamental obligatory passage point), as the dough must prove itself to be a 'full' translation from previously unrelated entities to a cohesive, bound structure, a true coordination. Furthermore, it is time, time in proving, maturing, fermenting, as a socio-material practice that makes the bread of the BOB wheat both real and alternative to conventional loaves. Finally, the proven dough is introduced to the oven wherein the heat functions to translate, incite mutations of, the dough and enact bread. Transforming an unpalatable (flour, yeast and) dough into a digestible staple of the human diet, and highly symbolic cultural object (Miele & Evans, 2010).

Figure 63 Kneading

The translation, mutation, into bread is still precarious, unstable, as any actant can still at this point fail to be enrolled fully into the Bread network. For example, if the oven's heat is too hot or too cool, too dry or too humid, the mutation maybe thwarted. Furthermore, the human actant, the baker may fail to act as expected, or required, for the successful translation of the dough into bread. Indeed, it is down to the human to assess the readiness, the completion of the translation, mutation, which is a complex and difficult task (not least of all because we cannot peer inside the loaf to judge whether it is fully formed as bread or not). It is a highly corporeal practice, developed over time with repeated experience of bread-making. Judging the completion of the mutation is gauged using all the sensory indicators.

'These stirrings, these knowledges, these intermingling, have the effect not only of constructing a single unified system, but also... of enabling the emergence of something new...of life, of good tidings'

(Serres, 1993/1995, p. 34)

The alternative-conventional, nature-culture, divisions are then perpetuated, further performed in both the 'real' bread of the BOB wheat (actor-)networks and in the construction of artificial, unnatural, conventional bread of commercial bakeries. Recognisable by its uniformity and 'claggy' mouth-feel, conventional bread is not only considered nutritionally deficient, but pernicious as well as contributing to environmental degradation. Whilst, the naturalness and purity of the BOB wheat real bread is manifest in its unconventional 'stumped' look, texture and flavour: 'it's stubborn nonhumanity and its dependence upon interspecies relations of production, all militated against any smooth standardisation' (Nimmo, 2008a, p. 278). Real bread, then, is made to stands in stark

contrast to uniformity of artificial bread, the irregularity of 'real' bread functioning to externalise the nature, purity and alterity of the network. This reflects, Murdoch & Miele's (2004) illustration of how supposed AFNs articulate different notions of quality, rejecting dominant conventions as 'requalifying' food things through new assessments of quality (in their reconnection to nature and tradition), specifically aesthetic notions. Furthermore, such 'requalifying' (on the aesthetic, material and sensorial) works to singularize, distinguishing real bread, the Watermill flour, and the BOB wheat network at large, from competing AFNs as well as conventional wheat/flour/bread production-consumption networks (Callon et al. 2002).

Figure 64 Real Bread

'the act of kneading dough makes it homogenous. The universe is made of these bridgings which extend out over our space'.

(Serres, 1993/1995, pp. 26-7)

The real bread then is the manifestation, of the entire BOB wheat network: the socio-cultural knowledges, practice, material and nonmaterial actants, values, ethics, discourses. It is the objectification of the limits of possibility, conditioning that which is real and that which is not, that which is possible, now, in the past and future, and that which is not. The real bread of the BOB wheat network is a quasi-object around which there is a folding of time and space. The past, and indeed the future, are made present (Head, et al., 2012) through the performance of specific knowledge-practice. The Watermill bread making method and the milling of BOB wheat grain into flour draws on traditional knowledge-practices, drawing the past into the present. Whilst in addition, the BOB wheat network draws on the future, looking to negate human and ecological degradation and restore vitality and health, for the longevity of both. This folding works to enact both the alterity

of the BOB wheat network and the modern social world. Yet, in this crumpling, within the folds, hide less than pure actants and aspects of the BOB wheat network.

Externalising Real Bread* Engendering Biopolitics?

Listening to the interrelations of the BOB wheat network, there is persistent talk, persistent concerned with nutritious eating, the health of the individual body, vitality of the population, sound environment practice /and or detrimental contributions to climate change (within agri-food production-consumption) as well as animal welfare. The BOB wheat network's juxtaposition with alterity works to associate the BOB wheat into relations with these overlapping, interwoven, value laden actant-networks. The biopolitical dispositif, as an 'enabling network' is drawn on by the BOB wheat network, giving meaning to the bifurcation of food production-consumption networks. Imbuing 'alternative' knowledge-practices, 'alternative' food production-consumption networks with deep moral and ethical value (Goodman, 2004; Slocum, 2007). The talk of the BOB wheat networks, then, draws on and reproduces this plethora of discourses, and their concomitant socio-material practices, enacting, performing and perpetuating these biopolitics.

Certainly, the knitting together of human, ecological and environmental 'health', and the practices of relational ethics (Whatmore & Thorne, 1997) at the heart of (supposed) alternative food production-consumption is biopolitical (Goodman, 1999). That is, the talk and technologies of translation deployed by the BOB wheat network implore human actants to 'think about the extinction of the human in terms that are at once political and biological' (Thacker, 2011, p. 159). These ties, framings and translations, create moral and ethical values concerned with discourses and knowledge-practices of ethical food production, acquisition and consumption as well as what constitutes wholesome foods and 'correct diet' (Bobrow-Strain, 2012; Gibson & Dempsey, 2013).

Such moves are bolstered by the emergence of, almost continuous, food scares (Lamine, 2005), repeatedly framing conventional, industrial food networks as 'risky' ((Lockie, 2006b). Further weaving food production-consumption practices ever deeper with biopolitical value, these events/discourses not only work to 'expose' conventional networks (Goodman, 1999) but to reinforce alignments of alterity 'nature, locality and scientific notions of health' (Enticott, 2003, p. 257).Thus, such 'scares' strengthen the authority and legitimacy of AFNs, enabling a deeper governance through an exploitation of discourses of risk (Beck, 1992), apparent politicisation (Lamine, 2005; Guthman, 2002; Enticott, 2003) that engender socio-cultural practices of responsibilisation (Garland,

2001).Thus presenting a 'proliferation of the social, generated by the functioning and extension of markets' (Callon, 2007, p. 140).

The BOB wheat networks' *real* bread is situated both at the intersections of both 'multiple practices and social relations in everyday life' (Halkier & Jensen, 2011, p. 102) as well as at the crux of the symbiotic metabolic human-nonhuman relationships that constitute food production-consumption networks. It is this intermediary position that potentially affords *real* bread a strategic significance. Indeed, the translations from BOB wheat grain to flour, and from flour to *real* bread are particular 'critical' obligatory passage points, particular 'critical' assemblages within the network through which all entities must pass in the on-going constitution of the (actor-)network. *Real* bread, then may be understood as a 'node' that channels all interests into one direction, establishing 'what counts' as legitimate knowledge, practices, entities, associations, identities and so on.

Specifically on account of the BOB wheat networks drawing on the biopolitical, we may conceive of *real* bread as a potential biopolitical technology: A critical assemblage working to rearticulate the 'specific moralities' (Fuentes, 2014, p. 110) of the BOB wheat network, together with the wider biopolitical dispositif. Certainly, *real* bread as quasi-object is a material carrier of social and political values, moreover values here associated with 'spiritual purity and moral goodness' (Stephan, 2015, p. 200). Real bread, as has been discussed, is produced through the specific socio-material practices of the Watermill method/ BOB wheat network. Knowledge-practices that form part of the wider cosmology of Biodynamics. These practices are imbued with a specific set of ideas, understandings and morality. Subsequently, through the raising of *real* bread these mortalities may well be seen as being are materialized (Jelsma, 2003, p. 107), in their enacting the BOB wheat network as alternative. Thus the BOB wheat network's *real* bread is a 'morally infused artefact' (Larssæther, 2011). More than that, it has been suggested that bread, as being essential to human biological existence and yet mundane on account of its quotidian nature, has the capacity to 'masquerade, and be wrapped up, as something entirely different from its seemingly intrinsic character...thus can appear benign whilst also being politically charged and morally laden' (Lavis, et al., 2015, p. 14).

Imbued with such values *real* bread, as the manifestation of the BOB wheat network, may well work to engender biopolitical struggles: problematizing the 'enduring metabolic intimacies between human and nonhuman bodies' (Stassart & Whatmore, 2003, p. 450; Mansfield, 2003) of conventional bread specifically but of conventional food production-consumption at large. This biopoliticisation working to frame such issues as potential

threats, technologies of power utilised to manage both the risk and health, that is to say vitality, of the population (Foucault, 1976/1978). Without doubt, the production-consumption of *real* bread may be seen as to ethical problematized and provoke 'moral reflection' (Barnett, et al., 2011, p. 27) within the BOB wheat network. Whilst, the shared corporeality of *real* bread production-consumption potentially grants a deeper internalisation of such biopolitics and values.

Certainly, biopolitical framings of food and eating are intrinsically embodied performances, political relations and cultural imaginings which may be resisted and disrupted by, as well as played out in, individual eating bodies' (Lavis, et al., 2015, p. 2). Thus the production-consumption of *real* bread in such frameworks be conceived as a form of corporeal governance and responsibilisation. Through this lens the biopoliticisation of *real* bread would imply that that the problematisation of the conventional and the values of the network are literally internalised in its consumption, and again externalised, as consuming is demonstrative of one's morality. Moreover, that as a biopolitical technology *real* bread would accordingly have the ability to manifest different body practices as well as shape subjectivities.

Yet, biopolitics speaks of the regulation of population through forms of mass surveillance (Foucault, 2008; 1997/2004) and thus speaking of the minutiae of the consumption of real bread may at first appear entirely misconceived. However, biopolitics, biopower and governance are the effect of relations, of networks of actants and interactions, and do not simply exist 'out there'. Biopolitics, like all entities, are enacted, co-produced and recursive, governed by and governing the shape of actants, associations and networks. Whilst the relationships of knowledge and expertise, and thereby governance, extend far beyond co-present interactions identities and practices (Lockie, 2006), they most certainly emerge in the daily reconstruction of the social. Indeed, biopolitics must be persistently reproduced in everyday relationships and socio-material practices, thus exploring the reproduction of biopolitics, as an effect of the BOB wheat network through r*eal* bread may well expose biopolitics, and biopolitical processes, as they are (re)constructed in mundane everyday socio-cultural relations.

Purification: Manifesting an Alternative BOB Wheat Network

The conventional-alternative bifurcations of food networks are omnipresent in our daily interactions with food. However, such distinctions are not given in the order of things, they are an effect, a product of ordering (Law, 1994). The objective of this chapter was to explore the incommensurable performance of wheat across the BOB wheat network and

the technologies whereby the network is coordinated. Certainly, contentious versions threaten the purity of the alternative identity of the network in their conventional nature. Subsequently, these conflicting performances are made absent, veiled, through means of their own success as well as technologies of simplification and traceability. Moreover, such oppositional and destabilising enactments are deleted entirely through the reproduction and deployment of the Modern ontology. Indeed, the alternative-conventional framing of food networks work to purify the network by making such performances invisible, even impossible, by (re)constructing a binary world. Consequently, what we have seen here, then, is the 'methodological erasure' (Goodman, 1999) of culture, so to speak.

Such purifications, enacting the alterity of the BOB wheat network, work too to capture power as an effect of the network. Setting frameworks of meaning (and potentially deploying biopolitical technologies governing conduct of other actor(-networks)) so that 'their own desired performance can take place' (Hitchings, 2003, p. 107). Yet, as Callon & Latour (1981) highlight, all black boxes are leaky and there will always be competing performance/enactments, ideas and initiatives, that seek to open black boxes that have been punctualized within actor-networks. Punctualization, then, 'is always precarious, it faces resistance, and may degenerate into a failing network' (Law, 1992, p. 385; Murdoch, 1998), thus these performances, translations and enactments are concerned with (re)creating strong social organisation (Whatmore, 2002, p. 216). Furthermore, punctualized 'resources offer a way of drawing quickly on the networks of the social without having to deal with endless complexity' (Law, 1992, p. 385), such is the point of fetishizing.

Significantly, these purifying performances, technologies, are deeply connected to mobilisation of the BOB wheat network as an alternative food network. These discursive separations, grounded in the Modern binary logic, work to unravel human and nonhuman, nature and culture (or social) interrelations, thereby both dichotomising our reality and denying the hybrid character of food networks. Subsequently, the bifurcation of food networks into the discrete spheres of conventional or alternative production-consumption networks, underpinned by the knowledge-practices and technologies of scientific rationalism, functions to make the complex arena of food intelligible, it translates, as well as coordinates.

The BOB wheat network, then, establishes coherency and stability through the network's identity as alternative, converting the complex and interwoven nature of the world and of the BOB wheat network by (re)creating mutually exclusive networks. Moreover, this is the

reality that the BOB wheat network wishes to manufacture and perpetuate as the Modern binary logic shapes more than just perceptions of food networks, it shapes the entire social world by delimiting what is possible. Subsequently, the BOB wheat network functions to delimit possible worlds, possible realities, it outlines the shape of the reality; it shapes how we 'see' and understand the world, what is truth, what is real, what limits to possibility are. The BOB wheat network then is coordinated through the persistent (re)construction of difference, Othering itself as alternative and enacting it's opposite, creating a binary by which its cosmologies, ideologies, moral and ethics values, as well as socio-material practices and entities are made both real and authentic.

The point of purification is twofold first it enacts distinction, difference constructed through problematisation and, subsequent to the distinction, is a value creation. The problematisation constructs both meaning and a moral and ethical hierarchy. Working to enact the BOB wheat network as alternative, then, aligns the network with values and meanings juxtaposed to AFNs (Allen, et al., 2003). The 'alternative' is constructed as a value laden socio-political opposition to, (inherently) unethical and pernicious, industrial conventional food networks. Thus the BOB wheat network can make claims to a deep conflict between the 'dominating values within conventional agriculture and a system of production and consumption where nature is respected beyond its ability to supply input to economic activity' (Larssæther, 2011). As such the alternative is woven through with moral, ethical and biopolitical values pertaining to the body and 'natural' environment.

The 'alternative', then, is a powerful semiotic tool, repeatedly associated with resistance (to global capital) as a prefigurative politics, as well as ideas of reciprocity and trusting relationships (Hinrichs, 2000, p. 296; Winter, 2003). Moreover, the foods at the heart of these relationships, constructed as 'good' as whole/ natural/ authentic/ *quality* foods (Holloway & Kneafsey, 2000; Murdoch, et al., 2000), tapping into various ethical and moral discourses. Certainly, then, the biopolitical value of purification is in the 'binary moralization of consumption' (Barnett, et al., 2011, p. 33). The (re)construction of the alternative-conventional binary enacts distinction and with it biopolitics, a mechanism by the broader biopolitical dispositif is commodified. Hereby the BOB wheat network, its flour, and *real* bread are imbue with deep moral and ethical values/meaning. Consequently, there is an imperative to veil that which is intolerable, and potentially threatening t0 undermining and delegitimizing aspects of the BOB wheat network. A 're-fetishization' through 'an aesthetic that creates further cultural and economic surpluses' for 'AFNs' (Goodman, et al., 2012, p. 213).

Purification then is central to both the stabilization and expansion, through its ongoing cycle of problematisation, interessement, enrolment and mobilization (if successful), and yet it is 'a very crafty and carefully staged de-fetishization and re-fetishization' (Goodman, et al., 2012, p. 212).The work of purification, the work to expand and export, is supported by academic pursuit (Kloppenburg, 1991)as the theories of defetishization claiming AFNs to be 'more honest, less mystified' (Gunderson, 2014, p. 109) food production-consumption assemblages. However, the biopolitical punctualisation of conflictual, conventional, performances of BOB wheat point to a somewhat different reality. Constructing the alternative-conventional food production-consumption binary, the BOB wheat network, AFNs, narrate a new relationships of associations and storied reconfiguration of the natural (Marsden, 2000). In performing *quality* relations and good foods, 'positive value-added gains' in terms of income are enacted (Marsden, 2000), indeed the alterity USP supports premium pricing (Guthman, 2014) in the pursuit of accumulation in such food networks (Barnett, et al., 2011; Murdoch, 2000; Lockie, 2002).

Subsequently, purification and the defining of the BOB wheat network as alternative 'acts as a new layer of commodity fetishism' (Gunderson, 2014). Indeed, the crossing out of the, apparently, conventional versions of the wheat circulating within the network is in itself a biopolitical act; an enactment performed with the explicit desire to bolster the authority and legitimacy of the network to the effect of power through governance of socio-material food and eating practices. Certainly, *real* bread works to carry the heavy moral and ethical load of the BOB wheat network (as alternative), and its consumption may well be conceived of as a literal internalization of these values and politics. Potentially, governing conduct and shaping subjectivities through socio-material food knowledge-practices in deeply corporeal manner. Actants would, in this view, come to literally embody the network and manifest its expansion in both economic and ideological terms.

Specifically, here the biopolitical value of purification is in the (re)articulation of the modern binary logic. Purification acting as a 'fig leaf' masking a 'devotion to a broader neoliberal agenda', as the network is 'in part, driven by the desire to increase' the size of their market share (Fridell, 2006, p. 10). Allied to which, is the exportation/circulation of the biopolitically framed ideologies (cosmologies, values, ethics moralities, subjectivities and socio-material practices) of the BOB wheat network. Such framings manifest alterity, functioning to singularize the BOB wheat network/flour/*real* bread, enacting difference that is relational and political (and where there are politics there is power). Differentiation here as simplification of complex social relations, is a product of the redeployment of

modern binaries, binaries that work to (re)construct asymmetrical and hierarchical power relations.

Conclusion

The Social Life of BOB Wheat: Manifesting Alterity, Biopolitics & Biopower

The staff of life, as a salient feature of everyday socio-cultural, economic and political life, is deeply symbolic, expressive of values, ethics, moralities and identities and yet simultaneously natural. Situated at the crux of the socio-cultural, human-nonhuman material world, wheat bread is at the heart of the symbiotic metabolic human-nonhuman relationship that constitutes food production-consumption networks, and cuts through socio-material knowledge-practices as well as meaning making. Moreover, in contemporary Britain 'real' bread is very much a fundamental feature of a multitude of 'alternative' social movements, specifically those such as the Slow Food Movement and the Real Bread Campaign. Originally conceptualized as a critical sociological exploration, the research sought primarily to question the alterity of supposed alternative production-consumption food networks and the food "things" therein. The principal objectives being to develop social science understandings of the constituent elements of AFNs, to explore the complex interconnections of so-called alternative food production-consumption, and in doing so make account of their assemblage, actants and key processes of (re)construction. Perhaps more importantly, to examine the deep bifurcation of food networks and the concomitant moralizing and ethical discourses omnipresent in our daily interactions with food. That is to say, those narrating a strong demarcation between 'conventional' and 'alternative', 'industrial' and 'natural', 'standard' and 'quality', the morally virtuous and the apathetic or irresponsible.

The social life of BOB wheat presented here sits within a broad sociological framework, drawing inspiration from agri-food studies in addition to contemporary social theories of biopolitics, biopower and governance (as pertaining to food and eating, health and nutrition as well as environmental degradation and climate change). Specifically, however, the research worked to explicitly challenge the traditional asymmetry of agri-studies, their being limited by the binary nature of their approach, their reproduction of modern ontological dualities (nature/culture, alternative/conventional, human/nonhuman, production/consumption) as well as an gaze towards production. Inspired to overcome the limitations of such limited frameworks, and speak to the defetishization thesis that cuts

through these literatures serving to map a prefigurative politics on to AFNs, relational-material approaches to food and more-than-human literatures entirely underpin the symmetrical following/tracing and ANT infused conceptual framework undertaken here. Furthermore, to attend to the contemporary biopolitical dispositif, which is somewhat marginalized from agri-food and AFN studies despite their persistent talking through it as well as around it.

This thesis is the story of British Organic Biodynamic (or as it has become known, BOB) wheat. Grounded in a ten month ethnography that followed/traced the wheat through the (re)production of the seed, the grain cultivation, harvest, milling and its transformation, as well as consumption, as *real* bread. It is the story of a self-defined alternative food network that both sets alive and blurs the duality of food networks and the purity of alterity. Revealing a heterogeneous web of hybrid actants, more than that, explicating BOB wheat as multiple, related, dependent, locally socio-materially constructed performances. Performances that persistently blur the traditional categorization of food networks as either conventional or alternative, moreover the modern distinctions of nature/culture, humans/nonhumans as well as production/consumption.

Tracing/following through fourteen years (or twenty if you take account of the years doubled up at the Seed Breeding Station) from potential seed to actual loaf (*real* bread), a complex trajectory emerges of multiple translations of the BOB wheat. Assemblages through which the caryopsis comes to be understood as a single and yet plural actor(-network), upon which myriad performances converge, and in-turn the caryopsis works to co-ordinate. The caryopsis being made various seeds and grains, being made different in the local socio-material enactment performed through knowledge-practices. Whilst radical translation of the caryopsis, its incorporation, enrolment into associations with new and different actants, works to draw the network together, shaping the network and other actants. Here the continuity of the materiality reality of the caryopsis is realised as the thing that traverses alternative-conventional, nature-culture, production-consumption and human-nonhuman. Continuity premised on both seed and grain being the single same material object, the same network of entities assembled in the same configuration excepting in semiotics.

The continuity of the caryopsis, however, immediately exposes a conflict within the BOB wheat network, with conventional and more-than-conventional performances being inseparable from alternative enactments of BOB wheat. The BOB wheat actor-network is the total effect of numerous ongoing translations, constituted by multiple conventional

(Trial Station and Certified seed C0-C1 multiplication), more-than-conventional (Seed Breeding Station) and the various alternative (organic, Biodynamic, stoneground) performances of wheats. Each translation projects the wheat into a different aspect of the BOB wheat network, and a new phase in its social life. These enactments do not simply coexist side by side but are related and dependent upon one another, more than that, that they spring from one another. Such intimate, intractable relationships of the conventional, more-than-conventional and alternative enactments presents a source of insecurity and instability within the network. With conventional and more-than-conventional being incommensurable, threatening to undermine the 'alternative' identity of the alternative (organic and Biodynamic) translations of the caryopsis, and more broadly the alterity of the network.

Unveiling the multiplicity and interconnectivity of the conventional, more-than-conventional and alternative versions of the wheats circulating here throws the BOB wheat network's efforts to purify these incommensurable versions into sharp relief. Conventional versions threaten the purity of the alternative identity of the network and as such it is necessary that these conflicting performances are made absent, or in the least veiled. Subsequently, the BOB wheat network works to punctualize oppositional and destabilising enactments of wheats through technologies of purification, simplification and traceability, in order to manifest alterity. Moreover, it works to delete entirely such treacherous versions through ontological purification, reconstructing the duality of food networks, as alternative or conventional. Indeed, it has been suggested that what we have here is the methodological erasure of culture: as the alternative-conventional framing of food networks is made manifest so as to purify the BOB wheat, making incommensurable conventional performances invisible, even impossible, through the (re)construction of the modern binary world. There is a crossing out of the conventional, and thus a re-fetishization, prioritizing and accounting for 'nature' through a veiling of all that appears conventional, industrial and capitalist, whilst working through the logics and effects of them. Fundamentally, claiming alterity as a de-fetishizing act through which the purifications of modern society are a re-dressed concealing its own work of purification.

The BOB wheat network, then, establishes coherency and stability through the network's identity as alternative. Coordinating the performances that constitute the network through the persistent (re)construction of difference, Othering itself as alternative and enacting it's opposite. Creating a binary by which its cosmologies, ideologies, moral and ethics values, as well as socio-material practices and entities are made alternative, real and authentic. In doing so it converts the complex and interwoven nature of the world and of the BOB wheat

network by (re)constructing artificially discrete networks, in the modern binary logic. Specifically, the radical transformations in actualising the BOB wheat flour and *real* bread are of particular importance within the manifestation of both the BOB wheat network and its alterity.

The violent interruption translating grain to flour simultaneously enacts the network as an alternative food network. Certainly, the BOB wheat network may only become an alternative food network when there is a commodity that consumers can recognise and access as both a food thing and alternative. The symbolic weight of 'doing' alterity necessitates a transformation that is deeply material and semiotic. Milling, then, as a profound socio-material reorganisation of the wheat, enacts a form able to carry the weight of the alterity, as well as the moral burden and ethical values of this social world. The violence at the heart of this interference makes possible the re-appropriation of enrolled actants, working to both veil (conventional performances) and produce a purified (alternative) actant capable of communicating such values. The violent transformation of the caryopsis, through its association with the mill performs a socio-material displacement that allows the network to be made an alternative food network, bridging the gap between agricultural commodity and the morally and ethically infused consumer good. More than that, this translation makes manifest a means by which the BOB wheat network, including its values and ideologies, may be externalised (and potentially internalised) through *real* bread.

Furthermore, the work of purification as externalized in the raising of *real* bread is concerned with establishing the legitimacy and authority of the BOB wheat network (as an alternative network) in order to secure its reproduction. Deploying a methodological erasure of culture, through the alternative-conventional duality of food networks, functions to enact a distinction that is uniquely politically and morally loaded. Indeed, here it has been contended that the BOB wheat network's *real* bread, through socio-material practices and discourses is made to draw on a specific set of moralities and ethics (moralities that are materialised in the raising of *real* bread). Indeed, drawing on the contemporary biopolitical milieu, 'alternative' food production-consumption as aligned with nature, comes to be extolled in highly moralized terms. A smorgasbord of socio-political discourses that work to imbue this supposed AFN, and its constituent entities with biopolitical meanings, with moral and ethical values, furthermore, stabilizing the networks identity as 'alternative'. Subsequently, *real* bread engenders a biopolitics, through the entanglement of biological bodies with a moral object the *real* bread, in manifesting the BOB wheat network and AFN. Indeed, it has been suggested that this purification, the

making and manifesting of alterity is woven through the contemporary biopolitical dispositif, persistently circulating, remaking, alterity, the Modern ontological framings of reality as well as biopolitical discourses and the moral and ethical values therein.

At the heart of the BOB wheat network, the raising of *real* bread is the manifestation of the fetishized BOB wheat network. As a technology of purification *real* bread veils the less than pure realities of the network. Realities that emerge in the BOB wheat network's hybridity and reconstructing performativity, a jigsaw of conventional, organic and biodynamic, of humans, plants and industrial technologies, of local, national and international. Such realities threaten the purity of alterity, and thereby stability of on-going associations, and as such the BOB wheat network must reproduce modern binaries and make absent that which it has made intolerable. Purification, then, is fundamentally concerned with the expansion of the BOB wheat network, in economic terms, and the exportation of the networks core values and ideology. Which, arguably functions to shape more than just perceptions of food networks. It shapes the entire social world by delimiting what is possible, possible realities, and thus aims to shape how we 'see' and understand the world, what is truth, what is real, what the limits to possibility are. Such purifications, enacting the alterity of the BOB wheat network, then work to capture power as an effect of the network. As purification establishes frameworks of meaning that potentially shape subjectivities and govern the conduct of other actor(-networks) so that the BOB wheat network's desired performance can take place.

Biopolitical Bread: Internalisation of *Real* Bread as Governing Behaviour and Shaping Subjects?

That which has been narrated here is only a fraction of the a/effects, processes, actants and collectives of even this food production-consumption network, particularly with regards to power, politics and governance. As such I would like to take this opportunity to consider possible future pathways for exploring, unpacking and theorising AFNs, but specifically the BOB wheat network. At the heart of this research has been the notion of alterity, its manifestation through processes of purification, specifically through the ontological making of the alternative/conventional bifurcation of food networks. As the research has demonstrated, taking this division for granted fails to account for the multiple links, intersecting influences and continual processes and negotiations that work to recreate the distinction. Yet, as Latour (1993) has suggested, 'it would be a mistake to deny the effectiveness of the separation (p. 13). Particularly given that the world 'itself does not

speak in' binary categories of alternative and conventional, and such orderings require strategies and technologies, it is possible to conceive of a 'spokesperson', a collective, seeking to define frames of meaning and thus impose the order. Consequently, it seems imperative to look to those entities seeking to impose order, moreover seeking to enrol others. So as to work to understand the implications of these framings, why food networks are conceived of in this way, as well as what might be gained and for whom. Moreover, what it means to make absent specific performance, particularly in a sphere imbued with biopolitics.

Real bread, it has been established, is as an externalisation of an apparently utterly natural and acultural, BOB wheat network, and one that stands at the heart of the symbiotic metabolic human-nonhuman relationship that constitutes food production-consumption networks. It follows that there are potential implications regarding the internalisation of the objectification of a morally and ethically infused food thing, or indeed AFN imbued with the cosmologies, values, ethics and morals of the BOB wheat network. Moreover, the biopolitical dispositif, imploring producer-consumers to regulate their conduct, and responsibilising the individual, in terms that are simultaneously political and biological, human and nonhuman, natural and cultural.

The manifestation of the BOB wheat network, as pure alternative, in *real* bread represents an objective translation that has the potential to be literally internalised. The consumption of *real* bread then may be understood as actualizing embodied mobilisation, and the objective expansion/ reproduction of the BOB wheat network. Subsequently, the literal internalisation of bread may well reflect both the internalisation of the network ideologies and values, and as such its extension/ reproduction. Importantly if we understand the consumption of *real* bread in this way, as the mobilisation, extension, of the network, there, as Goodman has suggested, exists within the consumption a 'potential to dominate others' (1999, p.26). More than that, such mobilisation has been contended to require the construction of subjectivities (Dubuisson-Quellier, et al., 2011). This is of specific significance, given that food production-consumption relationships and practices lend themselves to biopolitical governance, as at the crux stands a body that is equated with a life that must be optimised through self-surveillance and self-management.

Certainly, culinary practices, as socio-cultural material forces, work to (re)produce social order, values, reality and subjectivities (Vester, 2015; Du Puis, 2015), recursively shaping, and being shaped by, ideologies, values and socio-material knowledge-practices concerned with bodies, the environment, food and eating. Indeed, like power and agency, values,

ethics and morality are an effect of the network (Larssæther, 2011), of the assemblage in which subjectivities are embedded in. Fundamentally however, the construction of the subject through governance (of socio-material practice) is an exorcism of power which 'demands an articulation of forms of difference' (Frenkel & Shenhav, 2010, p. 346; Latour, 1993). Which points us directly back to the necessity to enact the modern binary and subsequently work to purify the BOB wheat network.

Moreover, it is possible that through the introduction of this new mediator (morally infused *real* bread) into the intimate corporeal relations of agro-food networks the BOB wheat network promises 'new corporealities and, quite literally, new bodies' (Goodman, 1999, p. 30). The internalisation of *real* bread promising optimal health, creative and spiritual growth, a new healthy, moral and ethical body. The socio-material almost/not quite object that is *real* bread within the BOB wheat network, then, may be understood as biopolitically strategic, aiming to regulate biological life, (claiming) to optimise biological life (Foucault, 1997/2004). In doing so, the BOB wheat network would be seeking to 'administer the lives of individuals and associations' through its positioning as a 'social authority' (Miller & Rose, 1990), specifically the node that is the Watermill. Through *real* bread, then, that BOB wheat network may be understood as manifesting 'action at a distance', shaping the conduct of individuals far and beyond the Biodynamic Farms and Watermill.

The *real* bread of the BOB wheat network, then, potentially engenders a very real, material, biopolitics as food and eating practices are governed 'according to cultural mores' (Lupton, 1996, p. 7; Lavis, et al., 2015). If this were the case, such a form of biopolitics would be far 'less visible than public debates' (Law & Mol, 2008, p. 143). Therein the benign would be mobilised in a highly political manner to engender a sense of responsibility, regarding the environment and health, of the self and others (Hinrichs, 2000).

Thereby the BOB wheat, in particular forms, has the potential to become a technology of translation in itself. *Real* bread functioning as a biopolitical technology, shaping subjectivities and governing the socio-material practices of bodies as well as delimiting/defining the social world. Moreover, the biopolitical (ethical and moral values) of the network may be literally internalized, as objectified in *real* bread that is consumed on the promise of a new corporeality and indeed externalised through that moral, ethical body. It follows then, that through the conceptual purification of food networks particular biopower relationships may be maintained and biopolitics disseminated, concerned with governing socio-material practices and shaping human subjectivities. A potential hegemony derived from the positioning of *real* bread (the consumption of *real* bread) at

the intersections of multiple socio-material practices, everyday social relations as well as at the heart of symbiotic metabolic human-nonhuman relationships. Specifically then, further research exploring the unique position of the BOB wheat (and more broadly AFNs) in the shaping of caring individuals and ethical consumers (Dubuisson-Quellier, et al., 2011; Guthman & DuPuis, 2006; Barnes, 2012), indeed neoliberal self-regulating, self-managing subjects (Barnett, et al., 2011, p. 29), appears imperative.

The Social Life of BOB Wheat: Reflections

The narrative and analysis of the social life of BOB wheat that has emerged here sit firmly in contemporary agri-food studies, specifically the AFN literature. Contributing an understanding of BOB wheat specifically, but AFNs and food production-consumption networks more broadly, as simultaneously real, narrated and collective, partially and precariously generated through the performance of a series of divisions. Dualisms that create a/effects, such as modern ontological realities, values, discourses pertaining to biopolitics and potentially biopower in the governance of conduct and shaping subjectivities. Most significant, is the explication of the BOB wheat network as constituted by multiple, locally socio-materially constructed versions of wheats, persistently performed through various knowledge-practices. A multiplicity that persistently blurs the traditional categorization of food networks as either conventional or alternative, moreover the modern formal distinctions of nature/culture, humans/nonhumans as well as production/consumption. Furthermore, that the multiplicity and performed nature of the BOB wheat, of our social worlds, simultaneously allows for the construction of alterity, through the purification of the incommensurable conventional and more-than-conventional enactments from which 'alternative' versions spring forth. Consequently, understanding BOB wheat as multiple and socio-materially performed allows for the construction of alterity to be conceptualized as a purification and a process by which an ontological reality is made and re-made.

The narrative of the BOB wheat network as an effect of a web of relations, that has no reality outside its continued reproduction, as the totality of multiple related performances of conventional, more-than-conventional and alternative enactments of wheat has relevant implications for both agri-food studies as well as alternative social movements. By demonstrating, first, how the caryopsis is the thing that traverses production-consumption, nature-culture, alternative-conventional (it being the same material thing over and over

again). The thesis clearly articulates how speaking of conventional/alternative food networks is somewhat limiting. In the first instance failing to account for, or simply denying, the complexity of food production-consumption relationships in addition to contributing to the ongoing production (and consumption) of a purified alterity, working against formulating a true alternative. Indeed, AFNs are embedded in and limited by neoliberal, capitalist socio-political and economic relations and thus do not represent the alterity they claim to be. More than that, this articulation of alterity forms part of the continuous process of social innovations in food production-consumption, innovations that are central to the contemporary neoliberal milieu and as such AFNs should not be conceptualised in opposition to the apparently conventional.

Secondly, in explicating that different knowledges, practices, technologies and cosmologies enact different versions of the wheat (that different translations produce different network effects and thereby different realities). Moreover, that these translations, central in network formation, work to enact realities wherein some of the performances of wheat circulating within the network become intolerable, directly conflicting the alternative identity (and thus threaten the (re)production of the BOB wheat network). Demonstrating how alterity, and the moral and ethical values therein, is made and remade disrupts the imagined purity of alterity central in the imaginings of AFNs and is consequently problematic for anti-capitalist and environmentally focused social movements. Precisely because it does undermine the authority, legitimacy and authenticity of AFNs as alternatives to capitalist and virtuous (environmentally, morally, ethically) modes of production-consumption. Addendum to which is the explication of this process of purification as being woven through, and contributing to, the contemporary biopolitical dispositif. Never static and always circulating, being remade, made manifest, alterity and biopolitical socio-cultural discourses are intimately tied together. Pointing towards AFNs and the related social movements as being deeply imbued with governmental power flows, political and economic agendas made invisible by their everyday nature and moral framings.

Yet, this speaking to the biopolitical, to issues of power, politics and governance has been limited. This is due to three factors, firstly the contemporary nature and expectations of a PhD thesis somewhat circumscribes the scope of the narrative. Secondly, the empirical research in terms of consumers and the internalisation of real bread, that is the internalisation of knowledge-practices of leavening real bread and the subjectification of the BOB wheat networks world view, morals and ethical values, was not sufficiently extensive to make more than reflective theoretical claims. As such, in the expansion of

food studies consideration of biopolitics, biopower and governance it would be fruitful to carry out further research. Finally, the classical concepts of ANT deployed here have worked to allow for an accounting of all the actants, human and nonhuman, within the BOB wheat network (this is not to say that I managed to make account of them all, that would be quite impossible given the complexity and capricious nature of networks), and it granted an insight into the processes by which the network is made and remade.

Importantly, whilst ANT, as the methodological approach and conceptual lens, is at the heart of this study, the research was never intended as a contribution to the ANT cannon. Primarily the classical ANT deployed here (authored by Law, Callon, Latour) is concerned with how networks and the entities that compromise them persist as assemblages, it works to describe in detail how things are brought into alignment and networks stabilise and evolve. Subsequently, ANT was used here to unpick the BOB wheat production-consumption network as well as describe and conceptualise the ways in which the network is made to hang together as an 'alternative' food network. Indeed, the research is intended as a contribution to agri-food studies, but specifically to relational-material studies of AFN and the social life of things. Which the classical concepts of ANT brought out and brought to life, animating the network and its constituent elements.

That being said, there was an objective to in utilised classical ANT concepts as a lens through which broader social issues maybe understood and engaged with. That is to say, as a window through which we may understand the construction of the social world in terms of biopolitics, biopower and governance as woven through our socio-material relations and knowledge-practices. However, whilst these concepts allow for us to speak of the relation processes of power, politics and governance, allow us to speak of politics and values as actants and as a/effects it does not grant us to speak critically. Certainly, it has proven problematic drawing more critical conclusion regarding biopolitical governance and the shaping of subjectivities. However, whether it is a reflection of data gathered or the application of ANT, living up to its widely contended character as apolitical, contending the shaping of subjectivities had little grounding and thus was too tenuous to make.

Finally…

The complex assemblage of actants, of interconnections, of a so-called alternative food production-consumption network revealed here most certainly disrupts the notion of alterity. More than that, there is a clear demonstration of the falsity of the duality of food networks, with performances, associations and actants traversing the divide. AFNs are

embedded in and limited by neoliberal, capitalist social, political and economic relations and thus do not represent the alterity they claim to be. Although, there is an apparent inability to exist outside of capitalism, the industrial agricultural context and the desire to make profit, own land and expand, in many ways the BOB wheat network remains alternative in ways intangible to the sciences. The enrolment of individuals, and their education, is simultaneously concerned with capital expansion/accumulation and the inculcation of individuals into the BOB wheat network ideology and cosmology. But more than that, it is about individuals coming to understand the truth and to care for themselves, others, animals, the planet and the ongoing existence of the human race. Whilst this may be biopolitical, it is also about connecting people to the world in which they exist, and indeed to themselves. Certainly, the analysis of the BOB wheat network here works to intellectualise something far more fluid and metaphysical than an assemblage of seemingly solid actants, even discourses, values, beliefs are made object in academia, and yet they are rarely felt and even more rarely truly expressed. It is important to recognise that there are particular qualities, enacted by specific actions and interrelations of and within the BOB wheat network that are not accounted for, indeed may cannot be account for in either social or hard sciences.

Certainly, continuing to conceptualize purified food networks, to speak of alternative and conventional will only function to limit our understandings of food networks, moreover, our understandings of power and governance therein. Indeed upon reflection, the BOB wheat network in many reflects a perfect Neoliberal project befitting of the late modern capitalist era (individualistic, market based ideological ventures). By enacting alterity it works to create distinction, differentiation in the marketplace, yet is concerned to generate a network that simultaneously enables the governance of individual choice and the potentially the subjectification of individuals as responsible for the security of the population. Moreover, the alternative/conventional food network binary works to mystify the depth and complexity of capitalist relations underpinning both, the BOB wheat network and AFNs more broadly. Yet, its work to purify, through modern dichotomies, veils the BOB wheat network as capitalist venture and as a project for the expansion of specific values, knowledges and practices. Looking to the future it would be interesting to take this symmetrical-relational-material approach to explore the idea that perhaps AFNs are perfect Neoliberal enactments. Furthermore, to examine to a greater extent the processes of de-fetish-re-fetish through the construction of distinction via the deployment of modern binaries as made manifest through sharing, disseminating, socio-material knowledge-practices, such as in the making of *real* bread.

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