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sector, where the large returns to be made on the sale of upmarket, quality wines has encouraged extensive investment in new techniques of production and processing. To a lesser extent, innovation is taking place even in some of Tuscany's most traditional products sectors, such as, for instance, olive oil. Thus, traditions are maintained at the same time as they are modified in line with new consumer expectations. Second, the market is changing. In particular, large numbers of affluent consumers from outside the region are entering as tourists to sample local food products. This movement has been bolstered by the extensive provision of agri-tourist facilities (which also serve to give the farm household an alternative source of income, perhaps maintaining their involvement in the provision of local products). Again, change and continuity go hand in hand.

As innovations and change occur in the production and consumption spheres, Tuscany may have to face new challenges and threats. Our *lardo di Colonnata* case study, for example, reveals the existence of a tension between the localized quality of a product and the scale of global demand. Potentially, this may lead the region to face a 'conventionalization' of the agri-food sector. As Guthman (2004) argues with regard to California's organic sector, and as we will describe in Ch. 5, this is a process of appropriation of the most high-value crops and the most lucrative segments of an alternative food chain by agri-business firms. This would lead to 'agro-ecological enfeeblement' (Guthman, 2004: 310), such that the alternative sector would cease to be substantially differentiated from the conventional one. For instance, as Guthman (p. 312) suggests, if expectations of intensification become embedded in land values, the cost of land would make conventionalization hard to resist.

To deal with these threats, as we have described in this chapter, in recent years regional authorities have developed a loosely defined concept of the Tuscan model. Beyond rhetoric, this concept has provided a regional platform around which Tuscany has successfully built a significant degree of consensus among different actors over the future of its agri-food policy. As stated above, this has promoted a bottom-up approach to agri-food development which has given all stakeholders some degree of ownership over the policies implemented.

However, it is important to consider that Tuscan farmers, like all farmers, operate within a larger political economy. The region has been successful at shaping its own model and creating an institutional fabric that supports it. Yet, for this model to become sustainable, political interventions are needed at scales beyond the region. In the context of an increasingly complex regulatory structure such as the one we have described in Ch. 2, only a concerted action involving the national and supernational levels can realistically prevent threats such as the 'Californiaization' of Tuscany.

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California: The Parallel Worlds of Rival Agri-food Paradigms

Introduction: Separation or Integration?

The aim of this chapter is to explore the nature of the contemporary agri-food worlds—the conventional and the alternative—in California. More specifically, we ask: what are the variations within each world? What sources of contestation are leading to (1) convergence and potential appropriation by the dominant agri-industrial complex; or (2) separation and real ecological modernization; or (3) a sort of coexistence and spatial multifunctionality and regulation of the two systems?

In this chapter we make some preliminary assessment of the agri-industrial pathway that distinctively marks out California as one of the most highly productivist[1] agrarian regions in the world. This region has applied successive waves of capitalist and endogenous development, with or against a series of 'obstacles'. As the literature has traditionally emphasized, the history of agri-food in California is the history of a tension within a regional brand of agrarian capitalism continually wrestling with its own contradictions between economic accumulation and social legitimacy.

The chapter first examines the historical and contemporary dynamics of the agri-industrial paradigm as it has played itself out in this bountiful but peculiar agrarian space. Specifically, it describes how the agri-food system in California has (quite successfully) attempted to overcome 'the obstacles' of what we term 'first', 'second', and 'third' natures. More so than any other region, California has developed since 1849 an agri-industrial dynamic that continues to exploit its natural and social conditions in ways that sustain an exceptional and endogenous form of 'agri-cultural economy'.

After exploiting the natural resource 'initial endowments' through a very effective 'extractive' mode (i.e. 'first nature'), the agri-industrial paradigm assembles a specific form of fictitious circulation of capital, goods, and services. This creates a 'second nature': a longstanding framework of flows

[1] 'Productionism' is used in this chapter to refer to the overall food system orientation which is geared to maximizing production through the setting up of regulations, production and marketing arrangements throughout the food supply chains. 'Productivism' holds a narrower connotation which refers largely to (primarily) farm-based increases in both the scale and intensity of land-based production.

of capital and labour, infrastructure and technologies, which provide a superstructure for the state to overcome the well-documented obstacles of labour and production time in the agri-food sphere.

However dominant or celebrated this peculiar model becomes at the end of the twentieth century, we see another set of profound challenges ahead. These are 'third nature' obstacles which were in part created out of the very success of a century of Californian agri-industrialism. Ranging from consumer and environmental pressure to the rising power of corporate retail capital, these concerns create a new dynamic terrain for the agri-industrial system that we analyse here by looking at the fruit and the dairy sectors.

The second part of the chapter examines the quite longstanding struggles of alternatives against the prevailing paradigm in California. At the very least, it is suggested that these represent a new 'space of articulation', one which may be less coherent, but which shows some signs of 'autonomous relocalization'. This dynamic is producing a more variegated set of producer–consumer linkages in agri-food, suggesting that there may indeed be two Californian agri-food worlds.

Seeing the Exploitative Vista

Speaking at the Californian State Agricultural Society in 1889, William H. Mills, a land agent for the Southern Pacific railroad, foresaw the significant global comparative advantages that existed for Californian agriculture (quoted by Stoll, 1998):

> the competition of soils and climates is immediately present.... In these markets, we see the fertility of the soils and the favouring conditions of climate competing with the environment of every other portion of the world.... In every market there are immediately present the effects of the system of labour, the methods of production, the favouring conditions of soil and climate; they meet face to face; distance no longer divides them. Their economic presence has become equivalent of physical contiguity.

Mills claimed that California could become the 'orchard of the world' and that it was turning the von Thunean principles of distance on their head. In short, it was making a fool of distance and nature as barriers to agricultural development. By the 1930s, as Stoll (1998: 181) argues,

> California fruit business represented industrial farming at its apex: the almost complete separation between farm production and consumption and the dedication of soils in a vast region to consumers far away. Though nature presented a set of ecological options making possible a great diversity, the growers' particular reading of nature led them to plant a limited number of plants in monocultural strands. Determined to enjoin California with the emerging national economy, they invested in labor practices, chemical inputs, and market-organisations intended to sustain specialised crops. People and nature served the growers in a singular capacity, but the growers refused to serve either in return.

These initial endowments set in train a course of dynamic agri-industrial development. Many writers have documented the innovative and distinctive features of this 'Californian model' (Allen, 2004; Walker, 2004), which is seen as representing the leading US agricultural region in terms of production and value, as well as being the premier home of alternative and food security movements. As such, the California model provides us with a distinctive and valuable insight into a world of food where the intensity of the 'battleground' between the alternative and the conventional is at its highest. To explore the architecture of this battleground, we will focus in particular on the power relations in the Californian agri-food system.

California as an Innovative Region: First, Second, and Third Natures

First Natures

In his fascinating agrarian history of California, Henderson (1998) admits that any student of the state faces the problem of the sheer complexity of its agricultural space. A kaleidoscope of varieties of crops has been grown, usually at productivity levels which far exceed the US national averages. Indeed, as Henderson argues, the unevenness in natural conditions and in the social and economic frameworks built up in certain places and in certain sectors stimulated capitalist accumulation through intensive agriculture.

Beginning with wheat in the gold rush era, sustained productivity increases were yielded on the back of the technological innovations, which were first and foremost based upon a unique set of 'first nature' physical endowments. Stoll describes how Californian agriculture took advantage from the start from being located 'in the rain's shadow':

> the Pacific High regulates the rain, but the mountains allocate it. Storms from the ocean drop some of their moisture on the coastal plain before encountering the Coast ranges, a series of parallel ridges that run north–south, from Los Angeles to the Oregon border.... Parallel ranges traversing the state create hundreds of valleys. Much of the state's agriculture came to be conducted on these grass-covered prairies in the years after the American takeover, and the gold rush of 1849.

The great valleys, the Salina and Santa Clara south of San Francisco, the Napa and Sonoma to its north, the Orange and Los Angeles to the south, and those composing the Central Valley, which runs north–south for 450 miles, contain the river basins of the San Joaquin in the south, the Sacramento in the north, and the Delta area abutting San Francisco Bay. These arteries and valleys provide variable but rich bases for intensive agricultural development and specialization. Bounded by the Mexican deserts to the south, the Sierras and Nevada to the east, and the forests to the north, California came quickly to represent a sort of agricultural island, distanced from the rest of the US in

terms of markets but with its own geophysical features which allowed for commodity specialization across different climatic zones (Bill Friedland, personal communication, 15 March 2005).

These first natures became the basis for capitalist agricultural development, which intensified production and raised productivity in California well beyond other regions in the US. By 1930, California was the greatest fruit-growing region, contributing between 60 and 100 per cent of the US production of table and raisin grapes, apricots, prunes, lemons, figs, almonds, and walnuts. By 1955, the average yield of tomatoes and cotton was twice the national average; milk per cow was ahead of all other states; and by 1980 strawberry yields were five times the national average.

First-nature natural resource exploitation was, then, central as a starter for agrarian capitalist development in California, and it was integrated with the exploitation of minerals and forest lands and the parallel developments of urbanization. Following Cronin's (1991) classic account of how Chicago became the centre of regional commodity circulation in the Midwest, profiting off the circulation of wheat, lumber, and meats from the surrounding rural areas of Wisconsin and Illinois, Walker (2001) documents the peculiar, but dramatic evolution of 'Californian capitalism' as it is based upon intensive but variable forms of resource exploitation. It was an exploitation of first natures, and one that sustained itself by creating the superstructure for a second nature.

Second Natures: Circulating Capital, Commodities, and Technologies

While the natural advantages and bounded geographies of California may have first stimulated its peculiar path of agrarian capitalism, it has been the dynamic social development of its organising forms, its private property rights, its generalized and liberalized market structures, its wage labour arrangements, and its flows of finance and money capital between the urban and the rural that instituted a framework within which such resource endowments could be further capitalized. Once the chief obstacle to the imposition of white individual farm occupancy had been removed (with the half a million indigenous residents reduced to 10,000 within a century), a 'free' system of labour (which involved large imports of migrant Mexican labour) and competitive markets could unfold quickly. Small settler farmers proliferated from the 1880s to the 1920s as extensive arable and grazing lands were broken up for more intensive systems of fruiticulture and dairying (Liebman, 1983). These macro trends hide the development of social struggles between extensive and irrigated lands and a variety of ownership and labour patterns that emerged in different parts of the state.

By 1925, there were 136,000 farms and many of their occupants were of urban origin, innovators and experimenters who had strong links to urban

finance houses. While the rural spaces were to be the domain of the petit bourgeois family farmers, their wealth was banked and circulated back into reinvestments in agri-business and capital stocks associated with the burgeoning financial centres of San Francisco and Los Angeles. In short, an agri-industrial complex was born. Karl Marx, writing in 1880, recognized the importance of the rapid centralization of capital taking place in California (quoted by Walker, 2001: 1900): 'California's regional capitalism was a mighty engine of resource discovery, extraction, cultivation and plunder that left no stone unturned in its efforts to wrest the maximum reward from the land.' Walker sees this as a 'pure' form of capitalist development that not only held the three key features outlined by Marx—private property controlled by a capitalist class, the exploitation of wage labour, and monetary investment for profit—but is also qualified by three distinctive regulatory features or infrastructures. These include: (1) the expansive and expansionist notion of agrarian commodity systems (and their attendant social division of labour); (2) the vital relation and transformative effect on nature in production and commodity circulation; and (3) the distinctive social organization of production and the business management side of the industry. From the 1850s, California became the first and most complete example of industrialized agriculture (Jelinek, 1982), which promoted an agri-industrial complex based on a hierarchical and diverse division of labour, from the farm to the factory. This created an 'integrated business system' which involved the flow of materials through commodity chains (Friedland, Barton, and Thomas, 1981), the interaction of different elements of the agri-industrial complex and the organization according to modern business practices.

Another distinctive feature was the lack of social resistance to the onset of this new agrarian capitalism. Unlike other regions of the US, such as for example the Midwest or the East Coast, where settler agricultures based upon family farming preceded the development of agri-business capitalism (see Friedmann and McMichael, 1989; Guthman 2003), California lacked the history and sunk costs of 'pre-capitalist' farming communities. Its 'island status', initially at least, reduced large-scale social resistance to its agricultural revolution.

Even though, as we shall see below, alternative visions and 'paradises' of small-scale agriculture, such as small horticultural enterprises at the end of the nineteenth century, the New Deal of the 1930s, and the organic movement of the 1990s, periodically emerged, these movements are all compromised into variants of an agri-food complex built upon a super-productionist paradigm. In this sense, California represents a quintessential exemplar of super-productionism, whereby, as we discussed in Ch. 3, the production sector is designed to produce more and more and the processing and retailing sectors tend to design and sell more and more. In California, this led to the 'redesign' of plants and animals and the scientific reconfiguration of first natures' outputs.

For Henderson (1998), this capitalist agrarian experience (of *second nature*) in California turns much of the principle of the widely recognized distinctiveness of agrarian capitalist development on its head. Following Kautsky (1988), as we explained in Ch. 3, the Mann and Dickenson thesis (1978) has long explained the persistence of relatively non-capitalist production forms, such as family labour and individualized property rights, as a function of capital's inability to reduce the gaps between 'production time' and 'labour time' in agriculture. The simultaneous rise of regional finance capital and agricultural capital in California suggests that disparities between labour time and production time can in fact become new opportunities for capitalist development. According to Henderson (1998: 32, emphasis added):

> this same nature-centred production poses opportunities for capital precisely because [capital] must circulate and precisely because the disunities of production and working time (necessitated by natural processes) and capital's time in circulation (in part, nature as distance or as space) exist. That is, if these things exist for potential capitalists *as a cost to be averted*, then they exist as an *investment for capitalists* looking to fund anyone who does get involved in having to cover the cost.

It is this integration among finance, agricultural, and agri-business capital that lies behind the sensational growth of Californian agriculture. The geography of credit takes on a special importance here. Its role was crucial in transforming many farmers into what Henderson calls 'capitalist–labourers' who functioned at times as a deployer of capital and employer of labour and at other times as a more or less proletarianized labour source for the owners of credit. What becomes significant in the Californian case is the degree and type of capital circulation and whether that circulating capital confronts a 'capitalist–labourer' farmer or a migrant labourer. In this sense, capital again confronts (second) nature, that is, nature in the form of the human body. As Henderson (p. 41) argues: 'workers are sets of biological processes and energy flows for which capital has only partial substitutions (robotics). They are themselves obstacles to capitalism. Bodies persist. That they are waged bodies is a capitalist solution. That they are waged bodies is a capitalist problem.'

For Henderson (1998), there are always partial solutions to the problems thrown up by capitalist circulation. For instance, the specific circulation times of capital and credit, work as human and mechanical labour, and the vagaries of nature give rise to the specific and variegated geography of Californian agricultural production. As Mitchell (2000: 474) summarizes:

> patterns on the ground do not autonomously give rise to other patterns, rather, complexly intersecting patterns of circulating money, bodies and nature create new patterns—new obstacles and new opportunities... only overcome or realised as the result of never-ending struggles as to who is going to control the point of production, the point of credit, and the point of labour reproduction.... Human agency sits right at the centre of Henderson's theory of regional development: the decisions of innumerable actors as they interact with shifts in capital, processes of nature, and unruly bodies continually mold the logic of capital, commodity and labour circulation.

For example, in the early 1920s San Francisco's Anglo and London National Bank became a broker and promoter of irrigation district bonds. As Henderson (1998: 122) explains, 'the borrowed money becomes a part of the [irrigation] industry's productive capital... the installation of an irrigation system is a capital investment such an industry might make—and results directly in the creation and addition of new wealth to the security back of the debt'. For Henderson (1998) this represents an example of the 'geography of fictitious capitals over supra-local space'. In the process, the meaning of nature changes:

> nature has in a sense led the district's farmers to over-accumulate periods of slow turnover—therein the investors' opportunity. But it is not so much the direct transformation of nature that constitutes the opportunity. Rather they rely upon a broadly differentiated space of 'second nature', the geography of human-produced differential rents—sites of different capitals in different locations, circulating along varied timelines and producing different 'needs' and different 'yields'.

Fresno County, for instance, from the early days functioned as a rural centre of production within a wider matrix of flows of commodities, labour, and capital. In the change from an arable and beef-producing area to one of intensive fruit cropping, finance capital was a key agent. When farmers needed to obtain credit to expand production or to manage the disunities between production investments and working and growing cycles, they turned to the (often, grain-based) financiers in the San Joaquin Valley or in San Francisco. The latter was the main financial centre, a regulatory centre and a transportation centre for the grain trade. Capital mobility in agriculture was thus highly developed by the start of the twentieth century, with rural banks keeping deposits in San Francisco and the gold and silver reserves being quickly translated into cash for investment and credit bonds.

This regionally mobile development of urban and rural-based credit fuelled the productivism of Californian farming and stimulated the development of mechanical technologies and the capitalization of the land, not least through irrigation technologies. Privatized forms of credit and finance capital became the main 'regulator' of the countryside and encouraged greater and greater local and regional specialization. Finance capitalized the land, forcing producers to get as much production as possible from it. This major dimension of regional development throughout the twentieth century also facilitated the growth of agri-business firms.

The state government played a supportive role for capital and agri-business by developing educational, research, and extension programmes to enhance production and make innovations. This publicly funded knowledge creation was rapidly applied to commodity specialization, especially after the

growth of the extension service in 1914, and it also fostered cooperative arrangements among 'growers'. For instance, the Commission Marketing Act of 1915 and the Fruit Standards Act of 1927 provided state control over quality in accordance with the co-op model, and the latter empowered grower-run marketing boards for every major commodity. The dairy sector also had its own State Dairy Bureau and a Pure Milk Act so as to assure quality and to limit competition.

The development of a distinctive and endogenous agrarian capitalism in California was thus based upon collaboration among industrial and finance capital, the regional state, and producer groups. These relationships were not always harmonious (especially concerning labour rights) but they continued and sustained an innovative culture. California became, Walker argues, a *learning region par excellence*. Innovative machinery used in one location was quickly followed by large amounts of capital for development and marketing there and elsewhere. Overall, this was an essentially endogenous economic development trajectory, based upon Californian banks, builders, and businessmen.

This agrarian capitalist framework was essentially built upon 'a mini-state within a nation-state'. In fact, while California busily assembled and developed hybrid forms of private and public regulatory structures of its own to facilitate its super-productivism, it tended to shun, from the start, the intervention from the federal state at large. As Walker concludes (2001: 191), this was a regionalized form of neo-liberalism that engrained itself through the course of the state's development in the twentieth century:

> industry grew and continually innovated, thanks to the creative genius of skilled labour backed by lots of money and robust regional markets. The state gave capitalist profligacy a free hand, periodically reformed its grossest excesses, then stepped back to give business a free hand once again. All along the way, California's resource economy walked forward on two legs: natural wealth and social production, industry and extraction, big business and small property, city and country, state and private enterprise, capital and skilled labour (not to mention highly exploited labour), safe bets and wild speculation.

The development of second nature agri-industrialism was built upon managing and manipulating the sets of first nature initial endowments. Probably more so than in any other agricultural region, the natural *obstacles* of capitalist agriculture were indeed, for a time at least, overturned or ploughed under into further opportunities. This trajectory was built upon a particular coalition and collaborative set of relationships between production-based rural concerns and urban-based industrial and finance interests.

However, by the 1970s and 1980s, these conditions and coalitions began to confront a new set of socially and naturally constructed '*obstacles*'. These are part of a third nature and represent both a reaction to the extreme forms of agri-industrialism, on the one hand, and a growing public concern for *consumerization*, rather than productionism, on the other. Moreover, they begin to cross-cut the previous harmonious integration between the urban and rural sets of interest even in the most productivist rural spaces of California. Simultaneously, the rising power of corporate retailing tends at least to match the traditional hegemonies of finance and industrial capital. In this more complex third nature realm, then, extreme productivism begins to meet a new corporate and public consumerism. In contextualizing this collision within the conventional agri-food sector, we will examine in more detail two commodity sectors: strawberries and dairying.

Third Natures: Emerging Public and Consumer Contestations

In the realm of *horticulture*, strawberry production well illustrates the contemporary phase of Californian agri-food development. In 1946, Californian strawberries represented only 6 per cent of US production; by 1988, the region accounted for 74 per cent of national production. The main reason behind this was the exceptional increase in yields, which rose from 3.7 tons to a staggering 24.2 tons per acre between 1946 and 1988—almost five times the tonnage produced in other parts of the country.

Most of the production is concentrated in a 20-mile-wide strip of land running along the central and southern coasts of California. Wells's study (1998) describes the high degree of labour 'flexibility' and exploitation that has characterized the Californian strawberry sector and its ability, through concentrated market power in the hands of berry producers, to develop a high degree of protection from the instabilities of the wider national and international markets. She argues that the organization of the industry reinforced the economic viability of relatively small producers operating in the same region and that control over hired harvest labour, in particular, became a key feature in ensuring profitability. The labour organization of the Californian strawberry sector displays significant amounts of flexibility concerning employer–employee relationships. Wells discovers, for instance, that before the Second World War a dominant form of organization was share-cropping (or share-farming), and that this almost disappeared afterwards, to return in the 1960s and then decline again during the 1970s. These were variable systems of labour control by growers that tended to minimize workers' rights, creating significant tensions and labour conflict in the fruit sectors.

The strawberry plants have been bred continually for over a century. Present-day varieties are intensely overbred (Friedland, 1998), and this implies the destruction of all other forms of life in the soil in which the plants are grown by covering the fields with plastic sheeting and injecting methyl bromide (MeBr) into the soil. This practice, which kills weeds and pests but also creates environmental problems, is currently the focus of an intense conflict between environmental groups and the strawberry growers, who

need to use it in order to keep production costs down. Indeed, growers continually face an intense cost-price squeeze: overall input costs continue to rise for conventional strawberry producers (more that $20,000 per acre) and 98 per cent of input energy comes from non-renewable sources. To secure a return on this investment, producers must rely upon pre-plant fumigation with methyl bromide, plastic mulch, drip irrigation, pre-plant chilling, fertilization with slow-release nutrients, foliar applications of synthetic pesticides, and concentrated semi-permanent hand-labour throughout the growing season. Despite these increasing (and often hidden) input costs, producers can expect profits of over $6,000 per acre (1994 prices).

For Wells (1998) this super-intensive system is maintained as a social and moral economy based upon particularly exploitative sets of labour relations that tend to shape the social constellation of particular sub-regions of strawberry production. For instance, Salina's valley growers are predominantly Anglo and farm large acreages; Pajaro growers are mostly of Japanese origin and work middle-size farms; North Monterey growers are mostly of Mexican origin and farm the smallest units. These differences, based on histories of local Anglo development and Japanese and Mexican insertions into the labour and property markets, have important implications for the differential social organization of production. Anglos, working the largest farms, tend to have hierarchical management structures, whereas the Japanese and especially Mexican farms have closer, informal relationships with their workers. This particular international mixing of productive and labour forms, combined with the mobilization of scientific efforts to continue to breed the 'super-strawberry', provides what seems to be a continually profit-making sector. However, there are also significant labour and environmental instabilities, which so far have been tackled on a short- or medium-term basis. In fact, despite a long history of worker resistance and political mobilization, union membership continues to decline, contracted labour is rising, there is more mixing of ethnic (especially Mexican) labour, and the significance of labour legislation is decreasing (Wells and Villarejo, 2004).

Despite the continued predominance of Californian strawberry production nationally and regionally, the industry faces significant vulnerabilities associated with its environmental impacts and its increasing dependence upon corporate retailing buyer power. As we will discuss in the next section, these trends suggest that the conventional systems of strawberry production will continue to be a growing source of social conflict in the region.

Third Nature Hits Back: The Onset of Methyl Bromide Regulations

In January 2001, the California Department of Pesticide Regulation (DPR) introduced controversial MeBr application regulations, which had a significant impact on strawberry agriculture. Further and stricter regulations were prepared at the end of 2004 as a result of local and regional public

concern but also as part of the Montreal Protocols proposed ban.[1] The DPR state-level regulations aimed at reducing human exposure to MeBr. For each fumigation site, the DPR regulations stipulated dual buffer zones where MeBr could not be applied to the soil. The buffer zones depended on the application rates (i.e. pounds of MeBr per acre, method of application, and the proximity of schools, houses, and other occupied buildings). The regulations also contained worker-hour restrictions and required growers to notify neighbouring residents when they were going to use the chemical.

Economic analyses of the effects of these public regulations suggest that they are significantly affecting the industry (Carter, Chalfant, and Goodhue, 2002; Carter et al. 2005). The main economic impacts include: forgone profits from sales of processing berries due to a reduction in season length; added labour costs due to the longer fumigation periods; loss of land for intensive production associated with the buffer zones; and public notification costs. The regulations came under close scrutiny in the courts as farmers fought to have them neutered. The regulations, it is claimed, forced some smaller growers out of business or obliged them to use alternative and less efficient fumigation procedures, which were seen as less effective at controlling pests.

By 2005, the use of MeBr was still not completely banned and the controversies over its effects continue. Carter et al. (2005) show that MeBr applications did not substantially decline between 1996 and 2003 and that the relative share of MeBr applications in relation to other crops has actually increased. Producers' organizations (such as the Strawberry Commission), however, continue to focus on the negative effects of this partial legislation, pointing to the impact this has on the industry, the decline in efficient production and the rise in imports from countries, such as Mexico and China, that are not legislating against its use. Alternative treatments, such as Telone and 1,3-D, are also seen to be harmful to humans and generally record lower yields. The chief of the Strawberry Commission believes that there are several well-entrenched myths associated with MeBr (Jones and Prescott, 2005). It is estimated that farmers' yields would decline by 15–20 per cent if the chemical were banned completely.

A technological 'solution' potentially lies in genetic engineering. Researchers in private firms and universities in California lead the way in developing biotechnology in strawberries (Whirty, 2000). An Oakland-based company announced that it had grown strawberries that were resistant to the herbicide glyphosate, commonly known as RoundUp. Company representatives argued that their ability to induce a tolerance to glyphosate would allow strawberries to survive sprayings of RoundUp and that this could be used as a substitute for MeBr within a few years.

However, the main barriers are considered to be consumer reaction and legal issues regarding implementation. As one of the key scientists argued,

[1] According to the EPA, US farmers purchased 38 per cent of the global MeBr in 1996.

competitive regions such as New York State cannot simply copy the new GM developments because the technologies are now owned by the companies themselves. Moreover, as he states (quoted in Whirty, 2000): 'all of these modified products have benefited the companies and the farmers, but there's been no benefit to the consumer at all.... Monsanto sells more herbicide, farmers have an easier time in dealing with weeds and can cut their costs, but the consumer doesn't get anything out of it. I can understand why there is a backlash.' In California, specifically, the growing ex-urban populations who have suburbanized the deeper rural areas are expressing the most public concern. As Thacker (2005) stated:

> weeds are less of a problem [in California, where the fungal infections usually kill crops]. There, farmers do not need the added herbicide. However, California farmers compete with developers for land, and many fields border houses and buildings. EPA considers Telone a probable human carcinogen, with moderate toxicity to wildlife. Application also requires a wide buffer zone if the field abuts an occupied structure.

With regard to the rise of *fruits and vegetables*, it is estimated that 55 per cent of the total value of Californian agriculture ($26 billion) is provided by the fruit, vegetable, and nut industries. As a result of their predominant market share, Californian producers and processors have traditionally held unique opportunities to exercise control over the markets for those commodities, and this has been supported by specific state policies for marketing, grower, and cooperative arrangements. However, over recent decades, as elsewhere, there has been an increasing marketing bill placed on growers, which represents a shift in the appropriation of value towards the retailers. The farm share of the value of the market 'basket' (i.e. the average quantities of food coming from farms and purchased for consumption in the home), which remained stable at 40 per cent between 1960 and 1980, has declined rapidly since then—to 30 per cent in 1990 and 21 per cent in 2001. Farm values have traditionally accounted for more than 50 per cent of retail value for animal products such as meat, dairy, poultry, and eggs, but these shares have now fallen to below half. The farm share for fruits and vegetables tends to be much lower and does not vary much between processed and fresh products (Carman, Cook, and Sexton, 2004). With more Americans spending a higher proportion of their incomes both in the main concentrated retail sector and in restaurants, farmers' share of the total retail value for the major food commodities was down to 19 per cent in 2001, compared with 41 per cent in 1950 and 24 per cent in 1990. For fresh fruit the farm share of retail value is even lower (16 per cent for fresh fruit and 19 per cent for fresh vegetables, 2001), falling from 26 per cent in 1980.

These trends are affecting Californian production systems with regard to the relative amounts of value the fruit growers are able to capture from the sale of bulk, conventional goods— in which they have long had comparative advantage. This is linked directly, as explained in Ch. 3, to the recent consolidation of the US corporate retailer sector (Wrigley, 2002). In 2002, retail chains (defined as a retailer operating eleven or more stores) accounted for 83 per cent of supermarket sales, compared with 54 per cent in 1954.

For instance, the arrival of a fast-developing Wal-Mart is driving non-value-adding costs out of the food supply system, raising competitive benchmarks for other retailing outlets. Wal-Mart opens over 200 new supercentres per year in the US; by mid-2003, it owned 1,333 supercentres in the US that sold Californian fresh fruits and vegetables. Increased retailer buying power is restructuring the traditional fresh fruit and vegetable markets, creating 'preferred supplier' contracts and intensifying competition among suppliers for shelf space. While fresh vegetable and fruit consumption continues to rise (15 per cent in the US between 1976 and 2002), so does product differentiation, with fresh-cut fruit leading the increasing demand. The amount of fresh produce in US supermarkets has expanded dramatically. It increased from an average 133 items in 1981 to 350 in 2001, reflecting a growing diversity of consumption practices and more demand for speciality and ethnic fruit and vegetables, as well as the growth in the diversity of fresh-cut, value-added, and convenience products.

In California, direct price and income supports apply to only a few major crops, such as rice, cotton, and dairy. The role of the state and federal government in the mandatory marketing programmes is mainly that of a facilitator. According to Carman, Cook, and Sexton (2004: 117), 'government provides the legal framework for industries to take collective action, but decisions on whether and how to use these programmes are made by the industries, and they are self-funded'. Today, perishable crops that need to be harvested, sold, and marketed within a short time-frame tend to give growers declining amounts of bargaining power in dealings with buyers, while the consolidation of purchasing within the hands of a few larger buyers (often operating for the corporate retailers) raises growing concerns about the oligopsony exploitation of producers.

As stated above, Henderson (1998) highlighted the opportunistic role of financial capital in exploiting the distinctive disparities between production and labour time in Californian agriculture. The new trends in the marketing of fruits and vegetables now suggest a similar opportunity for a more consolidated and consumer-driven corporate retail capital, which increasingly sells Californian fruits and vegetables across the country, but it does so by extracting more value from the producers.

We see then that despite the continued predominance of a vibrant and intensive fruit sector in California, based upon expanding and more diversified markets, the gradual consumerisation of agri-food—in the form of both more public environmental concern over the potential harmful effects of its technologies on the one hand, and of the rapidly consolidating buyer power of the retailers on the other—is beginning to shape and constrain the sector. In short, while much the sector still relies upon its peculiar brand of

Californian resource 'flexibility', it also has to engage with a more contentious and competitive social context.

Dairying: Innovation, Relocation, and Quality

The states of the Midwest, and especially Wisconsin, are traditionally regarded as the 'dairy states'. Even by 1970 Wisconsin dairy farmers were producing double the amount of milk compared with their western US counterparts. By 1993, however, California surpassed Wisconsin, and by 2000 it was the largest milk producer in the US, with 20 per cent of the national total. Like other sectors in the state, the success and vulnerabilities of dairying stem as much from its relationships with its cosmopolitan roots as with its agrarian ones.

If not in California as a whole then in LA county, dairying between 1925 and 1965 became a leading national player (Gilbert and Wehr, 2003). People and milk went together. This was one of the country's most populated and fastest-growing urban areas, which doubled its residential population and its dairy cows every couple of decades or so. After the Second World War, the county held one of the largest cow markets on the globe.

To understand the social dynamic behind this growth, it must be considered that the dairy farmers of LA county developed a new model that would be copied elsewhere in the US and beyond: 'dry-lot'dairying. Essentially, they concentrated cows on small plots, purchased, rather than grew, all the feeds, and then fed it to the animals on a 'zero-grazed' basis. By quickly becoming industrialized, with large herds, innovative technologies, and a heavy reliance on hired, rather than family, labour, this model created 'milk factories' and 'dairy cities' such as Dairy Valley, which contained 3,505 people and 85,000 cows in five square miles by 1960, Dairy Land, which had 600 people and 11,000 cows, and Cypress, which included 1,700 residents and 13,500 cows.

Gilbert and Wehr (2003: 484) describe an archetype whose principles were to transcend much of the industrialized dairying world:

> the three incorporated dairy cities were zoned exclusively for heavy agriculture. By stabilising the land market, the state's protective zoning kept property taxes low. It also insured the ability to improve and expand the dairies without fear of complaints from non-farm neighbours. Since they were essentially composed of farms, the single purpose cities minimised municipal services such as paved roads and street lights. In effect these were agricultural areas in the midst of one of the largest and fastest growing metropolises.

It is clear that the world's first industrialized dairies trace their origins to the urbanization of LA county, where a vibrant non-agricultural land market stimulated relocation and further capitalization of intensive production. Urbanization, suburbanization, and agri-industrialization of the dairying sector went hand-in-hand and began to lead to a 'structural separation' that marked out a distinctive Californian path for dairy industrialization.

There are significant regulatory features of this agri-industrialism. As the only major milk-producing state that lies outside the US Federal Milk Marketing Order, California administers its own milk pricing and pooling rules; and, as Butler and Wolf (2000) argue, this includes a quota that, according to many competitor states, artificially and unfairly increases the prices for Californian dairy producers. For instance, in a series of Congressional hearings relating to the regionalism of the US dairying sector, Northeast and Upper Midwest legislators were 'shocked and dismayed' at what they saw as the flouting of the rules relating to production quotas. The management of the Californian dairy state order system was regarded as 'inequitable'. California's endogenous economic regionalism, initially based upon its geographical (first nature) isolation to the west of the Sierras, was once again to the fore, with its state policy seen as 'cushioning market shocks' and uncompetitive by many of those outside its boundaries. DuPuis (2002) reinforces the significance of this regulatory distinctiveness, arguing that the method of pricing milk in California historically strengthened the protective boundary between market and manufactured products by strongly restricting entry into the fluid liquid market. The state had greater autonomy in setting prices and managing markets, and this protected Californian dairy farmers from US price competition.

Competitors from the Midwest and the East had good reason to be concerned. From 1950 to 1998 overall US milk production increased by 35 per cent as a result of increases both in population and income. This was complemented by a 58 per cent decrease in the number of cows and a 223 per cent increase in the milk per cow. In California these trends were even more pronounced; milk production increased by 361 per cent and milk cows increased by 82 per cent. By 1997 the average herd size in California was a staggering 530, compared with 59 in Wisconsin and 78 nationally. As with other farming activities, this represented a significant type of regional 'structural divergence' (Gilbert and Akor, 1988), which can only be explained in terms of the distinctive combination of regionally constructed conditions.

Among these regional conditions, the distinctive state regulatory context is especially important. The Californian state developed its own milk marketing orders in the 1930s, giving itself the autonomy to experiment without having to coordinate with neighbouring states. The state can set its own pricing orders using its own formulae, and since 1969 it has set its own milk quota rules, which are geared to maintain high revenue for those producers who historically marketed in the higher-valued fluid market. This has production implications, with Californian farmers receiving a non-quota price as their marginal price, while those under federal rules elsewhere have identical average and marginal price (Butler and Wolf, 2000; Sumner and Wolf, 1996).