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# Disciplining Nature: The Homogenising and Constraining Forces of Anti-Markets on the Food System

MICHAEL S. CAROLAN

*Department of Sociology  
Colorado State University  
B236 Clark, Fort Collins, CO 80523-1784, USA  
Email: mcarolan@lamar.colostate.edu*

## ABSTRACT

To understand the changing patterns within agriculture, it is important to look not only at social relations and organisational configurations. Also salient to such an analysis is an examination of how those formations give shape to non-humans. Much attention has been placed recently on the political economy of agriculture when speaking of these emergent patterns. Yet in doing this, the natural environment is all too often relegated to the backdrop; where the agro-economy is viewed as something that manoeuvres within the environment but never *through* it. The conceptual groundwork for this paper draws from two often unconnected scholars: Michel Foucault and Fernand Braudel. In Foucault, we find a framework, with a little conceptual development, through which to talk about how the economy (of both discipline and capital) enters into nature. Specifically, the argument is made that through the embodiment of discipline, nature too becomes disciplined. Yet in Foucault we find a discursive conception of socio-economic history; where capitalism is discussed, but always as an effect of the discursive structures of power/knowledge. Enter the work of Braudel, to provide us with a materialist counterweight to Foucault's theorising. In Braudel, we find a detailed analysis on the emergence of capitalism, out of which then comes his distinction between markets and anti-markets. In short, when *both* accounts of history are overlaid, interesting connections between the emergence of Braudelian anti-markets and Foucaultian discipline are revealed. Two brief case studies are then examined to add further depth to the discussion: the first focusing on corn; the second centring on the cow. The paper then concludes speaking on the issue of resistance.

## KEYWORDS

Foucault, Braudel, Markets, Power, Agriculture, Environment

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## INTRODUCTION

Over the years, the works of Michel Foucault have been used to examine critically a whole host of social phenomena, from sexuality to insanity, prisons, medicine, education and the body – in short, those instances of embodied bodies of discipline.<sup>1</sup> Only recently, however, have his ideas been applied to the natural environment (Baldwin 2003; Carolan 2005a; Carolan and Bell 2003; Coppin 2003; Darier 1999; Kaldis 2003; Rutherford 2000). This ‘greening’ of Foucault has opened the door to a critical re-examination of societal-nature relations, particularly in the context of domination, control, and power. Indeed, perhaps the greatest utility of such an approach is its ability to problematise the traditional nature-society dichotomy by viewing humans and non-humans as equally *effects* of power/knowledge.

A radical green Foucaultian critique still eludes us, however, given his anthropocentric theorising, which locates power within relations between people, groups, and institutions. This is not to suggest that conceptual space cannot be made in Foucault’s framework for the natural environment. For this to be done, however – that is, before we can begin speaking of non-human entities as disciplined or as effects of power/knowledge – we require a re-conceptualising of his work.

Yet even with such development, further conceptual problems remain (Bartky 1997; Carolan and Bell 2003; Levy 1999; Sandilands 1999; Shilling 1993; Turner 1991, 1996). The specific criticism of Foucault that concerns us here centres on his discursive conception of history (Bevir 2002; Carolan 2005c; Turner 2003). This is not to say that Foucault presents a type of naïve Berkeleian idealism. Material artefacts exist for Foucault – from panoptic prisons, to human bodies, to emergent economic structures. Yet these artefacts are only accessible, according to Foucault, through an investigation of the discourses from which they emerge (e.g., medical, technical, sociological, etc.) Bryan Turner (2003: 275), a prominent Foucaultian scholar, speaks directly to this point in relation to Foucault’s conceptualisation of the body: ‘Foucault’s analysis of the human body was an attempt to show that the ‘body’ was a contingent effect of power rather than a fact of nature’. Thus, while we can speak of Foucaultian power as having effects that are both discursive and material, we cannot, within this framework, speak of materiality (e.g., economic structural arrangements, the corporeal body, etc.) as possessing independent *a priori* causal force upon these structures of power/knowledge.

How, then, does one give further materialist grounding to Foucault’s genealogical account, without concomitantly taking away from his powerful critique of modern disciplinary regimes? Enter the work of economic historian and theorist Fernand Braudel.<sup>2</sup> According to Braudel (1972, 1981, 1982, 1984), capitalism, going back to the thirteenth century, has been witness to anti-competitive practices, whereby demand and supply are manipulated in a variety of ways. Braudel argues

## DISCIPLINING NATURE

that whenever large fortunes were (and are) made in foreign trade, agriculture, and the like, market forces are not, and cannot, act on their own (and in some cases not at all). From here, Braudel makes the important distinction between ‘markets’ and what he terms ‘anti-markets’. Specifically, Braudel describes markets as representing the dynamics of many small producers and traders in patterns of ‘open’ exchange where supply and demand is coordinated (and where prices govern the behaviour of the system). In anti-markets, on the other hand, commands replace price as the main mechanism of coordination, resulting in an exchange based upon rigid planning through a managerial hierarchy.

In describing the emergence of anti-markets, Braudel (1981) is clear that we should not view capitalism as merely a self-contained economic system. Rather, he argues that we must view its logic as dependent on social structures, political forces and cultural heuristics. Anti-markets thus cannot be abstracted from the ongoing adjustments they must make according to the contexts in which they are embedded. In other words, anti-markets *have* logics and they *create* logics: ‘It is the fact of having the means to create a strategy and the means to change it that makes capitalism superior’ (Braudel 1982: 353). It is here – in these self-reinforcing, self-reflexive logics that sustain anti-market activity – that we find connections between Braudelian anti-markets and Foucaultian conceptions of power and discipline. In short, our analytic scalpel is sharpened considerably when *both* Braudel’s and Foucault’s accounts of history are overlaid.

I begin this paper by working to open space up in Foucault’s theorising for the natural environment, which will allow us to speak of the disciplining of nature. From here, discussion turns to detailing Braudel’s argument on the emergence of capitalism and his distinction between markets and anti-markets. After this, connections are then made to allow for an articulation between the works of these two theorists. Once the conceptual groundwork has been presented, I then speak to how the rise of disciplinary anti-markets in agriculture has led to the increasing disciplining of nature (which, in turn, has further reinforced anti-market formation). In an effort to provide greater analytic depth to the discussion, two case studies are then examined, beginning with a brief historical reconstruction of corn followed by a similar examination of the cow. To conclude, I then speak to the issue of resistance as it applies to food production and consumption.

## THE RISE OF DISCIPLINARY REGIMES

In a powerful critique of modern society, Foucault argues that the rise of political liberty and its institutions was accompanied by a subtle counter-movement – the emergence of a new and as of yet unprecedented discipline directed toward the body. According to Foucault (1979), these disciplinary practices can be seen most vividly in the army, the school, the hospital, the prison, the mental ward, and in the factory. Through these institutions, bodies can be shaped in ways that

support the modern, capitalistic liberal state. In doing this, a 'political anatomy' was created, which 'defined how one may have a hold over others' bodies, not only so that they may do what one wishes, but so that they may operate as one wishes, with the techniques, the speed and the efficiency that one determines' (Foucault 1979: 138). And through this, 'docile bodies' emerged: bodies that have been discursively inscribed to embody the moral, political, and social conventions of the socio-political system.<sup>3</sup>

Foucault describes this transition by detailing how in traditional authoritarian systems power was embodied in the king (or queen) and exercised upon a largely anonymous body of subjects. In this system, the monarch represented the head of society. To violate a law, then, was to disrupt the social system and thus act in violation against the king himself. Consequently, punishment was typically swift and severe. This is an extremely inefficient method of control, however. It is both time-consuming and costly to be perpetually monitoring one's subjects. In addition, there is the potential for backlash: blatant displays of raw power by the king – such as through public displays of torture – can potentially upset the masses and cause them to revolt. What was ultimately needed then – particularly with the rise of liberalism – was a more efficient, less intrusive form of power. This non-sovereign power Foucault (e.g., 1980b: 105) called 'disciplinary power'.

In a disciplinary society, power is more invisible, less external and more covert. Effects of power now 'circulate through progressively finer channels, gaining access to individuals themselves, to their bodies, their gestures and all their daily actions' (Foucault 1980b: 17). Power now seeks to transform, not merely punish, by embedding within the subject what was formerly an external mechanism of control.

In *Discipline and Punish*, Foucault (1979) details the emergence of disciplinary regimes of power. Through this, he focuses on understanding the disciplinary technologies that are part and parcel of the modern, liberal state that operate from within the individual as 'technologies of self'. Later, in the first volume of *The History of Sexuality*, Foucault (1980a) broadens his analysis to speak to how the 'microphysics' of power, which produces 'docile bodies' (and, as we will see, docile objects of nature), connects up with institutional configurations at the macro-level. Two distinct yet related forms of power thus run through Foucault's theorising that function to support the modern state: a politics of the body, which focuses on the disciplining of the individual, and that of governmentality, which speaks to issues of control over entire populations for reasons of species management and regulation (Rutherford 1999).

The rise of disciplinary power, according to Foucault, was a condition of capitalist expansion. The rapid urbanisation, increases in population density, and industrialisation that characterised the late-eighteenth and early-nineteenth centuries within Europe, England and later the United States called for a new institutional order involving prisons, asylums, factories, clinics and schools in

## DISCIPLINING NATURE

which bodies could be made safe, serviceable and productive. Such ‘sorting devices’ thus became essential for capitalism’s expansion as it sought mechanisms through which to produce ‘well disciplined’ bodies. As noted by Foucault (1980a: 141), capitalism ‘would not have been possible without the controlled insertion of bodies into the machinery of production and the adjustment of the phenomena of population to economic processes’.

It is important, however, not to lose sight of the fact that objects other than ‘docile *human* bodies’ were also being created from these new disciplinary institutions and technologies: animals and plants too were becoming increasingly penetrated by the microphysics of power (De Landa 2003). To talk about power in relation to the non-human, however, requires further development of Foucault’s views, given his locating of power within and between humans and their corresponding subjectivities. Such development need not be extensive, however. The pieces are there to allow for the extension of power and discipline to non-humans, they simply need to be elaborated upon.

According to Foucault (1980b: 98), ‘power must be analysed as something which circulates, or rather as something which only functions in the form of a chain’. Yet, while placing analytic emphasis on subjectivities and individuals, other ‘things’ also constitute these circulating flows of power. This point is hinted at when Foucault (1980b: 97) writes that ‘what is needed is a study of power in its external visage, at the point where it is in direct and immediate relationship with that which we can provisionally call its object, its target, its field of application, there – that is to say – *where it installs itself and produces its real effects*’ (my emphasis). It is clear in Foucault’s writings that these circulating flows of power flow through, and are thus constituted by, individuals: ‘The individual is an effect of power, and at the same time, or precisely to the extent to which it is that effect, it is the element of its articulation. The individual which power has constituted is at the same time its vehicle’ (Foucault 1980b: 98). Yet what power *is* is more than mere subjectivities and individuals. For to become inscribed within subjectivities, power may first need to become ‘mineralised’, to borrow a term from Deleuze and Guattari (1987), in material technologies and coercions: ‘It [disciplinary power] presupposes a tightly knit grid of material coercions rather than the physical existence of a sovereign’ (Foucault 1980b: 104).

For example, in the case of agriculture, which is the focus of the case studies that follow, farmers are not immune from the disciplining regimes of modernity. Such discipline, however, is less likely to circulate through, for instance, the mental health profession, the military, or the media (paradigmatic examples of disciplining institutions). Instead, farmers are disciplined through such artefacts as commodity markets, state subsidy programmes, and agricultural technologies. Yet, as extensions of power, these artefacts also become effects of discipline, and thus become disciplined themselves. This represents our point of entry to start talking about the disciplining of non-human objects and animals – or, in other words, the disciplining of nature.

To speak of disciplining technologies in agriculture is to speak of not only inorganic objects (such as computers, barb wire, and the like), however. As detailed in the analysis that follows, disciplining technologies can also come to embody, literally, objects of nature: from, for example, corn, to cows, weeds and sheep. Yet, in doing this, these objects too become disciplined. People, therefore, are not the only things that are governed in agriculture. Also governed are those material coercions through which power circulates, which can include the natural environment: 'What government has to do with is not territory but rather a complex composed of men [sic] and *things*' (Foucault 1991: 93) (my emphasis).

#### THE EMERGENCE OF ANTI-MARKETS

In Foucault, we find an account of social life that focuses heavily on the disciplinary structures of modernity. Within these very structures, according to Foucault, resides causal explanation of the socio-material arrangements of modernity. And this includes our understanding of the emergence and expansion of capitalism: '[Capitalism] would not have been possible without the controlled insertion of bodies into the machinery of production and the adjustment of the phenomena of population to economic processes' (Foucault 1980a: 141).

Yet this then begs the question: if capitalism is the effect of discourse, what were analytically prior to these structuring structures of discourse? Admittedly, such 'chicken and egg' questions prove quickly problematic, for they ultimately lead to an infinite regress. Rather than going down that never-ending road, I propose in its stead the following alternative: to think of capitalism (or, more accurately, anti-markets) and disciplining structures as emerging *together*, in a complementary, self-reinforcing fashion. Which brings us to the work of Fernand Braudel.

Braudel (1981, 1982, 1984) has called attention to the striking differences between markets in the traditional sense – that is, between decentralised dynamics generated among many producers and traders – and what he terms anti-markets – where commands replace price as the main mechanism of coordinating human activity. Others too have written of the force of large institutions on market dynamics. Adam Smith (1993), for one, wrote on the effect that oligarchies had on the otherwise 'invisible hand'. Likewise, John Kenneth Galbraith wrote of the 'industrial system' when describing these anti-market colonising forces. Specifically, Galbraith (1993) saw 'two parts of the economy': one involving a multitude of small proprietors (e.g., the market), while the other was based upon highly organised corporations. Lenin (1939) also made a similar distinction in his discussion on monopoly capitalism versus competitive capitalism (the latter of which he believed to be based upon the 'free hand' of markets) (Meldolesi 1984). Yet, as Braudel notes, theorists have mistakenly attributed

## DISCIPLINING NATURE

anti-market forces as being an effect of some late-stage of capitalist activity, such as in the aforementioned cases of Galbraith and Lenin. In other words, up until the twentieth century, markets were viewed as being relatively 'open' and competitive, and it has only been in the last hundred or so years that monopolistic and oligopolistic practices have begun 'closing' them down.

Against this, Braudel argues that significant monopolistic patterns can be detailed much earlier. Toward this end, he illustrates a historical account where anti-market forces were used, reaching as far back as the thirteenth and fourteenth centuries (by the Dutch, French, Spanish and British), to colonise all corners of the globe. These institutional configurations possessed the ability to manipulate the market at a distance for self-benefit: for instance, a corporation can flood the market with a particular commodity in order to artificially drive down the price or, at the other extreme, they can withdraw large amounts from the market to artificially drive prices up.

To help describe this economic landscape, Braudel uses an analogy of a three storey building. The 'lowest' level for Braudel, which I have yet to discuss, is the 'non-economy'. This storey represents the ground level of material life, for here resides 'an extremely elementary economy' (Braudel 1982: 21). Here we find those properties and processes that remain outside the logic of economic exchange but upon which all forms of such exchange depend – from kinship ties to the natural environment. 'Above' this resides the stratum of 'markets'. Here is the realm of open and free economic exchange, where price is dictated by supply and demand as a result of decentralised dynamics between numerous buyers and sellers. Finally, 'above' it all resides 'anti-markets' (what Braudel equates to capitalism). Each 'higher' level therefore emerges out of, and in doing so becomes irreducible to, its 'lower' substratum – that is, 'anti-markets' emerge out of 'markets' which emerge out of the 'non-economy'. In the words of Braudel (1982: 229–230),

I would argue that a third sector should be added to the pre-industrial model – that lowest stratum of the non-economy, the soil into which capitalism thrusts its roots but which it can never really penetrate. This lowest level remains an enormous one. Above it, comes the favored terrain of the market economy, with its many horizontal communications between the different markets: here a degree of automatic coordination usually links supply, demand and prices. Then alongside, or rather above this layer, comes the zone of the anti-markets, where the great predators roam and the law of the jungle operates. This – today as in the past, before and after the industrial revolution – is the real home of capitalism.<sup>4</sup>

Building upon this, Braudel then makes the rather novel argument that the word 'markets' should only be used to describe one of these three storeys: namely, the realm between the non-economy and anti-markets (or capitalism). Braudel thus reformulates the relationship between the market and monopolies. While many often think of open competition (markets) and monopolies (anti-markets) as



competing poles in the same capitalist system, Braudel argues that only the latter (anti-markets) can be applied to the 'capitalist' label (Wallerstein 1986). Thus, instead of viewing free markets as the defining feature of our economic system – and thus what makes it different from, say, feudalism (as argued by Marx) – Braudel sees anti-markets as that defining characteristic. As Braudel details at length, while markets existed in previous economic systems, monopolistic capitalism did not; a point that leads him to the conclusion that monopolistic capitalism, and not markets, should serve to be the delineating characteristic between such economic systems as 'capitalism' and 'feudalism'.

By what methods, then, have anti-markets emerged? One method is by purchasing directly from the producer at a low price – what Braudel (1982: 47) refers to as 'private trading' – which allows, for example, the storing of a commodity until its market price reaches a desired level (or for the purpose of manipulating the market price). Long distance trade is another means through which people can release themselves from the 'free hand' of the local market, for such trade is based upon price differences between two markets connected only as a result of the activities of a 'middlemen' (be it a person or a firm). Indeed, Braudel saw long distance trade as essential for the emergence of anti-markets. In the words of Braudel (1982: 408): 'The indisputable superiority of *Fernhandel*, long-distance trading, lay in the concentrations it made possible, which meant it was an unrivalled machine for the rapid reproduction and increase of capital' (again, notice the emphasis on market *concentration* as a defining characteristic of anti-markets).

This is not to suggest, however, that capitalists (in the Braudelian sense) were somehow superior to those engaged in market activities. The question was not one of choice, where some were content with small profits, while others, being the risk takers that they were, gambled for the chance of unimaginable profits (Wallerstein 1991). What separated capitalists from non-capitalists was money and capital: 'really big profits were only attainable by capitalists who handled large sums of money – their own or other people's' (Braudel 1982: 432). For money, Braudel (1982: 432) went on to argue, gave one the ability to survive the risky climate of speculation and long distance trade: 'Money, ever more money was needed: to tide over the long wait, the reverse, the shock and delays'.

Earlier, I mentioned Braudel's three 'storeys' of reality: the non-economy, the market, and the anti-market. In regards to the non-economy, there is some debate as to just what Braudel included within this realm, particularly concerning the role of the natural environment. On the one hand, some argue that Braudel 'tended to deploy environmental factors as a backdrop' (Beinart 2000: 270). Others have sought to provide a more ecological reading of Braudel (giving particular focus to his work *The Mediterranean and the Mediterranean World in the Age of Philip II* [1972]) (e.g., Moore 2003a, 2003b). Of the latter, such analyses have tended to focus on the eco-geographical processes that led to the unfolding of the world-economy. My concern in the natural environment,

## DISCIPLINING NATURE

rather, as it applies to the emergence of anti-markets, is directed in another conceptual direction.

At one point, Braudel (1982: 229) refers to ‘the *soil* into which capitalism thrusts its roots but which it can never really penetrate’ (Braudel 1982: 229) (my emphasis). In doing this, he is speaking to the tendencies of monopolistic capitalism (anti-markets) to expand into and colonise realms previously outside its logic’s reach – although, according to Braudel, such expansion does have its limits (which are ultimately the effects of available technologies). In this paper, I would like to develop this argument further, with help from Foucault: as referring to ‘*the soil*’, literally – or, more generally, to the natural environment.

## THE RISE OF THE ANTI-MARKET WITHIN OUR GLOBAL FOOD SYSTEM

While debate remains in economic circles as to what exactly constitutes a monopolistic market, a ‘rule of thumb’ appears to be emerging: when four firms control roughly 40 percent or more of any market, such firms are positioned to sufficiently distort the market into something that is noticeably less than ‘free’ (Heffernan 1999). Using this as our benchmark for anti-market activity reveals striking trends occurring within the industrial, global food system. Allow me to turn now to the work of William Heffernan and Mary Hendrickson (Heffernan 1998, 1999, 2002; Heffernan and Hendrickson 2002, 2005; Hendrickson and Heffernan 2002; Hendrickson et al. 2001), who have spent considerable time detailing this phenomenon of market concentration within the sphere of food production.

To look into this phenomenon of market concentration in the food system – forming what they call ‘food chain clusters’ (or what McMichael [2000] describes as the ‘global corporate regime’) – Heffernan and Hendrickson (2005, 2002) calculated the concentration ratios of the top four firms (or CR4s) for each specific food industry (these are US figures). In 2004, for example, the four largest beef processors accounted for approximately 83.5 percent of all cattle slaughtered (up from 72 percent in 1990). Among pork packers, the CR4 was 64 percent (up from 40 percent in 1990), while among pork producers it was 49 percent. In 2004, four firms owned and processed 56 percent of all broiler producers (up from 44 percent in 1990), while among turkey producers the largest four firms controlled approximately 51 percent of the market (up 33 percent from 1990). Heffernan and Hendrickson (2002) likewise note similar concentration trends occurring in grain processing. For instance, the CR4 for terminal grain handling facilities in 2001 was 60 percent. Among corn exporters, the four largest firms in 2001 controlled 81 percent of the market, while among soybean exporters that figure was 65 percent. Other CR4s (for 2001) in

the grain processing industry are as follows: flour milling, 63 percent; soybean crushing, 80 percent; and ethanol production, 49 percent.

According to Braudel (1982: 400), 'Capitalism did not take up all the possibilities for investment and progress that economic life offered. It was constantly watching developments in order to intervene in certain preferred areas – in other words, it was both *sufficiently informed* and *materially able* to choose the sphere of its action' (emphasis in original). We can see this in agriculture. For numerous reasons, capitalism (as anti-markets) was slow to penetrate fully into the realm of agriculture (see, e.g., Friedland 1991; Friedmann and McMichael 1989; Newby 1983; Redclift 1991; Reinhardt and Barlett 1989). Yet, once these 'natural obstacles' (Mann 1990) were overcome – that is, once capitalism was, in the words of Braudel (1982: 400), 'materially able' to choose agriculture as its 'sphere of its action' – the transformation was rapid. And with this transformation, so too came the reconfiguration of both farmers and nature.

The introduction of biotechnology into agriculture, as detailed in the two case studies that follow, has contributed significantly to this process. Biotechnology is 'big science' (Galison 1994). That is to say, it is a capital-intensive enterprise, which places small firms (and the individual farmer) at a significant disadvantage. Conversely, large firms are better positioned to deal with such risky investments (in part thanks to their greater access to capital and credit), which thus allows them to engage in such strategies as cross-investing in other sectors of the economy (Barney 2002). Nevertheless, even some large firms are beginning to feel the heat when it comes to the biotechnology race. Cargill, for instance, believed it a safer economic bet to sell their seed business to Monsanto (which has access to biotechnology and important genetic patents) and form a joint venture, rather than to 'go it alone' in this highly competitive field (Olson 1998; Heffernan 1999). And with each merger comes increased market concentration within the agri-business sector, which, as noted by Braudel, is the hallmark of anti-market activity.

What we find in agriculture, then, is the following vicious circle: market concentration begets 'big science' technology, which, in turn, further begets market concentration, and so on. Such trends between technology and anti-market concentration were likewise of concern for Braudel. Unlike Smith and Marx, Braudel's enthusiasm for technology was decidedly restrained; for investments in new technology, in his view, often served to further invigorate the anti-market sector. Wallerstein (1986: 15) sums up Braudel's position toward technology as follows:

Every time the competitive market seems to regain ground against the monopoly [anti-market] sector, by enlarging the number of economic actors, by reducing the costs of production, and therefore prices and profits, someone (but who is this someone?) seeks to make some great new technological leap forward, to put the capitalist world-economy back into an expansionary phase – and to line the

## DISCIPLINING NATURE

pockets of the big capitalists, by creating for them once again some closed and highly profitable sector which will last perhaps another thirty years.

A similar relationship between technology and concentration has also been described within the realm of production agriculture – what Cochrane (1958) termed nearly a half century ago as the ‘agricultural treadmill’. Briefly, when a new technology is produced, those first to adopt are most likely to experience windfall profits from the increases in output that often accompany production orientated innovations. Over time, however, others see the relative advantage of the technology and adopt it. Yet as this occurs, the cumulative effect of heightened output begins to exert a downward pressure on prices. Finally, those last to adopt eventually find themselves in the position where they now must simply to remain in the marketplace, even though the investment is no longer profitable (but necessary to remain on the ‘treadmill’).

Having established that anti-market forces are indeed present within our food system, I would now like to add greater specificity to the above discussion, while weaving into the argument what these tendencies mean in terms of disciplining the natural environment. To further tease out how those forces of history – that of anti-markets and discipline – overlay each other, let us turn attention to the following two case studies: that of corn and the cow. In what follows, a brief historical narrative of each commodity is provided. The goal: to illustrate how the natural environment itself becomes disciplined as it comes to embody anti-market logics, for the purpose of instilling within farmers subjectivities and practices that support those very logics.

## THE DISCIPLINING ANTI-MARKETS OF OUR GLOBAL FOOD SYSTEM

Foucault (1980b: 141) writes, ‘power *is* ‘always already there’, that one is never ‘outside’ it’. I take this description of power to include those involved in production agriculture: and that includes farmers.

While capitalism (in the Braudelian sense) was slow to penetrate the realm of production agriculture, once it did, it required an assemblage of bodies to support its underlying logic of accumulation, concentration and monopolisation. To recall the words of Foucault (1980a: 141): capitalism ‘would not have been possible without the controlled insertion of bodies into the machinery of production and the adjustment of the phenomena of population to economic processes’. The question for us here, then, is the following: How is nature disciplined as it becomes an instrument of anti-market logic, so as to contribute to the ‘insertion of bodies’ (e.g., farmers) for the sake of capital accumulation and concentration? Let us now turn to two short historical cases to further investigate this question.

*A Brief Look at Corn*

The logics of anti-markets were slow to penetrate the seed, yet once they did its transformation was swift. Arguably capitalism's first major foothold into, literally, the seed, came with the creation of hybrid corn (Kloppenborg 1988). So it is here, then, that our discussion will begin.

Specifically, hybrid corn is first-generation grown from seeds produced by crossing carefully selected unrelated parent stocks (with an average yield 25 to 30 percent higher than that found in more traditional varieties [Hayenga 1998]). Hybrid corn does not, however, pass its desirable traits – higher yields, (alleged) better resistance to disease, and greater overall vigour – onto its offspring. Consequently, each generation must be bred anew. This, in effect, gave agribusinesses a *de facto* patent on their product (which was significant at the time given that officials were unwilling to open the Patent Act up to living organisms [Boyle 1996]), and helped the seed industry generate revenues of between \$60 and \$70 million by 1944, up from almost nothing ten years earlier (Kloppenborg 1988; Paul and Steinbrecher 2003).<sup>5</sup> (And as of 2002, the domestic [US] seed industry had annual revenues of \$5.7 billion, with international revenues exceeding \$25 billion [Economic Research Service 2002].)

Importantly, however, this shift to control corn was ultimately an attempt by corporate (anti-market) players to instil discipline within the farmer. It disciplined them, for instance, to repurchase their seeds at the beginning of every growing season. It disciplined them to narrow their commodity profiles and specialise, so as to extract maximum profits from this new high-yielding technology. And it disciplined them to mechanise and industrialise (to capture associated production efficiencies) which, in turn, disciplined them to expand in scale their operations (so the expense of these pieces of equipment could be spread across a larger operation).

As more farmers began to be instilled with this logic, however, the genetic diversity of corn started to erode. Specifically, corn's previously rich gene pool began to slowly evaporate and be replaced by a smaller, shallower variant. This, in turn, made corn increasingly susceptible to diseases of potentially epidemic proportion (which is what happens to a species as its genetic variety becomes perilously 'thin'). Thus the need arose for additional technologies. And from this, farmers and corn became yet further disciplined.

Traditional breeding techniques alone were insufficient to achieve the sort of control now needed over corn. The 'desired' traits sought were either lost from the gene pool entirely, due to the aforementioned genetic erosion, or were never in the gene pool to begin with. Hybridisation thus began to give way to modification – specifically, *genetic* modification. With this move, the very genetic make-up of corn was opened to precise, systematic anti-market manipulation at a level never before known. Perhaps the most famous (and infamous) case of this can be found in StarLink corn.

## DISCIPLINING NATURE

StarLink is a trademark for several genetically modified corn hybrids produced by Aventis CropScience and distributed through several seed companies. StarLink hybrids contain a plant pesticide protein known as 'Cry9C', an Aventis proprietary technology derived from a common soil microbe, *Bacillus thuringiensis* (*Bt* has been shown to kill such destructive 'pests' as the European and Southwestern corn borers, the black cut worm, and the corn stalk borer).<sup>6</sup> StarLink also is one of a few currently approved genetically modified crop varieties that contains 'stacked genes' (that is, it contains more than one commercially desirable transgenic trait): namely, the insecticidal *Bt* Cry9C protein, thereby giving it resistance to the abovementioned caterpillar pests; and genes from the bacteria *Streptomyces hygroscopicus*, which makes StarLink tolerant to glufosinate herbicides. Thus, unlike hybrid corn, which brought the farmer back year after year to purchase only seed, herbicide tolerant varieties of seed (like StarLink) now create a level of dependency requiring farmers to come back to purchase both seeds *and* expensive chemical inputs. And it should be of no surprise to discover that these inputs are frequently owned by the same company that developed the 'proprietary technology' (seed) in question.

The emergence of genetically modified plants has likewise served to limit the farmer's freedom of practices and independence of choice, thus highlighting yet another instance whereby farmers are being disciplined. Unlike previous generations, farmers are now working with patented products governed by very precise utilisation conditions. For example, license contracts for the genetically modified variety of soybean that is resistant to Round-Up stipulate that licensees may not cultivate other varieties using another herbicide than the one authorised by Monsanto nor exchange seeds with neighbours. Moreover, farmers must agree to let the firm inspect their crops for three years in a row. Monsanto, consequently, has devoted significant resources to its prosecution of farmers accused of violating the company's seed patents; it has, for example, built a department of 75 employees and set aside an annual budget of \$10 million for the sole purpose of investigating and prosecuting farmers for patent infringement (Center for Food Safety 2005). Indeed, it appears that a farmer could be sued today for not effectively embodying the ideal farmer as conceived by anti-market logic.

Yet such objects of discipline – like today's highly engineered varieties of corn – are instilling within farmers other subjectivities as well, all for the purpose of upholding current ways of *doing* farming and the underlying anti-market logics that support that system of food production. For instance, definitions of a 'good yield' have changed considerably over the years. Before the hybridisation of corn, for instance, a 'good yield' was often below 100 bushels an acre, whereas today over 200 bushels an acre are not uncommon in some places in the Midwest (US). Aesthetics have likewise changed over the years as a result of the infiltration of anti-market logics into agriculture. Toward this end, for instance, it has (re)conditioned farmers' beliefs as to what constitutes a 'good

looking' field. A few generations ago, fields were allowed to have a few weeds in them. Today, however, following the chemical (and now genetic) revolution in agriculture, fields are increasingly expected to appear 'clean' (e.g., weed free) (Carolan 2005b; McHenry 1997). All of which has had a further cumulative affect on how farmers evaluate just what a 'good farmer' is – recognising that such a definition today is likely quite different from that of a generation or two ago.<sup>7</sup>

#### *A Brief Look at the Cow*

For purposes of brevity, I will not go quite as far back, historically speaking, as I did with corn. Granted, the cow has historically been under some degree of control for some time, save for perhaps when domesticates became feral (for example, 'stud' books were quite popular among horse breeders in Europe and England during the eighteenth century [Orland 2004]). Yet it was not until recently, with the rise of genetic and hormonal engineering, that we have seen the full scale entry of anti-market logic into the cow.

Take, for instance, the technologies being put into place to speed up the productivity of cows, be they for dairy or beef. One such example is rBST (*recombinant bovine somatotrophin*). In 1993, the FDA approved the hormone rBST, which is sold under the name of Posilac. When rBST is injected into a calf during the early stages of its development, it acts as a growth hormone, speeding up protein synthesis and growth. And when injected during lactation, rBST serves to mobilise body fat to use for energy and diverts feed energy more toward milk production than for tissue synthesis, increasing milk production by, on average, ten to fifteen percent, although increases of thirty percent have been recorded (National Research Council 2002).<sup>8</sup> In short, through rBST, the cow comes to embody the highly productivist orientation that is our modern global food system (Wilson 2001), and thus is (re)created in the image of anti-market logic.

Modern cows likewise have a tendency toward lameness, are significantly less fertile than only a few decades ago, and possess a very narrow genetic lineage (National Research Council 2002; Weigel 2001) – all of which require the introduction of yet further 'technologies'. This is the result not only of 'selective' breeding techniques, but also of the environment within which (industrial) beef cattle are raised. Let us now briefly look at this environment in more detail.

First off, animal concentration (the hallmark of a modern feedlot) is premised upon the presence of a cheap, plentiful and transportable food source: namely, corn.<sup>9</sup> Cattle, however, have not evolved on a corn based, high starch diet (Rogers and Poore 2002). When on such a diet they thus run the risk of acquiring what is called 'feedlot bloat', when the cow's rumen inflates and causes suffocation (Pollan 2002). In addition, a corn-based diet can also give a cow acidosis, which can lead to the animal developing diarrhoea, ulcers, liver disease and/or a total

## DISCIPLINING NATURE

loss of appetite (Krehbiel et al. 1995). This is why antibiotics become a necessity: to counter the effects of a 'modern' cow's diet and environment (e.g., to inhibit gas production in the rumen, prevent liver infections, etc.) (Field and Taylor 2003; Pollan 2002).

Like corn, then, the well disciplined cow is ultimately an effect of the mineralisation of disciplinary powers directed toward the farmer, which seek to instil within them subjectivities and practices that perpetuate anti-market logics. As I have highlighted, a modern disciplined cow requires a number of things for it to reach slaughtering age. All of which, if not delivered in a timely manner (and at prescribed times), may result in the cow not living to reach market. This animal is premised upon, for instance, the purchasing of vaccinations, vitamins, and growth hormones, a plentiful supply of corn so as to expedite growth and help promote 'marbling', and readily available antibiotics.

The modern cow has also made raising cattle a high-volume, low-margin business (Simpson 1996); an effect that has likewise served to further discipline the farmer.<sup>10</sup> As a result of the aforementioned 'efficiencies', which are part and parcel of a well disciplined cow, the cattle market has seen increasingly razor thin operating margins. In this economic climate, larger operators are at a competitive advantage given economies of scale, which has inscribed within farmers particular subjectivities – such as the near ubiquitous belief 'Get big or get out!'.<sup>11</sup>

Yet like corn, these technologies also give shape to aesthetics and tastes as they relate to these animals and those that raise these animals. Bulls, for instance, are chosen for particular traits – such as their ability to sire progeny that produce large amounts of milk. Consequently, a 'good looking' animal today is not the same as what a 'good looking' animal was a few generations ago. Likewise, with the advent of hormones, antibiotics, and the rise of the confinement operation, we have seen a noticeable shift in the standards that are used to judge what is, and what is not, a 'good producer'. All of these, in the end, perpetuate a certain way of *doing* animal production from the perspective of the farmer, and thus serve to further solidify anti-market concentrations.

## MARKETS OF RESISTANCE

In presenting this argument, I am not suggesting, however, that control over nature is a purely modern phenomenon. As Carolyn Merchant (1980) has persuasively argued, we have been seeking control over nature since at least the dawn of the Enlightenment. The modern control of which I speak is both quantitatively and qualitatively different than that addressed by Merchant. Early-modern control was a control for technical knowledge: we sought to dominate and lay open the environment for the secrets that it might 'reveal' (Merchant 1980). Today, however, as noted by Foucault (1979), control comes increasingly from *within*



– that is, objects are disciplined by way of embodying the monopolistic forces of anti-markets.

Through it all, however, resistance remains. As noted by Foucault (1980a: 95), relations of power presuppose relations of resistance: ‘Where there is power there is resistance, and yet, or rather consequently, this resistance is never in a position of exteriority in relation to power’. Power, for Foucault, is thus relational: not power over (hegemony), but rather power *through* – as an effect of continually shifting social, political, and economic configurations.

Resistance in agriculture to the disciplinary logic of anti-markets occurs by way of a number of routes. Given Foucault’s focus on power as circulating relations between individuals, the most immediate examples are those forms of resistance that are intentional. Examples of this include the growth of organics and farmers markets (e.g., Andreatta and Wickliffe 2002; Carolan forthcoming b), CSAs (community supported agriculture) and farmer cooperatives (e.g., Cone and Myhre 2000), and ‘seed saver’ organisations and urban gardens (e.g., Rosset 2000). From grassroots collective activity directed against large-scale hog lots (e.g., DeLind 1995), to groups protesting GM (genetically modified) foods (e.g., Reisner 2001), to concern over surveillance and testing in the wake of mad cow disease (Carolan forthcoming a): examples of such purposeful resistance are readily available.

Anti-market forces are dynamic, however, and will seek, as best they can, to resolve this ‘problem’. Again, resistance is relational. With each ‘pull’ by activists to problematise and dismantle the global food industry, anti-market logic responds by ‘pulling’ back. This, for instance, can be seen in the organic food market. Here, we find (US) organic standards, as detailed by the USDA, that increasingly conform to the industrial model and its overarching anti-market logic – from their placing increasing emphasis on commodity uniformity, to the development of ‘organic’ standards that allow for the use of certain chemicals for insect and weed control (Allen and Kovach 2000; Anton-Dunn 1997; DeLind 1993, 2000, 2002).

I would like now to push for a more radical interpretation of Foucaultian resistance. While most are comfortable to talk of resistance as something that occurs between people, what if we were to include in our discussion the non-human realm? I shall now argue for the position that plants and non-human animals too can resist.

As earlier described, the disciplining of nature within the realm of production agriculture was (and is) an effect of anti-market logic directed at the disciplining of farmers (so they *do* agriculture in a way that ensures continued anti-market concentration). In the case of corn, this quest resulted in, for example, hybrid corn. Corn, however, ‘resisted’ such early attempts at control through its becoming increasingly susceptible to insect pests and disease. This, in turn, led to attempts to further discipline corn: such as genetically engineering it for pest resistance and herbicide tolerance.<sup>12</sup> This then led to corn’s further ‘resist-

## DISCIPLINING NATURE

ance': this time, for instance, by 'contaminating' non-modified adjacent fields, (potentially) harming non-targeted insects (e.g., monarch butterflies), and in its threatening to create 'super' weeds and bugs.

I expect some to take issue with my use of the term 'resistance' in the above paragraph, for it appears to place agenic capacity within a non-agenic object. How, for example, could the loss of corn's genetic diversity over the last century be seen as a form of 'resistance'? For Foucault, however, resistance *is* the effect of discipline – be it passive or purposeful. Indeed, some have gone as far as to suggest that Foucaultian resistance can also be found at the unconsciousness biological level (Michael and Still 1992; Coppin 2003). Resistance, therefore, need not presuppose intentionality for Foucault, as long as it is part and parcel of the relational dynamics of power.

Yet another question remains. Since disease is not a product of the organism itself, but rather of ecology, does it make sense to say that corn is the 'agent' of resistance? Answer: Yes and no – it all depends upon whether we are speaking of corn-as-object or corn-as-ecology.

To discipline an 'object' of nature is to view it as truly an object and thus deny its larger ecological connections, which is precisely what agro-biotechnologies work to do (McAfee 2003; Kloppenburg and Burrows 1996). This is why disciplinary control over nature is so precarious, for it ignores the ontological assemblages (or its hybridity [Latour 2004]) that make up these 'objects'. To speak of objects of nature as being controlled from within, however, is not to claim that such control is purely a modern phenomenon. For instance, the acorn being controlled from within as it transforms into an oak has little (if anything) to do with monopolistic capitalism. In this case, control is ultimately an effect of ecology; a product of co-evolutionary processes that acknowledge and embody (literally) the ontological hybridity of the acorn. Modern disciplinary control, on the other hand, denies these ontological (ecological) assemblages, locating itself within anti-market logic rather than ecology.

For instance, as farmers in the Heartland of the United States began to focus solely on corn and soybean production in the early to mid twentieth century the pest and weed ecology of fields changed. Previous to this, commodity profiles were diverse as were rotation schedules. This contributed to maximum amounts of biological activity in the soil, which helped to maintain a mineral presence that both fed plants and heightened tilth and absorption. All of this helped to maintain a pest and weed ecology where herbicides and pesticides were rarely needed, except in exceptional cases of infestation. However, as fields have become more specialised (in terms of commodities raised as well as the narrowing of genetic bred lines), pest and weed ecologies have changed. Thus began a particularly vicious circle: changing ecologies (precipitated by the epistemic reductionist shift from ecology to object) necessitated the use of chemical inputs, which, in turn, further stifled microbial activity in the soil, which thus further necessitated the use of chemicals (herbicides, pesticides, and fertilisers), and so

on. And with each step, the farmer became (and continues to become) further disciplined: in terms of the inputs they were (and are) *required* to purchase, to the farm management practices *needed* so as to maximise the embedded technology of these inputs, to the contractual obligations that *dictate* how they are to use today's genetic technologies.

Ultimately, modern disciplinary control of nature is precarious at best, for it denies the role of ecology in continually reshaping relationships and effects. When speaking of corn 'resisting' by way of becoming susceptible to disease and insects, we must understand this resistance in the context of a radical political ecology – involving not only corn, but also viruses, insects, farmers, Monsanto, and the like. Anti-markets deny these interconnections, however, because such assemblages are incompatible with neoliberalism and the economic reductionism upon which it rests. In order for anti-market logic to penetrate a commodity, it must first ascribe to epistemic reductionism and thus disregard these ecological interactions. Only then can it engage in the necessary economic reductionist arguments, where calls for market based management and the patenting of biotechnologies are then made (McAfee 2003). Such is in recognition that it is much easier to claim ownership of (and thus commodify) an ontologically independent 'object', than if it were a hybrid-object that is inseparably connected to its environment.

As Foucault (1980b: 236) notes, power and resistance are not held or possessed but reside *within the connections among things*. Perhaps we can, then, find room for non-humans within a Foucaultian framework after all, and in doing this begin to see resistance and power in a noticeably more ecological light. I have sought here to reveal just one such avenue through which a radical green Foucaultian critique could be nurtured.

## CONCLUSION

To understand the changing patterns within agriculture, it is important to look not only at social relations and organisational configurations, but also at how those formations give shape to non-humans. Much attention has been placed in recent years on the political economy of agriculture when speaking of these emergent patterns (e.g., Bonanno et al. 1995; Constance et al. 2003; Friedmann and McMichael 1989; Heffernan and Hendrickson 2000; Rudy 2003). Yet such analyses all too often relegate the natural environment to the backdrop, viewing the political economy of agriculture as something that manoeuvres within a given environment but never *through* it. I have worked to place the natural environment back into this equation: seeing it as something that disciplines, by way of its embodying anti-market logic, but which, in doing so, becomes disciplined itself.

## DISCIPLINING NATURE

In Foucault, although he himself said little on the subject, we find a point of entry into understanding how regimes of discipline have entered into the natural realm. Though he was not speaking of the natural environment, Foucault (1980b: 97) did argue that power must be studied ‘in its external visage, at the point where it is in direct and immediate relationship with that which we can provisionally call its object, its target, its field of application, ... where it *installs itself and produces its real effects*’ (my emphasis). In shaping subjectivities, Foucault thus recognised that power may come to be embodied within material objects, which can include, as I detailed earlier, the natural environment. And by embodying disciplinary power we can think of these objects as themselves becoming disciplined.

Foucault’s conceptualisation of capitalism, however, is overshadowed by the analytic emphasis he places on the discursive structures of disciplinary power. The significance of markets, the economy and corporate consolidation within agriculture, however, necessitates a firm materialist foundation upon which to rest our analysis. Enter the work of Braudel. Here we find a detailed discussion highlighting the emergence of capitalism, from which comes his important distinction between markets and anti-markets.

In combining approaches, we can begin to speak of discursive structures of power/knowledge and anti-markets as *both* possessing causal efficacy, whereby each influences, and is influenced by, the other. From this then opens the door for discussions regarding interactions between Foucaultian discipline and Braudelian anti-markets, which resulted in the following argument: namely, that technologies of discipline emerged alongside anti-market forces, to categorise, sort and record ‘bodies’ – of both the natural and human sort – so as to produce hard-working, obedience objects (and subjects) that conform to the logics of capital accumulation and market concentration.

## NOTES

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<sup>1</sup> I should note, however, that Foucault’s work in these various fields often goes beyond discipline – to such areas as ethics, genealogy, governmentality, biopolitics, etc.

<sup>2</sup> Save for world-systems scholars (e.g., Arnason 2001; Day 1980; Moore 2003a, 2003b; Wallerstein 1986, 1991), Braudel’s work has been largely neglected by social theorists.

<sup>3</sup> It is important to note that Foucault’s account of the disciplinary powers that give rise to these ‘docile bodies’ is far from uncontroversial (see, e.g., Bartky 1997; Bordo 1993; Mills 2003; Sawicki 1991; Turner 1996).

<sup>4</sup> However, Braudel (1982: 455) later acknowledges that these distinctions are more conceptual than analytic: 'It would be all so simple if this working distinction were clearly visible in real life, with demarcation lines discernible with the naked eye. Real life is not of course so simple'.

<sup>5</sup> All monetary figures are in US dollars.

<sup>6</sup> The Cry9C protein is effective because it binds to different sites within the insect's gut and destroys the stomach cells.

<sup>7</sup> One can clearly see here instances of what Foucault (1986) calls 'normalising codes of discourse' – e.g., 'right' and 'wrong', 'good' and 'bad', etc.

<sup>8</sup> As would be expected, rBST has resulted in wind-fall profits for Monsanto, the artificial hormone's only producer. The hormone must be injected every two weeks for several months a year, with each dose costing between \$5.15 and \$5.80 (US). While Monsanto does not release sales figure for Posilac, one analyst estimates that it accounts for about \$300 million, or five percent, of the company's annual sales (Elias 2004).

<sup>9</sup> These technologies have greatly shorten the time it takes to bring a cow to slaughter. For instance, in the 1930s, beef cows did not go to slaughter until they were four or five years old. In the 1950s, that number was reduced to between two and three years. Today, the 'magic number' is down to between 14 and 16 months (Chenoweth 2003).

<sup>10</sup> I realise the term 'farmer' must be used very loosely in the context of industrial beef production.

<sup>11</sup> I am reminded of when Secretary of Agriculture Ezra Taft Benson said to (US) farmers in the 1950s 'Get big or get out!'. This was then followed, twenty years later (1970s), by similar sentiments from then-Secretary of Agriculture Earl Butz, who told farmers to 'Adapt or die!'.

<sup>12</sup> Do not confuse pest 'resistance', which anti-markets are trying to produce, with the resistance generated in opposition to these logics. As detailed shortly, the resistance I am speaking of is a thoroughly ecological one. Agro-biotechnology, on the other hand, is non-ecological in nature, for it is premised upon a reductionist epistemology.

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