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AGRICULTURAL REVOLUTIONS IN AMERICA'S HEARTLAND: THE CORN BELT AND THE MAKING OF AMERICAN CAPITALISM

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AGRICULTURAL REVOLUTIONS IN AMERICA'S HEARTLAND: THE CORN
BELT AND THE MAKING OF AMERICAN CAPITALISM

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DISSERTATION

Submitted in partial fulfillment of the requirements for
the degree of Doctorate of Philosophy in Sociology
in the Graduate School of
Binghamton University
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Accepted in partial fulfillment of the requirements for
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ABSTRACT

The family farm has been the foundation of America's cheap food model. This research examines how cheap food from the Corn Belt was produced from 1840s to the late twentieth century. It investigates how the interrelationships between family farming, proletarianization-housewifization, and national and world markets configured and reconfigured. Utilizing a world-ecological framework, I argue that Illinois and Iowa, the heart of the Corn Belt, were the epicenter of two successive agricultural revolutions that fundamentally transformed world accumulation and world nature. The analysis is centered on the development of successive agricultural revolutions over the *longue durée* of capitalism, with the greatest attention on the nineteenth and twentieth century revolutions in the United States. At the core of the dissertation I examine what I call the 'double dialectic': the contradictory relationship within the agrarian household and in relation to world markets and world power. The findings of the study are historical and methodological. Historically, the Corn Belt family farm possessed a unique position within the capitalist world-economy, resulting in relative prosperity and long-term stability. Contrary to regional studies of the Corn Belt, the study provides a world-ecological framework for reconstructing the origins, development, and crisis of the Corn Belt family farm and interpreting how the production of nature, the pursuit of power, and capital accumulation constitute its development.

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Introduction: America's Cheap Food Model

If the modern world was paved with cheap food, as Moore (2010, 2015) claims, how did that process unfold in the United States in the world-system? The following study examines the origins, development, and crisis of the family farm in the American Midwest to explain the role of cheap food in the world-system. production of cheap food over the *longue durée* of American capitalism in the world-system. I argue from a world-ecological perspective that Illinois and Iowa, the heart of the Corn Belt, were the epicenter of two successive agricultural revolutions that fundamentally transformed world accumulation and world nature. Illinois and Iowa's unique position in the capitalist world-ecology provided stability and relative prosperity to farm families while producing cheap food. The study makes clear that machines were not the sole source of cheap food. Instead, cheap food understood here emerged through interrelationships between the farm enterprise and household, proletarianization-housewifization, and finally, world-systemic cycles of accumulation.

The following study asks, what are the forces and conditions that give rise to successive agricultural revolutions? What is the relation between agricultural revolutions and capitalist crises? Finally, how do agricultural revolutions reshape the world-system? The historical reconstruction the nineteenth and twentieth century United States agricultural revolutions focuses on two interrelated developments. The first is world accumulation in the context of the core. For example, as will be argued in chapter two, Britain's developmental crisis was pivotal to the emergence of the United States first

agricultural revolution. The second is the contradictory farm relations existing primarily with the farm family itself. The conflicting demands of work for farm men and women, and their interests, became a limit and opportunity to capital accumulation. From a world-ecological perspective, I theorize and historicize the unique position of the Corn Belt family farm in relation to world accumulation and world nature. While the global law of value operates through time and across space as a central force constituting different social formations, those social formations possess their own logic, tendencies, and demands that reproduce in relation to the law of value. As a socio-ecological formation, the family farm has reproduced and transformed through dynamics of the conditions of re/production and world accumulation and state power. From this perspective, the family farm must be situated within cycles of accumulation, the production of nature, and the penetration of capitalist markets in agriculture.

Agricultural revolutions are productivity revolutions in farming that produce more food with less labor input, driving down the costs of food for wage-laborers in core countries. Successive agricultural revolutions over the long-durée of world capitalism have centered on what Braudel calls ‘civilizational crops’. The ecology of crops, like wheat and corn, demand specific material transformations that in turn give rise to new opportunities for capital accumulation that in turn transform agrarian and urban households worldwide. Additionally, agrarian social formations directly involved in the production of civilizational crops must be examined as those social relations of production and their contradictory developments constitute the emergence and development of agricultural revolutions. To be sure, the material transformations are dialectically bounded to the maintenance and ongoing transformation of the agrarian

social formation. The key indicators of determining what an agricultural revolution is will be elaborated later in the introduction.

There are numerous regional accounts of the historical development of the Corn Belt. Indeed, I have drawn on specialists as an important secondary source. At best, these studies provide a clear historical reconstruction of the social, economic, and cultural relations of the family farm in relation to the development of American capitalism. At worst, they provide tedious historical details without synthesis. The objective of this study is not to provide another regional account of the Corn Belt. Instead, this study provides the first world-ecological account of the unique position of the Corn Belt family farm. The world-ecological framework, as discussed below, permits a unified historical analysis of family farming and world-systemic processes as mutually conditioning relations constituting the totality of the capitalist world-ecology.

The following study is situated at the intersection of the agrarian question and the domestic labor debate to explain the origins, development, and crisis of the Midwestern agrarian household and its contribution to American development in the capitalist world-system. It is a call for a world-ecological synthesis that transcends the limits of the agrarian question and the domestic labor debate in the reconstruction of America's cheap food model. The analysis is centered on a double dialectic: the internal dynamics of the agrarian household and the household and market. In this way, there exists multiple dialectics within the household (accumulation, power, and nature) and in relation to capitalist markets (accumulation, power, and nature). We are, then, speaking of layers within layers of contradictions and surpluses in the web of life. The challenge of the dissertation is to discern the patterns, forces, and trends of capital accumulation, the

pursuit of power, and the production of nature in the agrarian household and in and through the capitalist world-ecology. In doing so, I explain the contradictory relationship of micro-level processes on the farm in the Corn Belt, primarily between farm men and women, and the contradictory relationship of macro-level processes of national and world markets that constitute America's cheap food model in the making of the capitalist world-ecology. The broader, and more abstract, objective of this study is to historicize and theorize this double dialectic to contribute to our understanding of large-scale social change.

Introduction of introduction concludes

Capital's cheap food model emerged through the cheap natures of households and frontiers. Agrarian households are gendered and classed contradictory sites of production and reproduction. The rhythms of capital accumulation and secular nature of capitalism impose demands and limits on households such that the production of commodity crops and the reproduction of the household are "simultaneously mutually supporting and mutually undermining one another" (Ollman 2008: 18). The cheapness of food stems from the ongoing cheapening of the social formation of family farming, particularly, of agrarian women and extra-human nature. The socio-ecological conditions of existence for the family farm necessarily changes as capital accumulation, state power, and the production of nature configure and reconfigure.

At some point, however, exhaustion sets in for the reproduction of the family farm or capital accumulation, or both simultaneously. When crisis conditions persist in the proletarian household or in centers of accumulation, movements to fresh frontiers had been a tried and true strategy. Fresh frontiers eclipse decaying frontiers, producing an

ecological surplus that at once improves the economic standing of proletarian households and renews accumulation. However, at the point of production where cheap natures in their many forms may undermine the conditions of reproduction for that particular group, depending on the characteristics of said group in relation to the historical conjuncture. Nevertheless, capital's cheap nature strategy of successive frontier movement has been crucial to the production of cheap food.

But the production of bountiful cheap food for capital accumulation does not necessarily concentrate in the cheapest zones of the world-system. In the Corn Belt United States, the social conditions of existence of farming were relatively higher than the Wheat or Cotton belts. The timing of incorporation into the capitalist world-ecology and the socio-ecology of the different regions mattered to the production of cheap food. When and how certain regions were incorporated enable us to explicate on the one hand the conditions of existence of world accumulation and the other hand the unique opportunities regions present. In this context, zones of cheap food raise questions of the reproduction of the different social formations in their different *combinations* of commodity crops, household production, and national and world markets. This study will theorize these relationships.

Justification

Why should we care about agriculture? Organizations and researchers from all political persuasions agree that agricultural development is crucial for comprehending the ongoing water, energy, and climate crises, as well as the possible solutions. If, as the FAO (2014) claims, saving the family farm is the key to resolving the manifold crises of our times, then what were the causes of such crises? The short answer is productivity

revolutions. Importantly, however, what were the historical, ecological, and geographical conditions that allowed for such productivity revolutions? Are such revolutions beneficial and desirable, and for whom? To adequately address the hard-pressing questions of agricultural development, economic growth, and sustainability, this dissertation examines the historical development of the Midwestern family farm in the United States.

The Family Farm as a Social Formation

Defining the family farm has been a highly contentious objective over many decades in the United States. As an ideology, the family farm has been used as a tool to legitimize private property and capitalist development (Buttel 1980). There are political and economic consequences linked to policies for how the family farm is defined. The United States Department of Agriculture (USDA), for example, who is the leading authority influencing Congress, scientists, farms and the public has a vague definition of family farming. According to the USDA, 97 percent of the 2.1 million US farms are family-owned operations, and is defined as “any farm where the majority of the business is owned by the operator and individuals related to the operator, including through blood, marriage, or adoption” (USDA 2015). The highest concentration is the Midwest. Since the family farm is the unit of observation in this study I will attempt to define it. Note, however, that abstraction is necessary to defining the family farm and that as a historical formation its definition must co-evolve. As we will see, Marxists have constructed a much different definition than that of the USDA, each containing political and economic projects.

Buttel (1980: 10-11) describes four characteristics that adequately defines the family farm: 1. owning and operating the farm, 2. family labor makes up most of the

labor utilized, 3. is fully, or nearly, commercial and competes with other producers, and 4. the majority of the family income is derived from farm-produced commodities. Taken together, these characteristics define the family farm. However, the absence of one or more of the characteristics indicate a structural transition away from family farming. Historically, the family farm has been the most common unit of agricultural production (Friedmann 1980).

The family farm, or what Friedmann (1978a) refers to as “simple commodity production” are distinct from capitalist enterprises on a number of fronts. We often think of capitalism as the separation of people from the land and concomitant dependence on wage-labor. This is not the case for simple commodity producers in which the ownership of the farm and the provision of labor is unified in the household through specialized commodity production that exists in a capitalist mode of production (Friedmann 1980: 161).¹ “The unity of property and labour...is contradictory because it internalises within one person or family the structured conflict between property owners and labourers, who are usually related as employers and employees” (Friedmann forthcoming, cited in Bernstein 1986: 14). The contradictory nature of simple commodity producers operates through the presence of the household and the business. The success and reproduction of the family farm is dependent on both the reproductive and productive activities of the members of the household in its lifecycle. Forces outside of the household, such as

¹ Bernstein (2010: 128) defines petty commodity producers as follows: “small-scale commodity production in capitalism, combining the class places of capital and labour, whether in a household or an individual; subject to class *differentiation*.” Bernstein’s (2010) “petty commodity producers” is the equivalent to Friedmann’s (1980) “simple commodity producers,” although petty commodity producers is the most commonly used term for family farming.

policies, may strengthen the capacity of family farms to reproduce. Conversely, agribusinesses who control large segments of commodity chains may weaken the family farm unit. Note, for Friedmann (1980), simple commodity producers are not fully capitalist. That is, the family farm is not fully commoditized and as such their conditions of existence cannot be analyzed from the ‘logic of the market’ only (Bernstein 1986: 12). This allows Friedmann to explain how farming households reproduce the conditions of existence outside of market relations, but also always within competition between capitalist producers. On the one hand, simple commodity producers have a distinctiveness than that of capitalist producers (i.e. unity of labor and property). On the other hand, simple commodity producers’ conditions of existence are always in relation to capitalist producers’ conditions of existence in the world market. Relatedly, production is determined by kinship and the farm division of labor is formed through gender and age. Inequality and power differentials exist within households based on gender and age in which the male head of the household accrues the greatest surplus. This is unique in the context of advanced capitalist countries with well-developed labor markets.

For the remainder of the study the term “petty commodity producer” will be used to specify family farming. Farmers are petty commodity producers when they are subjected to the law of value which compels them to compete successfully on the market to maintain land and unwaged labor—their key means of production (Post 2011). Petty commodity producers, while often thought of as an obstacle to capital accumulation, dependence on the market have created a dynamic of “specialization, competition, accumulation and technical innovation,” similar to that of capitalist development (Post 2011: 45). Taken together, Buttel’s four characteristics, Friedmann’s notion of

reproduction of simple commodity production, and Post's conceptualization, we form a definition of family farming i.e. petty commodity production.

Petit Bourgeois Yeoman Household

While a standard definition has been constructed for the family farm, one class of farmers, what I call the "petit bourgeois yeoman household," were fundamental to two successive agricultural revolutions in the Corn Belt. These farm families were not capitalist farms that employed year-round wage-labor, nor were they tenants or sharecroppers. These farm families were relatively wealthy, and certainly more numerous than capitalist farms, with many concentrated in Illinois and Iowa. After the capitalist farms, these agrarian households were usually the first to purchase modern farm and household equipment. Their standard of living was better than most farmers and certainly better than many proletarian households. The value of their land was usually higher than most, reflecting the high-quality soils and proximity to major markets. Finally, this group of farmers were more likely to join the conservative, commercial-orientated farm groups, like the American Farm Bureau Federation (AFBF), and not populist farm groups.

The development and persistence of the petit bourgeois yeoman household suggests that farming in the Midwest was not a classless endeavor. Indeed, beyond the capitalist farmers, the class of petit bourgeois yeoman household who is at the center of the study was selected based on their ability to persist and give rise to two, and perhaps three, agricultural revolutions.

The Agrarian Question and Domestic Labor Debate

The following study is situated at the intersection of two fields of study: the agrarian question and the domestic labor debate. Each of these literatures are broadly

concerned with capitalist development. However, the center of analysis for the agrarian question are class politics, agricultural transformation, and the persistence or demise of the family farm or peasantry. Whereas the center of analysis for the domestic labor debate are the experiences of women and their unpaid work, social reproduction in relation to commodity production, and women's changing patterns of work in and outside the household. A world-ecological synthesis of these two literatures can be fruitful for historicizing and theorizing the Midwestern agrarian household. Before attempting synthesis, I will explicate the motivates and insights from the agrarian question and the domestic labor debate.

The Agrarian Question

The initial agrarian question asked what was the fate of the peasantry as capitalism penetrated agriculture? Originally formulated by Engels (1894), and later Kautsky (1899) and Lenin (1899), the agrarian question was principally concerned about agrarian transformation resulting from capitalist development, and the ways in which class conflict and solidarity would emerge. This was expressed in the politics of the peasantry in the transition to bourgeois democracy and socialism during the late nineteenth and early twentieth centuries. Less than a hundred years later Byres (1996) and Bernstein (1996) forwarded three problematics of the agrarian question: the contribution of agricultural surplus to capitalist industrial development, how changes in the forces and relations of production transform agrarian social formations, and how changes in agrarian class structures generate political resistance. Each of these are discussed in turn respectively.

The first foundational problematic of the agrarian question examined here is the importance of agricultural surplus fueling system-wide capital accumulation—what Bernstein (1996) called the ‘accumulation’ problematic. Capitalist agriculture produces surplus above and beyond its immediate consumption. Private property and the imposition of taxes compels agrarian producers to compete. As agrarian producers are subjected to the law of value they must compete, leading to specialization, commercialization, and technologies that advance labor productivity. The result of this development is cheap food and fiber that serves proletarianization and industrialization. The ‘accumulation’ problematic suggests that agricultural surplus is necessary to, and conditions, industrialization and capital accumulation (Akram-Lodhi 2017: 2). Our concern here is to what extent Midwestern petty commodity producers were a source of surplus to industrialization and accumulation.

The restructuring of agrarian political economies through the forces and relations of production represents the second foundational problematic of agrarian question—what Bernstein (1996) called ‘production’. From the agrarian colonial division of labor to British ‘high farming’ to nineteenth century United States family farms and sharecropping to the long Green Revolution, the development of the forces and relations of agrarian production have been pivotal to the restructuring of capital’s agro-food systems. Revolutions in the forces and relations of production have fundamentally transformed agrarian social formations worldwide. The production problematic, then, is above all else concerned about the ways in which the forces and relations of production restructure farm production and productivity, and attended consequences on agrarian

classes. Our concern here is to explain how Midwestern petty commodity producers were foundational to two successive agricultural revolutions.

The third problematic, what Bernstein (1996) called ‘politics’, concerned the class struggle of the peasantry. Part of this scholarship has examined the ongoing class differentiation and conflict unfolding in rural economies (Bernstein 2010). Capitalist agriculture has been a rapacious combination of dispossession by displacement and differentiation, dispossessing peasants and small-scale farmers through the arm of the state (successive rounds of enclosures) and the politically constructed inequitable agro-food markets of the world-economy. Throughout the history of the modern world-system land reform in favor of rural elites have been a recurring phenomenon resulting in the privatization of the commons, the enlargement of agricultural land for better off peasants, and pushing poor peasants into increasingly marginalized lands. Such political economic developments have generated worldwide ‘peasant wars’ (Wolf 1969). The balance of class forces and class struggle between agrarian social classes constitute “structures of domination, subordination and surplus appropriation” (Akram-Lodhi 2017: 3). Rural uprisings have been a political response to the exploitative agrarian class structure. Our concern here is to what extent agrarian class politics constituted the trajectory of Midwestern petty commodity production.

Two more recent developments in the agrarian question are worth noting in relation to the study at hand. First, following Byres (1996), we are concerned about “agrarian transitions”. That is, how non-capitalists forms of agrarian production are transformed into capitalist or semi-capitalists social formations. In turn, those older agrarian social formations no longer pose as an obstacle to capitalist development. Byres

(1996) ‘agrarian transitions’ incorporate the three problematics of the agrarian question to explain how each country historically and spatially traverse different paths to agrarian capitalism. In *Capitalism from Below and Capitalism from Below*, Byres (1996) historicizes the American and Prussian paths to agrarian capitalism. In the American path, as Byres (1996) and Post (2011) argue, independent farm producers turned petty commodity producers were at once a precondition for American industrialization and a home market for manufactured goods. Agrarian transitions, then, are fundamentally about the ways in which agrarian social formations are obstacles and opportunities to capital accumulation. Chapter three challenges the current consensus of the American agrarian transition (Headlee 1991; Byres 1996; Post 2011; Bauerly 2016).

The second important development is Bernstein’s (2006) notion of the agrarian question of capital and the agrarian question of labor. Bernstein (2006: 452) argues that as early as the 1970s the agrarian question of capital had been resolved through worldwide land reforms—that is, all of world’s peasantry had been effectively incorporated into capitalist relations of production. The end of the agrarian question of capital marked the beginning of the agrarian question of labor. Importantly, as Bernstein (2006: 455) points out, how will “classes of labour,” those that “compromise ‘the growing numbers...who now depend – directly *and indirectly* – on the sale of their labour power for their own daily reproduction’” (original is italicized). Those classes of labour now must pursue the means of subsistence through a variety of income-generating activities beyond farming, including both rural and urban labor markets. Bernstein’s innovation enable us to further analyze the interconnected processes of agrarian change,

evolving labor markets, and escalating surplus humanity in the era of so-called globalization.

Extending Bernstein's innovation, Friedmann (2006) makes a call for analyzing the dialectic of the agrarian question of capital and the agrarian question of labor as world-historical phases of capital accumulation and the state-system. The cyclical movements of the agrarian question of capital and the agrarian question of labor can tell us about the scope and scale of historical capitalism's projects and processes. British hegemony was not equal to that of American hegemony, nor was the rising world dominance of agro-food capitals in the most recent phase of historical capitalism. Rural expulsions and migrations (domestically and internationally) have been highly uneven, depending on the degree of dispossession by displacement and differentiation and industrial capital's absorption capacity. Those developments themselves are constituted through the modalities of world accumulation and world hegemony. Thus, the dialectic the agrarian question of capital and the agrarian question of labor can improve our historical analysis and theorizations of the interconnected processes of agrarian change, labor markets, and surplus humanity in both its cyclical movements and secular trends.

The Domestic Labor Debate

During the late 1960s and 1970s, following the women's movement, radical and socialist feminists began to challenge economists and orthodox Marxists, who ignored the political economy of women in capitalism. Feminist scholar-activists sought to synthesize a theory production and reproduction, or resolve "the unhappy marriage of Marxism and Feminism" (Hartmann 1979: 1), to explain the totality of capitalism. Based on Marx's undertheorized notions of the reproduction of labor-power, feminists began constructing

a theory of social reproduction. Following Brenner and Laslett, social reproduction theory is defined along two interrelated aspects. First, societal reproduction refers to the reproduction of the dominant system organizing society. The reproduction of capitalism is dependent on ever-increasing capital accumulation. Second, social reproduction refers to

“the activities and attitudes, behaviors and emotions, and relationships directly involved in maintaining life, on a daily basis and intergenerationally. It involves various kinds of social necessary work—mental, physical, and emotional—aimed at providing the historically and socially, as well as biologically, defined means of maintaining and reproducing population. Among other things, social reproduction includes how food, clothing, and shelter are made available for immediate consumption, how the maintenance and socialization of children is accomplished, how care of the elderly and infirm is provided, and how sexuality is social constructed” (Brenner and Laslett 1991: 314, cited in Bhattacharya 2017: 6-7).

Social reproductive labor has three main forms: the biological reproduction of children, care work and socialization of those children, and the daily maintenance of the labor force through cleaning, cooking, and shopping, as well as emotional labor (Briskin 1980: 137). Combined, this unpaid domestic labor formed the basis of social reproduction. Thus, the domestic labor debate was born. Utilizing Marxist categories, feminists sought to insert a materialist analysis to the experience of women and their contribution to capitalism. If the conditions of existence for capitalism is the exploitation of a class proletarians, what about the proletarian housewife? Does the housewife under capitalism produce value? Is her labor subjected to the law of value? What is her contributions to capital accumulation? The domestic labor debate, like the agrarian

question, is immense. We are only concerned about the main insights gained from the debate as it relates to the study.

To address these questions, some scholars within the domestic labor debate have conceptualized two distinct modes of production—the capitalist mode of production and the domestic mode of production (Benston 1969; Harrison 1973; Delphy 1976; Walby 1986, 1990). The capitalist mode of production is constituted through capitalist’s exploitation of laborers. The domestic (or patriarchal) mode of production is constituted through men’s exploitation of women.² The domestic mode of production is said to be ‘non-capitalist’. In this schema, capitalists are to be the ultimate winners, male proletarians shared, albeit less, in the surplus, and women and the wives of proletarians are largely the losers. Women are said to be an exploited class that are separate from their husbands and male counterparts. Male proletarians benefited from controlling the private labor of their wives. Capitalism and patriarchy infused in, and, of course, outside, the household, reproducing patterns of work and inequality. However, the theory of the domestic mode of production, as Molyneux (1979: 16) argues, is problematic based on inconsistency in the levels of abstraction, as compared to Marx’s mode of production, and that the determination of households is “subject to considerable variation”. The dual-systems theory, as described here, had been supplanted by a more dialectical approach to social reproduction and capital accumulation.

Beyond a theory of the domestic mode of production, feminists have sought to explain if, and to what extent, domestic labor affects the value of labor power. Strictly

² The use of the word “exploitation” is used polemically rather than theoretically or analytically. There is a tendency in some of the domestic labor debate to use Marxist concepts as metaphors, as opposed to historical or theoretical categories.

speaking, the value of labor power is “determined by the value of the ‘bundle of commodities’ necessary for the reproduction of labour power” (Molyneux 1979: 10). But it is certainly more than that. Seccombe (1974: 7) quoting Marx, states that “the value of labour power is determined...by the labour time necessary for the production, and consequently also the reproduction of this special article”. For Seccombe (1974), since domestic labor is not governed by the law of value, it produces no surplus-value. Yet, according to Seccombe (1974: 9), domestic work does create value through the selling of labor power. That is, when labor power is exchanged on the market for a wage, capital “realizes the value created by the housewife’s labour also” (Coulson et al. 1975: 62). Seccombe’s claim that domestic work produces value is based on the fact that purchased commodities are rarely consumable without several steps of processing. For example, food must be grown or purchased, cleaned and prepared, and served. Molyneux (1979) and Briskin (1980) argue that domestic labor does not produce value, but transfers value to reproduce labor-power. In any case, the consumption (and production) of the means of subsistence is the precondition for the reproduction of labor power (Seccombe 1974; Molyneux 1979; Briskin 1980).

One of the main theses within the domestic labor debate is that housework lowers the value of labor-power. The argumentation follows like this. Capitalists do not pay for domestic work performed in proletarian households. Unpaid domestic labor is overwhelming performed by women. This unpaid domestic labor forms a ‘subsidy’ for capitalism, a cost that does not enter capital’s balance sheet. There is consensus that domestic labor necessarily lowers the value of labor-power and that this form of unpaid work is “essential” or “crucial” to the reproduction of capitalism.

However, we cannot assume *a priori* that domestic work necessarily lowers the value of labor-power. Molyneux (1979: 10) explains that the value of labor-power is determined by the standard of living of a particular region in a particular time, differences in skills and gender, class struggle.³ Low-paid labor, such as migrant farm workers, may live in squalor conditions that may make it difficult or unrealistic to perform domestic work. Medium or high-paid labor can afford to purchase better housing that enables the improved conditions of domestic work. There is at once qualitative and quantitative dimensions to domestic work, depending on class, geography, and access to resources. The quality of the housework may improve with women's ability to access better homes and improved household technologies. Those household technologies may decrease the time spent on household domestic labor. There are class-determined thresholds in this qualitative/quantitative dynamic of domestic work that must be acknowledged. Therefore, we cannot simply assume the invariance of domestic labor determining the value of labor-power, without historicizing the standards of living, wages-levels, and material conditions, and how those determinants themselves constitute the nature of domestic work.

Within the domestic labor debate, the question of whether domestic labor is subjected to the law of value is central. The law of value compels capitalists and petty

³ The value of labor-power is also determined by the “general level and rate of accumulation, the level of profits in a given enterprise or sector of production, the relation between Departments I and II, and the general technological levels” (Molyneux 1979: 10). The amount of domestic work in part depends the prices of daily inputs. On the one hand, high market prices for daily inputs may necessitate an increase in domestic work so as to reduce purchasing commodities. On the other, low market prices for daily consumable commodities may be purchased by proletarians so as to reduce domestic work.

commodity producers to commercialize, specialize, and innovate to lower the socially necessary average labor time objectified in commodity production. In short, producers are forced to raise the productivity of labor, a process that occurs either through mechanization or the intensification of labor (Post 2011: 45). Domestic labor, however, is not compelled by the same objective forces as commodity production. Domestic labor experiences no specialization, no direct competition with other domestic producers, no equalization of labor, nor any fundamental transformation on the organization of labor. The privatization of domestic labor, then, is not *directly* subjected to the law of value. In part, this is due to the fact that domestic labor lays necessarily (or not necessarily) external to the inner dynamics of capital accumulation (Collins 1990).

Indirectly, the law of value shapes the specific form of domestic labor under capitalism. Because household work is less directly affected by the law of value it contains a higher degree of elasticity than commodity production. The elasticity of household work enables capital to draw on women as a labor reserve. Women's participation in the labor market shortens the time to perform domestic work. While there is a large debate on whether or not household technologies reduce the intensity of domestic labor or shorten the necessary time of social reproduction, it does seem on the whole that the rationalization of women's domestic work has provided a "modicum of extra time" (Coulson et al. 1975: 67). However, this extra time, which can only be determined historically on a case by case basis, has been used either to maintain or improve the economic and social existence of women and households. Finally, the dynamism of capitalism, compelled by the law of value, has historically meant the taking over of household enterprises and domestic work by capital and the state. For example,

the development of semi-processed food, nurseries, hospitals, retirement homes, etc.

While the law of value does not directly enter into the process of domestic work, it does indirectly structure the unpaid activities of members of the household, women in particular.

Beyond the central questions addressed in the domestic labor debate, we also gain insight from the dialectical unity of production and reproduction. The origins of capitalism and accumulation of capital gave rise to the contradictions between production and reproduction. As whole populations become divorced from the means of the production there is a corresponding spatial separation in the spheres of production and reproduction, a historical process that relegated women to the privatization of domestic labor (Secombe 1974). From here, as families become more dependent on wages for survival, the demands of production are imposed on reproduction. Wage labor necessarily becomes elevated above all other forms of labor because the survival of the family unit depends on it. The opposing forces of production and reproduction is expressed in women most explicitly in work and family (Bridenthal 1976). For many working women the increased separation of the spheres entailed a double burden, imposed by the conflicting demands of production and reproduction. This was beneficial to capital and men on several fronts. Capitalists could draw on women as a surplus labor pool when class struggle intensified. Over the *longue durée* of capitalism women have received lower wages than men. In part, this is an outcome of patriarchy and women's role as housewives. Women are saddled with the bulk of domestic work requiring that she work around the schedules of their husbands and children, forcing many women into part-time jobs. Thus, their wage labor is only viewed as supplementary to the male bread-winner.

Men derive real material benefits from being the “main” income earner, including “an independent source of spending money, homeownership, pension security in old age, and the customary right to be served at home while abstaining from domestic labour” (Secombe 1993: 12). When women do enter the wage labor they are relegated to low-wage employment, a product of the patriarchal subordination of women in the household and the material conditions of reproduction. The dialectical unity of production and reproduction enables us to see how the changing sexual division of labor, work patterns, and gender inequalities configure and re-configure. More broadly, social reproduction theory enables an understanding of “how categories of oppression...are coproduced in simultaneity with the production of surplus value” (Bhattacharya 2017:14).

A World-Ecological Synthesis: Accumulation, the Production of Nature, and Pursuit of Power

The previous section explicated the questions and insights animating the agrarian question and the domestic labor debate. We now turn to synthesis. While Marx’s dialectic methodology, specifically his method of abstraction, was simultaneously an ontology and epistemology⁴ for conceptualizing capital accumulation and capitalist development, it was Marx’s labor theory of value that formed his main theorizations of capitalism. Marx sought to explain where value came from under capitalism. Unlike Smith and Ricardo who thought value derived from the exchange of commodities, Marx argued that value is formed through production and can be understood as the abstract social labor time objectified in commodities. That is, the socially necessary labor time to produce a given commodity i.e. the normal conditions prevailing in an industry and its productivity. The

⁴ Paolucci (2007: 71) calls this an “onto-epistemology”.

whole competitive nature of capitalism, its technological dynamism, and its expanded reproduction turns on the socially necessary labor time.

The law of value soon begins to dominate more spheres of life, both for capitalists and workers. This is evident in the expansion of the proletarian class and generalized commodity production. The law of value finds its origins in the dispossession of rural producers from the means of production and in the frontiers of the “New World,” each operating in a mutually dependent fashion. Marx’s value relations do not explain everything about historical capitalism, but one cannot adequately explain its development without incorporating Marx’s labor theory of value. Marx’s value relations form the foundation of world-ecology.

A World-Ecological Methodology

Environmental sociology has long claimed that humans are part of nature. Rarely, though, has it demonstrated that humans are indeed part of nature. World-ecology seeks to rectify epistemological rifts correlated with our common analysis of nature and society. Synthesizing insights from world-systems analysis, environmental history, and radical feminism, the world-ecological perspective seeks to theorize and historically reconstruct the bundled relations of humans and the rest of nature. In challenging common understandings and analysis of nature and society, the world-ecology framework forces us to rethink our “methodological procedures, narrative strategies, and conceptual language *all at the same time*” (Moore 2015: 5). Easier said than done. It was not for nothing that Marx (1976) said, “There is no royal road to science, and only those who do not dread the fatiguing climb of its steep paths have a chance of gaining its luminous summits”. World-ecology challenges us to rethink our assumptions and notions

of the world around us in innovating ways. It is to this end that a world-ecological perspective may improve our explanations of the challenges facing the modern world.

I follow Moore's (2015: 3) conception of capitalism as world-ecology, that is, "joining the accumulation of capital, the pursuit of power, and the co-production of nature in a dialectical unity". A world-ecological framework seeks to reveal the forces, patterns, and trends of world-historical development, and suggests, that capitalism as world-ecology is both a process and a project to remake material natures, our ideas of nature, and to control unruly natures. It is a framework that theorizes the strategic relations that have been fundamental to historical capitalism. Marx's dialectics and value relations approach enable us to begin to think through capitalism-in-nature. This will be explored later in detail.

The methodology of world-ecology is consistent with the world-systems tradition. World-ecology research is rooted in Hopkin's (1982) methodological critique that forwarded the parts-whole relation in contrast to the methodological movement from concept to indicator. To illustrate this critique let us take climate change to examine how each methodology gets from abstract to concrete. Climate change is an abstraction or concept that is typically known through a set of indicators—CO₂, methane, rising global average temperatures, more extreme storms, etc. In world-systems analysis, climate change is understood through the way parts configure into the whole, where the whole is climate change and the parts are elements of production and power named through theoretical abstraction. The parts-whole directive "says to keep moving out by successive determinations, bringing in successive parts –themselves abstract processes—in continuous juxtaposition and in this way form the whole which you need for interpreting

and explaining the historical changes or conditions under examination” (Hopkins 1982: 147). The totality of climate change or, say capitalism, can partially be explained through the parts-whole relationship.

Following the parts-whole dialectic, world-ecological framework moves beyond ideal-type conceptions of capitalism in favor of explanations that explain cumulative and cyclical configurations of humans and the rest of nature over the *longue durée* of historical capitalism. In world-ecological perspective, “the goal is to focus our attention on the relations of the *oikeios* that form and re-form capitalism’s successive contradictory unities of the exploitation of labour-power (paid work) and the appropriation of a global zone of reproduction (unpaid work) from the family to the biosphere” (Moore 2011b: 26). Extending Marx’s labor theory of value into world-ecological framework means systematically incorporating the unpaid work of humans and the rest of nature. The production of value pivots on the paid (productive) and unpaid (reproductive) work of humans and the rest of nature. From world-ecological perspective value-relations unify production and reproduction, operating through the dialectic of exploitation and appropriation. Exploitation refers to Marx’s classic conceptualization of paid work, whereas appropriation refers to capital’s capacity to usurp the unpaid work of humans and the rest of nature in service to capital accumulation (Moore 2015). Enlarged capitalist reproduction depends on increasing the unpaid work of nature (including humans) faster than the exploitation of workers. Capitalism’s vitality depends on appropriating larger and larger swaths of unpaid work over and above what it pays out in wages. Given all this, social reproduction is at the core of world-ecological thinking.

Capitalism as world-ecology is a way of organizing nature. As a world-historical civilization, the capitalist world-system originates and develops through world accumulation, world nature, and world time. World hegemonies have been at the center of remaking those forces to serve its demands. Successive hegemonic cycles of accumulation give rise to new sources of cheap natures that serve capitalists, proletarians, and farmers in the heartland, albeit unevenly. Those forces that enabled hegemonic ascent form the limits of growth that give rise to developmental crises. As world hegemons experience developmental crises the solution is a twofold mutually interpenetrating process: advance proleterianization-housewifization and increase agricultural productivity. At a higher level of abstraction, the mutually interpenetrating relation represents the agrarian question of capital and the agrarian question of labor (Bernstein 2006). The twofold solution only works to the extent that fresh frontiers and households produce cheap natures, cheap food in particular, so as to enlarge world-ecological surplus and revive world accumulation. Capitalism as world-ecology, then, develops through crisis, revolution, and renewal, ratcheting up the capitalization of nature and restructuring world accumulation. Following this section, the broad sweeps of historical capitalism will be discussed in further detail.

This dissertation utilizes three concepts derived from world-ecology: work/energy, commodity frontiers, and world-ecological surplus. Work/energy refers to the capacity to do work, implicating both productive and reproductive activities (White 1996; Moore 2015). To perform work requires the expenditure of energy and in doing so generates energy—the life-making processes in which humans and the rest of nature

participate.⁵ It is through this work-energy nexus that humans form an important and decisive relation with the rest of nature. Capitalism as world-ecology is a definite historical relational process and project forming through the work-energy nexus of historical natures. Governed by the law of value, work/energy as value-in-motion contributes to capital accumulation and to the basic reproductive necessities of both day to day and inter-generational relations. In discussion with the value form (the commodity), Moore (2015: 102-3, original is italicized) states,

“From this perspective, *work* encompasses much more than direct participation in commodity production. Rather, work encompasses the totality of waged and unwaged activity performed by humans and the rest of nature within the reach of capitalist power...both moments are inscribed in the law of value...the value relation—*including the systemic determination of socially necessary labor-time—encompasses not only production relations, but also the broader relations of appropriation of nature’s work/energy, provided “free of charge,” or as close to free as possible.*”

All civilizations require people to expend energy to work to produce food, clothing, shelter, and fuels. Under capitalism, work/energy takes a particular form, operating through the soils, waterways, humans, and climates in order to advance labor productivity. The work/energy concept enables us to move beyond Cartesian thinking by unifying the dialectic of productive and reproductive activities of humanity-in-nature. The key question is how does capitalism exploit and appropriate the work/energy of historical natures?

⁵ Farming is a clear example of the work/energy of natures. In raising crops farmers must work with the soil fertility, hydrology, and crop needs all within a human-led productive system. The totality of the farm, and its reproduction, is formed through the work/energy of human and non-human natures.

The concept of commodity frontiers is also valuable to the study at hand. Commodity frontiers examine the work/energy relations in commodity production and how those enter into the circuits of capital. “Commodity frontiers are regions where minimal capital investment can consolidate and accumulate great quantities of land, labor and resources” (Marley 2015: 4). They connect cores and peripheries and fundamentally transform regional and global ecologies through production, trade, colonialism, and accumulation. The impoverishment and wealth accumulated from these frontiers enabled a great divergence between regions and countries around the world, reproducing inequality and uneven development. “The concept of the commodity frontier sheds light on the ways in which place-specific commodity production shapes and is shaped by the socio-spatial expansion of the law of value” (Moore 2000: 411). Commodity frontiers are not simply out there, nor do they exist in a vacuum. Rather, they are made and remade through flows of capital and world powers, connecting for example family wheat farmers into a global wheat market. In the late nineteenth century the socio-ecology of regional wheat baskets, from Argentina to the United States to Russia, became connected through wheat as a commodity, as well as relations of power and politics. Crucially, commodities frontiers lower the system-wide costs of reproducing labor-power, setting off a wave of economic expansion. The origins and development of historical capitalism were made on the frontier.

The final concept introduced here is world-ecological surplus, which refers to the “ratio of the system-wide mass of capital to the system-wide appropriate of unpaid

work/energy” (Moore 2015: 95).⁶ World-ecological surplus, or simply ecological surplus is a heuristic concept that is analogous to Marx’s organic composition of capital, that incorporates the unpaid work/energy into an analysis of different phases of capitalist expansion and contraction. It helps to explain the quantitative/qualitative dimensions of a given phenomenon, process, or development. Post-WW II witnessed a *high* ecological surplus in which cheap food and energy greatly reduced the costs of the proletarian class in the industrial world, which enabled workers to consume basic and luxurious commodities that fueled the economy. Over the course of an accumulation cycle, the unpaid work of extra-human natures tends to fall, resulting in a falling rate of profit in the world economy. *Low* ecological surplus refers to moments when the prices of basic commodities—food, clothing, shelter, and fuel—begin to rise, a process that may lead to crises. Low ecological surplus means that capital is expending more work/energy on capitalized nature than appropriating unpaid work/energy. Over the last half century more energy is required to produce a single calorie of energy: in 1930s 2.5:1, 1970s 10:1, and today around 20:1 (Steinhart and Steinhart 1974; Pimentel et al. 1973; Acker et al. 2013). World-ecological surplus, like Marx’s organic composition of capital, is not exact measurement. Rather, it a concept to analyze the changing configuration of the work/energy of humans and the rest of nature, and how those relations contribute to productivity and accumulation.

It should be clear that the concepts are interrelated. Work/energy is the basis of the reproduction of civilizations. Work/energy takes particular historical forms under

⁶ For nearly two decades ecological economists have begun to calculate the world ecosystem services. In 2011, world ecosystem services came to \$125 trillion (Costanza et al. 2014: 152).

capitalist value relations so as to advance labor productivity and accelerate capital accumulation. Central to capitalism as world-ecology are the emergence and development of commodity frontiers, which are made possible by work/energy regimes and flows of capital and power. These commodity frontiers lower the system-wide cost of reproducing labor-power, which is indicated by the ratio of the mass of capital to the mass of unpaid/work energy i.e. world-ecological surplus. These concepts allow analysis of one or multiple processes at the local, regional, and world scale. They also allow one to see how processes change over time and space.

Finally, for the purpose of this study, I must explain what are agricultural revolutions and what do they do. Agricultural revolutions are fundamental transformations in the productive relations of farming and food provisioning. It entails transformations in the forces of production, including, but not limited to, the introduction of new food crops, new crop rotations, improvements in livestock breeding, and the introduction of machinery (Overton 1996). Included within this definition, are the relations of production, such as private property rights in land, changes in the size of farms, and changes in which people are employed by others on the land (Overton 1996). Agricultural revolutions, then, are fundamental breaks in the conditions of production and reproduction—new ways of organizing farming and agrarian households.

If agricultural revolutions are fundamental breaks in the organization of farming and agriculture, what do these revolutions do? Above all else, agricultural revolutions are productivity revolutions that deliver a “quantum leap in the food surplus” (Moore 2015: 243). For example, prior to the English agricultural revolution the typical family produced an average surplus of 25 percent. During the English agricultural revolution,

agrarian families were produced an average surplus of 50 percent (Bairoch 1973: 453). Agricultural revolutions, then, are productivity revolutions that deliver cheap food so as to lower the “system-wide cost of reproducing labor-power” (Moore 2015: 243). The value of labor-power is strongly conditioned by the price of food such that cheap food increases the rate of exploitation, even in the absence of transformation in the technical composition of capital (Moore 2015). Agricultural revolutions, then, play no small role in the origins and development of a world proletariat.

Agricultural revolutions not only deliver cheap food, they also entail the displacement of “uncompetitive” agrarian producers. Those producers turn into rural and urban wage laborers that ensure a cheap supply of labor for industrial capitalists. Successive agricultural revolutions form the foundation of successive industrial revolutions (Bairoch 1973; Moore 2015).⁷ However, this is no one-street. Industrial manufacturing supplies agrarian producers with the tools and equipment that further advance labor productivity. Agricultural development, with its surplus and demand, fueled industrialization:

“Agriculture not only set free the food resources and workers needed for that big adventure that was the industrial revolution; it not only made possible or even fostered the demographic revolution and generated the birth of the modern textile and iron industries; but it also provided in the early stages a large part of the capital and entrepreneurs that animated the motive sections of that revolution” (Bairoch 1973: 498).

⁷ For Bairoch (1973), agricultural revolutions developed roughly fifty years prior to industrial revolutions.

The historical agricultural and industrial revolutions formed a unity expressed in agro-industrialization or agro-industrial complex – “the progressive integration of agricultural and industry via enhanced market imperatives” (Bauerly 2016: 3-4; Headlee 1991; Page and Walker 1991; Post 2011).

Finally, agricultural revolutions have been crucial to the rise of world hegemonies. The Dutch, English, and American hegemonies constructed their own unique agricultural revolution that became the world model of cheap food. The uniqueness of each agricultural revolution is a product and producer of world accumulation. The limits and demands of world accumulation structure and enable new forms of production, transportation, and exchange of world agriculture. The historical limits of world accumulation and the demands of ascending hegemonies condition, indeed necessitate, socio-ecological transformations far and wide. The material demands of nineteenth century British hegemony propelled a global railroad revolution, incorporating fresh frontiers to deliver cheap food faster. Hegemonic ascent has unfolded through delivering cheap food to its industrial proletarians first, and then, delivering cheap food to other world centers of industrialization. Hegemonic-led agricultural revolutions have been a central pivot for restructuring and expanding the world division of labor. Agricultural revolutions are world-ecological revolutions, fundamentally accelerating world accumulation, world time, and world nature.

Moore (2010, 2015) argues that each phase of capitalist expansion is constituted through successive agricultural revolutions that in turn produces a historically unique cheap food model. In the United States the Midwestern family farm has been the crucial social form for successive agricultural revolutions. Moore suggests that since the

nineteenth century there have been three agricultural revolutions in the United States. While Moore provides a broad-historical interpretation of the agricultural revolutions, less explicit are the interconnections of gender, class, and ecology of petty commodity production in the Corn Belt Midwest. Corn Belt petty commodity production formed a unique position in the origins and development of successive agricultural revolutions in the United States.

In sum, the world-ecological framework is a synthesis of world-systems analysis, environmental history, and radical feminism. The framework enables us to discern how the patterns of world accumulation and power are constitutive of and constituted by agrarian households and environmental transformations. Taken together, these constituent parts, as interpenetrating and mutually conditioning one another, form the proceeding historical analysis so as to reconstruct Corn Belt petty commodity production in the totality of capitalism. A world-ecological reconstruction of the American agrarian question can improve our world-historical explanations of American capitalism in the world-system.

Historical Capitalism

We start with the “organic and historical movements” (Ollman 2003: 17) of capitalism. Capitalism, like previous modes production, is a historical social system with an origin and “a history of “conjunctures” and economic crises” (Braudel 1977: 5). Capitalism is a way of organizing social property relations, patterns of work, labor and commodity markets, and nature. As a world-historical mode of production capitalism’s law of value has structured the world market, while penetrating the everyday existence of households. The logic of capitalism is the endless accumulation of capital, and its history

is the “commodification of everything” (Wallerstein 2011: 16). I discern three major interconnected themes or patterns of capital accumulation and capitalism: the concentration of capital accumulation, the pace of proletarianization and housewifization, and frontier civilization.⁸

Proletarianization and Housewifization

Capitalism’s tendency towards the commodification of everything has resulted in an increase in proletarianization in the world-system. By proletarianization, I mean when individuals no longer own the means of production and depend on selling their labor-power for wages. Tilly (1984) argues that the most significant change in the modern world is proletarianization. Primitive accumulation beginning in the long sixteenth century expropriated poor peasants from the means of production, effectively turning them into rural and urban wage workers. A long-standing debate discusses whether primitive accumulation is simply the historical origins of capitalism or that it has been an ongoing process throughout modern world-system. In any case, the development of historical capitalism has witnessed a growing world population who lack ownership of the means of production. Capitalist social-property relations are foundational for the ‘rules of reproduction’, class conflict, and economic development (Post 2011). The balance of class forces and the strength of the state are crucial forces of excluding classes and groups from land, reinforcing the law of private property. For capitalists, the conditions of existence depends on a class of wage labor to exploit, but much more than this as we will see. For workers the conditions of existence depends directly on the wage

⁸ These three themes and patterns are largely derived from Wallerstein (2011), Dunaway (2001, 2012), and Moore (2015).

relationship, but, again, much more than this. Capital and labor form a contradictory mutual dependence. No other process has influenced the quality of life on individuals than proletarianization (Tilly 1979).

The uneven development of proletarianization has been an ongoing process emerging from the origins of capitalism. In this unevenness two relationships can be discerned: 1) the pace of proletarianization and 2) the degree of proletarianization. First, the pace of proletarianization has had fits and starts, depending on the cyclical patterns of economic expansion and contraction, balance of class forces, and the strength of the state in the hierarchy of the capitalist world-system. The pace of proletarianization depends on also upon the regional patterns of production and reproduction, along with timing of incorporation of that region. Wallerstein (2011) and others have argued that the pace of proletarianization over the *longue durée* of capitalism has been slow, evidenced in that just half of the world's population is considered proletarian.

What historical developments can we discern that may hasten the pace of proletarianization? For this study, the development most relevant is agrarian capitalism. Again, primitive accumulation, a rural-based process, dispossesses peasants, independent household producers, etc. from the land, creating a reserve army of labor for capitalist industries. Remaining rural producers were compelled by the law of value to 'sell to survive'. Competitive producers were successful to the extent that they could advance agricultural productivity, a process usually linked to greater market-dependency. The historical road of proletarianization has been paved with cheap food, unleashed by successive world-historical agricultural revolutions. Moore (2010, 2015) argues that world hegemony over the *longue durée* of capitalism have generated agricultural

revolutions, accelerating the pace of proletarianization worldwide. While we cannot deny the importance of the state in the process of proletarianization, for our present study we are most concerned about the role of agrarian capitalism in the making of proletarianization.

The degree of proletarianization is also central for the purpose of our study. Today, only a small fraction of the world's population is fully proletarianized. As might be expected this population resides primarily in the core. However, many households even in the core would not be considered fully proletarianized. Much of the world's population is semi-proletarianized, and has been the statistical norm in the modern world-system. That is, they derive more than half of their resources and income from non-waged labor (Wallerstein 2011: 26). The semi-proletarian household has been the mainstay in the *longue durée* of the capitalist world-system (Dunaway 2012). The persistence and durability of the semi-proletarian household will be explained shortly.

How do we explain the degree of proletarianization in the modern world? Part of the explanation is found in what Wallerstein (2011: 26-7) calls the "minimum-acceptable-wage threshold" which can be understood as the minimal levels of wages required to "cover the minimal costs of survival and reproduction". Fully proletarianized workforces tend to increase the level of wages, cutting into the profits of capitalists. There is a temporality (and spatiality) to the pattern of proletarianization and increased level of wages. The longer and more established workforces exist the more they are organized politically to demand a greater share of the surplus. Newly established workforces are not well organized and are unable to demand higher wages, more benefits, etc. On the whole, fully proletarianized households and workforces tend to have a higher

minimum-acceptable-wage threshold than semi-proletarian households and workforces. The reason for this difference beyond the political organization and representation of associations and unions, are that semi-proletarian households engage in multiple non-waged labor activities that make them less dependent on waged labor. Capitalists can realize higher rates of profits with a semi-proletarianized workforce that has a lower minimum-acceptable-wage threshold. Semi-proletarianized households are more likely to emerge in rural regions undergoing significant transformation. Thus, rather than categorizing the expropriated as proletarians, it makes more historical and analytical sense to view the workforce in terms of degree, not kind. The advantage of differentiating between semi-proletarian and proletarian are threefold: first, we can explain the changing household composition of waged and non-waged labor, second, the distinction explains household decision-making regarding time spent on waged and non-waged labor, and third, it is one indicator “of the ways in which capital accumulation is proceeding in different parts of the world economy” that effects patterns of migration and labor and commodity markets (Collins 1990: 7-8; Wallerstein et al. 1979; Wood 1981). A somewhat similar pattern has developed in agrarian capitalism that will be detailed below.

If the history of capitalist development has been a long, uneven process towards proletarianization it has also been a long, uneven process of housewifization. Housewifization is defined as the “process of through which capitalists obscure the economic value of nonwaged and nonmonetary contributions of capital accumulation” (von Werlhof 1983: 356, cited in Dunaway 2012: 101). As one part of the double dialectic, proletarianization and housewifization form an organic whole within the

household. Proletarianization is only possible to the degree that housewifization can counter capital's cost of production. That is, to the extent the unpaid work (domestic or otherwise) reproduces the daily needs of the worker and intergenerational needs of the household. In *Patriarchy & Accumulation on a World Scale* Marie Mies (1986: 38) argues that "capitalism cannot function without patriarchy" and capital accumulation turns on the ability to maintain "patriarchal man-woman relations" and to recreate those forms through time and space. The reproduction of capitalist relations of production has been made possible through a dialectical contradiction between proletarianization or semi-proletarianization and housewifization (Dunaway 2012). Capital accumulation works at once to dispossess people from the means of production, thus requiring a growing population of wage workers, while externalizing the costs of reproduction onto households, predominately women. While proletarianization has swept across the world-system, housewifization, too, has perhaps been equally as powerful in shaping the everyday existence of people and their households.

The process of housewifization has been a powerful force in shaping familial relations and households and contribution to capital accumulation. Housewifization works for capital accumulation to the extent that women's domestic and non-waged labor is rendered invisible on the balance sheet. Women's contribution to the resource-pooling household has always been essential for daily and intergenerational reproduction (Smith et al. 1984; Mies 1986; Dunaway 2012). Capital has extracted surplus from the household, while externalizing the costs of production onto the household. When women work in the formal labor market housewifization justifies low wages and precariousness.

Low wages paid to women justify the ‘male breadwinner’ and the ‘family wage’ that have reinforced the patriarchal dominance of husbands over their wives and families.

Proletarianization and housewifization are close proxies for production and reproduction/non-productive work. Under capitalist relations of production productive labor or waged labor were most associated with men’s role. Men’s productive labor was performed “outside the household in the work place” (Wallerstein 2011: 24), where capitalists extracted surplus-value. Social reproduction and non-waged (subsistence) labor were most associated with women’s role. It was believed that these forms of work produced no surplus-value that could be appropriated by capitalists. And so did begin the process of valuing men’s work and de-valuing women’s work, a relationship expressed in the male ‘breadwinner’ and his ‘housewife’ (Wallerstein 2011). The de-valued work of women in and outside the household countered the rising costs of production for capitalists, namely adult males’ wages. Male breadwinner and female housewife was geographically constituted through the separate spheres of the work place and household, corresponding to production and social reproduction respectively.

To be sure, women have historically performed productive labor in factories, mines, and fields. Women and children constituted a large portion of the labor force in the industrial factories during the Industrial Revolution (Secombe 1993). As this study points out, farm women performed all the major farming tasks of their male counterparts on top of domestic chores and non-waged labor. Without a doubt agrarian women were farmers. However, according to national statistics and gender roles and expectations women were merely “helping out” i.e. women were “invisible farmers” (Sachs 1983). In agrarian households the separate spheres of production and social reproduction labor was

not so distinct, especially in poor and middling farm families. The de-valued work of farm women had real material consequences expressed in women's conditions of work on and off the farm. This will be explored in detail throughout the course of the study.

For the purpose of this study we are most concerned about dialectical unity of production and reproduction within the agrarian household as a changing dynamic of proletarianization and housewifization. As we have already briefly noted, agricultural revolutions have been a historical mechanism in the process of proletarianization in the world-economy. As I will argue throughout the course of this study, proletarianization and housewifization not only became generalized throughout the economy, but within the agrarian household itself. In this way, we can observe the results of the double dialectic.

Concentration of Capital

Today, when we speak of the concentration of capital we are generally referring to the period of late capitalism, sometimes referred to as monopoly capitalism. Some of the largest monopolies are in the agro-food sector (e.g. Monsanto, Cargill, Smithfield). Far from being unique to late capitalism, monopoly power has characterized the *longue durée* of historical capitalism. From the "chartered companies of the sixteenth to eighteenth centuries, the greater merchant houses of the nineteenth, the transnational corporations of the twentieth," (Wallerstein 2011: 29) capitalists primarily from the core have gained monopoly power over particular commodity chains. Such practices engendered unequal exchange between empires and colonies, resulting in the polarization of wealth in the core and periphery. The increasing concentration of capital refers to fewer capitalists owning the means of production and thereby a greater "command over labor" (Marx 1990: 777). Therefore, the increasing concentration of capital accumulation is the

limiting of competition, resulting in an increase control over the market. Super-profits are realized when fewer capitalists or companies control a greater share of the market. While there is an underlining tendency of competition among individual capitalists, there is also another tendency of the class interests of capitalists. There are fundamental class contradictions that constitute the totality of capitalism. One fundamental contradiction that speaks to our second theme of the concentration of capital accumulation is the interests of individual capitalists and the collective interest of the capitalist class.

The concentration of capital accumulation in a manifold process objectified in individual capitalists and capitalists as a class. The ‘dull compulsion of economic forces’ requires that individual capitalist or companies compete over the extraction of surplus-value and greater control of the market. Increased competition among capitalists tends to cheapen the commodities, requiring an increase in the rate of exploitation. To beat the competition the individual capitalist incorporates innovative technologies in the production process so as to advance productivity, or may exert more control over their workforce. If the competition fails to emulate the successful capitalist they are likely to be driven out of the market. Revolutions in the forces of production and control over technological rent has often meant the elimination of competitors and the increased concentration of capital. For individual capitalists, the objective is to accelerate the rate of capital accumulation faster than his/her competitors. In doing so, they may eliminate their competitors and gain a greater share of the market, increasing the likelihood of higher profits. While the extraction of surplus-value is the primary objective for capitalists, the increased concentration of the market can increase the concentration of power that operates and acts as a dynamic feedback loop.

The tendency of capitalist competition is in contradiction with the countertendency for the reproduction of the capitalist class. While the interest of individual capitalists is to increase the rate of exploitation, and thereby, extract more surplus-value, the interest of the capitalist class is to reduce the costs of production, namely labor and inputs. Wallerstein (2011: 17) states that reductions in the costs of production “frequently favoured particular capitalists against others, and some therefore preferred to increased their share of a smaller global margin rather than accept a smaller share of a larger global margin”. Wallerstein continues, contending a second contradiction arises between individual and class interests, namely that the commodification of everything increases capitalists dependence on creating more consumers to purchase commodities. Capitalist competition, however,

Frontier Civilization

Our third theme and pattern emerging from capital accumulation is frontier civilization. The internal contradictions of capital accumulation and its growth imperative necessitate the geographical movement of capital. Moore (2015) has gone the furthest in conceptualizing capitalism as frontier civilization, suggesting that capitalism does not have a frontier, but is a frontier. Commodity frontiers are regions where low-levels of capitalization exist, including proletarianization and the concentration of capital. These frontiers renew capital accumulation through a wave of Cheap Nature, including food, energy, labor, and raw materials. However, capitalism expansionary nature requires an ever-expanding flow of cheap inputs to increase the rate of accumulation. Commodity frontier’s remake regional political economies and political ecologies while contributing to world accumulation and world nature. Moore’s world-ecological analysis historicizes

the origins, development, and crises of historical capitalism through its relationship to commodity frontiers.

Great waves of capital accumulation are made possible through great incorporations of frontiers. In the long sixteenth century Spain's "discovery" of Potosí in the long sixteenth century was foundational to the origins of modern capitalist world-system. The wealth flowing from the largest mine in the world incorporated a steady-supply of low-cost labor sanctioned by the state's mita system. Land and labor were reorganized around the needs of mining silver and producing wealth for the Spanish empire. Empire and colony were formed through the production of nature, the pursuit of power, and the accumulation of capital. Importantly, though, as Moore (2010) argues, that empire building was not simply built on pillage and plunder in the New World, but exhaustion and crisis in the Old World. Silver mines in Central Europe were in rapid decline that when combined with successive fiscal crises compelled colonial projects far and wide. "The commodity frontier therefore represented an epoch-making strategy of appropriation that was, at once, crisis-creating and crisis-fixing" (Moore 2010: 61).

Capitalism's frontier civilization is both historical and analytical. Historically, great waves of accumulation have proceeded through profitable frontiers. Most pertinent to our study is the western agricultural frontier of the United States, that was made possible through the violent displacement of Native American tribes and the reorganization of land and labor. Analytically, commodity frontiers enable us to explain moments of the concentration of capital, waves of proletarianization, and socio-ecological contradictions between and within regional production complexes.

It should be clear that the three themes and patterns of proletarianization/housewifization, concentration of capital, and frontier civilization are interpenetrating and interconnected through capital accumulation. They are “mutually supporting and mutually undermining” processes, with the “undermining activities that invariably prevail” (Ollman 2008: 18). How did these processual patterns emerge, develop, and transform in the case of the American agrarian question? What are the prospects for family farming today?

Historical Sociological Method

Unlike historians, “historical sociologists,” Sewell (2005: 15) states, “have traditionally been willing to address the biggest questions: the rise of capitalism, the nation-state, or modernity; the dynamics of revolutions; the governance of empires; the rise and fall of civilizations”. The goals of the historical sociologists are to address the questions by discerning the variety of forces, trends, and patterns constituting social change. Like most historical sociologists studying long-term, large-scale social change, I draw a several kinds of data sources. The research performed for this study occurred over several years. In the main, I utilized a combination of primary and secondary research. Primary research consisted of archival material the Illinois State Historical Society, Illinois Digital Newspaper Collections, State Historical Society of Iowa-The Annals of Iowa, the USDA collections, including the National Agricultural Library, National Agricultural Statistics Service, and *Apron Strings and Kitchen Sinks: The USDA Bureau of Home Economics*, University of Richmond’s Digital Scholarship Lab, and United States and state censuses. These archives were an invaluable source for digging deeper into the depths of historical change.

In terms of secondary sources, I drew a combination of regional specialists and world-historians. As stated above, there are a great many scholars that have studied Midwest agriculture, and from a variety of perspectives. Such specialists are able to detail the economic, social, and ecological changes specific to the Midwest like no other. The inherent limitations of strictly regional studies are just that, an undue focus on the region. World-historians have provided sufficient accounts of historical capitalism that necessitates that we reexamine regional studies in a new light. In the main, secondary sources are viewed as inferior to primary sources. However, as Skocpol (1984: 382) explains, “if a topic is too big for purely primary research—and if excellent studies by specialists are already available in some profusion—secondary sources are appropriate as the basic source of evidence for a given study”. The historical sociologists, then, must have “an enormous appetite for reading” and a “notable capacity for synthesis” (Hobsbawm 1975: 177 and 178, cited in Byres 1996: 15).

Chapter Overview

The next chapter historicizes the transition from feudalism to capitalism through British hegemony. The origins of the capitalist world-ecology, and the debates therein, can shed light on the origins of petty commodity production in the American Corn Belt. In particular, I examine agrarian change, regional and global transformations, and crisis and renewal. Chapter three focuses on the transition to petty commodity production in Illinois and Iowa. The objective is to explain the unique position of Illinois and Iowa agrarian households in the capitalist world-ecology. I argue that while Illinois and Iowa agrarian producers engaged in commercial wheat production on an extended scale, signaling the transition to petty commodity production, they quickly shifted away from

commercialized wheat to specialized corn-hog farming that resulted in dynamic stability, increased flexibility, and advancement in prosperity. The transition to petty commodity production, however, did not simply unfold through the differentiated demands and opportunities of commodity crops. The transition also unfolded through the paid and unpaid work of women. I further argue that Illinois and Iowa were the epicenter of the first agricultural revolution, 1840s-1900. In historicizing the origins of petty commodity production in Illinois and Iowa, I challenge and extend the current consensus of the American agrarian question.

Chapter four examines the transition period between the first and second agricultural revolutions, 1900-1930s. The focus is on the process of agrarian housewifization as a co-production of farm prosperity and farm women's demand for improved working conditions. A little known historical development called the "farm woman problem" is analyzed to explain the relationship between the structural forces of capital, the state, and science and farm women's agency. While the process of agrarian housewifization began in the transition to petty commodity production throughout the nineteenth century, it was only during the first half of the twentieth century that it became a systematic project to remake the household in the web of life. It was no coincidence that relatively wealthier farms in Illinois and Iowa received the most benefits from home economists, farm groups, and capital. I explain why wealthier farm households were the target of housewifization and the attendant results.

Chapter five examines the second American agricultural revolution, 1933-1970s. Like the first, Illinois and Iowa were once again the epicenter of the second agricultural revolution. The twentieth century productivity revolution was a complex of hybrid corn,

tractors, and a new miracle crop—soybean. The new complex appropriated a greater share of unpaid work of nature than had been accomplished in the nineteenth century. However, the productivity revolution was not simply a product of technological innovations, but was also a product of the demands of agrarian housewifization and American hegemony. At the turn of the twentieth century petty commodity production had been generalized. By the end of the second agricultural revolution, occurring no later than the 1970s, culminated in the 1980s-farm crisis.

In the final empirical chapter, I explore the renewal Corn Belt farming in the development of agrofuels. As the heart of the Corn Belt, Illinois and Iowa farm families were well positioned for the revolution in agrofuels. To what extent did the agrofuels boom of the 1980s to the present lead to the survival or demise of the family farm? What role did women play in this development? These questions are addressed in this chapter.

Chapter 2: The Longue Durée of Agricultural Revolutions, Proletarianization, and World Accumulation

Introduction

The rise of British hegemony unfolded through several world-systemic forces, beginning in early modernity. Competitive empires, namely Britain, France, and Holland, but also Spain and Portugal, vied for control over the emerging capitalist world-economy. The competitive struggle for hegemony unfolded through strategies of appropriating and exploiting cheap natures near and far. Each ascending nation-state faced socio-ecological limits and challenges to capital accumulation and political power, requiring the reorganization of an international division of labor, restructuring domestic production in both agriculture and industry, reinforcing colonial-based unequal exchange, and finally, restructuring the gendered household division of labor.

The following chapter is organized around the transition from feudalism to capitalism in the nineteenth century. I examine the socio-ecological limits to capital accumulation in early modern era, who were the key competitors of world hegemony, the changing production relations in the core and periphery, but also in agriculture and industry, and contradictory class and gender dynamics. The objectives of the chapter are the following: demonstrate world-systemic processes constituting the capitalist world-ecology of early modernity, the role of agrarian change in that development, and how Britain, facing a developmental crisis, renewed accumulation through housewifization-proletarianization at home and cheap food from the United States. In so doing, I

demonstrate the interdependent nature of the capitalist world-ecology between hegemons and ascending powers. Contrary to agrarian question scholars, this methodological procedure seeks to reconstruct agrarian change through the totality of capitalism, and the totality of the capitalism through agrarian change.

The Transition from Feudalism to Capitalism

The capitalist world-ecology of early modernity emerged and developed through dialectical unity of the production of nature, pursuit of power, and world accumulation centered on the epoch-making innovations of shipbuilding and trade in the early modern era. Each hegemonic cycle of accumulation has emerged through the forests of the modern world. Pivoting on world-systemic processes of power and exchange, competition between ascending hegemons pressed colonial projects to appropriate forests near and far. Timber was one of the most voluminous traded commodity in the early modern era (Bunker and Ciccantell 2005). Industry, the state, and household all depended on access to cheap timber for their reproduction. Nearly all commodity production in the modern world, and certainly prior to, depended on access to timber, but especially cheap timber. From processing sugar in Madeira to building ships in Europe to making glass, furniture, iron, and more, all derived from forests. Forests resources were “essential to imperial and industrial expansion” (Mosley 2010: 33). However, as deforestation advanced, and with it the increased cost of production and transportation, new sources were appropriated from colonial hinterlands, from Asia to the Americas.

By the fourteenth century Britain’s forests had regenerated from the exhaustive projects of Roman smelting works. By the sixteenth century with Dutch ascendancy, southern England was exporting six hundred shiploads to Holland each year, especially

oak (Chew 2001: 122). A ‘timber famine’ intensified with the enclosure movements (16th-18th century) that turned feudal peasants into market dependent yeoman farmers and tenants who relied on marketing short-term annually crops like corn and wheat over the long-term nature of planting and harvesting timber.⁹ Britain’s dependence on military force and mercantile capitalism only advanced the timber famine as high import (transportation) costs cut into profits. Competing demands over the forest resources existed between the ironmasters who sought to supply armaments for naval ships and farmers who needed timber for fuel and building materials (Bunker and Ciccantell 2005: 127). The demands of naval vessels won out because Britain’s military strategies would become the solution to securing cheap natures globally.

The ability of Dutch to develop a superior shipbuilding industry was a product and producer of its socio-ecological obstacles. World-renowned for its knowledge of hydrological projects, the Dutch constructed a network of canals connecting hinterlands with its agriculture, industry, and transportation (Mumford 2010: 122). While the Dutch began exporting timber to Portugal and Spain early on, by the sixteenth century they had developed a dynamic shipbuilding industry that created forward and backward linkages throughout the economy, becoming what Bunker and Ciccantell (2005) call a “generative sector”. Dutch shipbuilding was superior to that of Britain and other major powers in that access to cheap natures of initially Germany and Poland, and then later, the Baltic combined with skilled labor that overcame obstacles to shipping large volumes of commodities. Supported by state infrastructure projects that eased the burden of moving

⁹ Farmers did not harvest wood for market exchange. Rather, they use the resources of forests for fencing, buildings, tools, etc.

bulky inputs, Dutch shipbuilders, more than its competitors, knowledge of turning a variety of different kinds of timber into different parts of the ship that could overcome the obstacles of weight-volume ratio in transporting bulky low-valued commodities was revolutionary. Competing with the Portuguese in Asia, colonial expansion exemplified in the Dutch East India Company (VOC) appropriated teakwood in Java, along with bullion, cotton, and coffee (Chew 2001). The VOC also expanded intra-Asian trade when “between 1633 and 1663” over “160 tons per annum” of brazilwood was “shipped to Japan” (Chew 2001: 125). Over that same period the VOC shipped over 400 tons from Siam (modern day Thailand) to Europe. The whole production of cheap natures was underwritten by access to silver and gold in the Americas, but also southeast Asia (Chew 2001). The ability of the Dutch to procure cheap natures in the form of wood, grains, and textiles allowed states and firms to offer cheap shipping globally, thereby undercutting their competition.¹⁰ Unlike the Portuguese or the Spanish who shipped primarily luxury items, the Dutch shipbuilding industry revolutionized shipping via standardization that would permit profitable exchange of low-value bulk goods (Bunker and Ciccantell 2005). Cheap timber was the foundation of cheap trade, industrial expansion, and Dutch hegemony (1625-1675) (Wallerstein 1982: 96).

“The Dutch opening of bulk trade with the Baltic societies constituted the first instance of long-distance trade in industrial inputs and in cheap foodstuffs; it was a major and revolutionary step toward capitalist industry as opposed to mercantile trade...In this sense, Dutch technological and organizational innovations to enable cheap bulk transport constituted the pioneer instance of the factory system that was to revolutionize European industry, agglomerating laborers around machines to produce more goods with fewer workers in ways that produced additional capital that could

¹⁰ The Dutch could build ships for less than a third to half of the cost of British shipbuilding (Bunker and Ciccantell 2005: 111).

then be invested in other, similarly labor-saving and production-cheapening industries” (Bunker and Ciccantell 2005: 107-108).

For Britain to compete with Dutch hegemony required access to new forms of cheap nature, as its dwindling sources of timber served Dutch accumulation early on. State conservation strategies were ineffective due to competing demands of farmers, industrialists, and the military. Britain’s strategy for competing against the Dutch was not industrial or commercial but military supremacy. To access cheap timber and other raw materials, British capitalists constructed trading houses in Germany, Scandinavia, and Russia that increased trade throughout the seventeenth century. The voracious demands of Britain’s economy, as its military force strengthened and metallurgy was revolutionized, the cost of importing timber for Britain increased. Inter-state competition and profit-driven capitalists forced Britain into a seemingly intractable timber famine. The cost of importing wood continued to rise even with the increased trade. Britain’s reliance on military force for securing raw materials led to an increase in the use of raw materials, which, in turn, facilitated the expansion of the further penetration of its colonies globally.

The solution to Britain’s timber famine rested in its colonies. In North America, New England’s vast forests supplied high quality timber and a booming shipbuilding industry in the United States supplied a sixth of the total British fleet prior to the American Revolution (Bunker and Ciccantell 2005: 132). Throughout the eighteenth and nineteenth centuries New England was one of several of Britain’s timber frontier. In the late eighteenth century France blocked Britain’s timber trade in the United States, impelling Britain to expand trade with Baltic, increasing to two-thirds of all Baltic trade (Peet 1972: 3), and intensifying timber extraction and the creation plantations of tea,

coffee, cotton, and sugar in India (Mosley 2010). The production of nature unfolded through the knowledge and power objectified in British botanists, who ‘bio-prospected’ hundreds of varieties of trees and other plants that would suit Britain’s commercial and military demands (Brockway 1979). Britain’s botanical knowledge, then, was essential for appropriating the unpaid work of India’s cheap timber while warring with France in the United States and the Caribbean. The search for cheap natures was constituted through European conflict between Britain, Holland, and France that came to a head after a century and a half of war. Britain’s establishment of economic ascendancy and dominance was conditional on securing cheap natures from its colonies around the world.

The production of nature of early modernity, however, was not limited to earth-moving activities, but also emerged with and through idea-making that reconstituted privilege, power, and domination. The production of Dutch and English botanical knowledge centered around appropriating and transferring the genetic resources like plant germplasm from its colonies for its own uses (Brockway 1979). Intense competition between the Dutch, English, and French over colonial genetic resources entailed protectionism at home and eco-cide abroad (Kloppenborg 2004). Environment-making in the colonies principally centered on dualist notions of subjects and objects. Western ontology became a powerful force of science and empire-building that reconstituted privilege, power, and domination. In the emerging western ontology hierarchal dualism prevailed, privileging society over nature, man over woman, and civilized over uncivilized (Plumwood 1993). White men of privilege and power, including some working-classes in the core, were part of civilized society, where most women, nature, and colonies were part of an uncivilized and unproductive nature. Such hierarchal

dualisms expressed in the discourse of colonial projects were a justification for plundering the unproductive natures of colonial subjects. Human exceptionalism and the domination of nature went hand in glove with the colonization of the Americas. The totality of the production of nature in the colonial projects of early modernity was no less earth-moving activities as it was also idea-making and power-creating activities (Moore 2015).

The production of nature in the colonies of the ascending economies of the emerging capitalist world-ecology centered around appropriating cheap natures as they actively constructed “nature” as external, fungible, and “subordinat[ed] it to new ‘measures of reality’” (Moore 2017: page). From the Columbian Exchange to the Dutch and British trading companies, competition for cheap natures pivoted the unequal exchange of commodities and diseases, the transformation of indigenous agricultures into monocultures, and the exploitation of indigenous populations as silver miners. The “biotic transmission” (Williams 2016: 100) of Eurasian diseases like small pox and insects transported via European ships wreaked havoc on indigenous peoples of the New World. Demographic collapse in the New World was indeed worse than Europe’s Black Death (Federici 1998).

In world-historical terms, wood was an absolutely necessity to economic ascendancy for both the Dutch and later Britain, but it was not sufficient. Dutch and English agricultural revolutions were crucial for advancing state power and world accumulation, a process that gave rise to successive hegemonies. Agrarian change, then, took center stage on the transition from feudalism to capitalism (Wallerstein 1974; Brenner 1976; Wood 2002; Moore 2015). As class conflict intensified between lord and

peasant, and the already thin margins of peasant subsistence continued, peasants brought marginalized land under cultivation. Stagnating agricultural productivity throughout feudal Europe undermined seigneurial rents and limited economic growth (Wallerstein 1974; Brenner 1976). Feudal lords' inability to extract more surplus from the peasantry to support luxurious consumption and military defense against other lords resulted in lords enacting strategies of absolute surplus extraction, which rarely register productivity revolutions. Central to the crisis of feudalism, that is, the ability for the system to reproduce the conditions of surplus extraction was a demographic collapse which was co-produced through the Black Death, peasants autonomy and power, but especially peasant women, and harvest failures due to warming climates (Federici 1998; Mosley 2010). Concomitantly, wages for urban workers increased with the price revolution. Although trade occurred throughout the Middle Ages, transportation costs were prohibitively high for non-luxury commodities. The socio-ecological contradictions emerging from feudalism as a way of organizing nature, but especially production and reproduction relations, became untenable as lords were unable to maintain incomes even as they enacted harsh strategies of absolute surplus extraction, a process that merely exacerbated the crisis of feudalism.

The solution to the epochal crisis of feudalism, and thus, the transition to the capitalism, was twofold. First, frontier movements both internal and external to Europe were carried out, centering around food, fuel, and resources, notably, gold and silver (Moore 2010a). This moment necessitated the expansion of space in the world-economy, generating a world division of labor premised on different modes labor regulation dependent on the socio-ecologies of different commodities (Wallerstein 1974). Second,

the class contradictions arising from the relationship between lord and peasant around the means of production and subsistence gave rise to stagnating agricultural productivity (Brenner 1976). The “rise of sheep farming” led to the great enclosures of the long sixteenth century in England. Eastern Europe turned into Western Europe’s breadbasket, expressed in the “second serfdom” or what Wallerstein (1974: 91) calls “coerced cash-crop labor”. In the emerging European capitalist world-economy Western Europe’s economy had variety and specialization, engendering dynamic development, while Eastern Europe and the economies of colonies of the New World were monoculture in nature, resulting in disaccumulation (Wallerstein 1974: 102).

For centuries, European peasant-lord relations and patterns of production developed through stable weather patterns. Climatic conditions began shifting in the fourteenth and fifteenth centuries with increased severe winters with the coming of the Little Ice Age, posing an obstacle to advancing agricultural productivity, a problem that exacerbated the low levels of productivity on marginalized lands (Wallerstein 1974; Moore 2000).¹¹ As Wallerstein (1974) suggests, when crisis conditions prevail minor changes in ecological relations, including climate, can be powerful levers of social change. The severe winters of the late feudal period gave way to mild winters in the long sixteenth century, reconstituting new relations and patterns of agricultural production (Wallerstein 1974).

In this context, the Dutch agricultural revolution emerged through the epochal crisis of feudalism, registering a regional socio-ecological crisis. In the fifteenth century,

¹¹ Cooler temperatures in the first half of the seventeenth century also affected agricultural production, leading to higher food prices, a development that exacerbated the socio-economic crisis of the century (Parker 2013).

peasants pushed to their subsistence limits reclaimed the water-logged peatlands that they in turn drained while attempting to protect fields from flooding. The continually subsidence of peat soils posed an obstacle to arable farming and feudal lords surplus extraction. The effect was revolutionary. Supported by cheap grains from the Baltic, market dependent peasants, if seeking to eke out a living on the land, had no other option than to shift from subsistence arable farming to commercial pasture farming, including dairying and cattle raising (Brenner 2001). Where stable ecological conditions prevailed, peasants raised summer grains for the nascent beer market (Brenner 2001). Subjected to competitive markets, farmers from maritime Netherlands specialized, invested, and innovated, advancing labor productivity and supplying cheap food to European markets. Beyond dairy and cattle specialization, the Dutch replaced fallow fields by growing a variety of legumes as feed for livestock and improving the soil through increased manuring (Tauger 2011).¹² Improved animal breeding soon thereafter followed in a dynamic process that added more manure that in turn facilitated a greater appropriation of the unpaid work of soils (Mazoyer and Roudart 2006). Dutch farmers export-led development and concomitant dependence on European markets turned economic expansion into contraction when competition intensified during the seventeenth century. Markets became saturated, turning peasant prosperity into a reproduction crisis. The Dutch agricultural revolution had emerged through the socio-ecological contradictions of

¹² With the new rotation of fodder crops, but especially fodder legumes, and grains there is a lessening of leaching and denitrification. In part this is due to the ability of the roots of said crops to expand “widely and deeply” allowing to absorb great quantities of fertilizing minerals. “It is precisely these minerals, shielded from losses resulting from drainage and denitrification, that are incorporated into the biomass from the fodder crops, consumed in the stables by an increased number of livestock, and found, for the most part, in the additional manure produced” (Mazoyer and Roudart 2006: 320).

feudalism, enabled through a transportation revolution and the simplification of wetlands, allowing the majority of Holland's population to work outside of agriculture.¹³

Proletarian wages in Holland were highest among other comparable European countries, including Britain (Brenner 2001). Industrial productivity, too, was among the highest in Europe. Advances in labor productivity in agriculture, then, became a powerful force in the process of industrialization.

The Dutch became the first true world hegemon reorganizing world nature and world accumulation with Amsterdam as the world entrepôt. The city-states of Italy, nor the Spanish or Portuguese had transformed the world-economy in such a manner (Arrighi 1994). The Dutch had turned obstacles of a fundamentally socio-ecological kind into strategies of accumulation, most notably around agrarian class conflict, timber frontiers for its shipbuilding industry, and specialization in pasture farming. The Dutch agricultural revolution, dependent on the appropriation of cheap natures from home and abroad, emerged from the epochal crisis of feudalism and its own socio-ecological crisis experienced most directly by peasants. By the second half of the seventeenth century, however, economic expansion turned to contraction, opening the door for ascending competitors.

Britain's agricultural revolution, like the Dutch, was a world-ecological affair, a product and producer of the production of nature, the pursuit of hegemony, and world accumulation. Britain could not have advanced agricultural productivity without several

¹³ During the sixteenth century probably more than half of the population worked outside of agriculture (Brenner 2001: 215; Moore 2015:).

underlying forces at work. Moments of primitive accumulation joined together with moments of colonial expansion, remaking households worldwide.

Three agrarian classes of producers made up Britain's agricultural sector. The landlord, capitalist or yeoman farmer, and the landless agricultural labor (Takahashi 1952). It was the yeoman farmer that took center stage in Britain's agricultural revolution. Prior to the transition to capitalism, with the decline of the manorial system wealthier peasants began money rent, as opposed to labor rent, to lords. The effects of the change in kinds of rent combined with private property resulted in fundamental transformations in the relations of production, leading to class differentiation. Takahashi (1952: 328) explains the results:

“As rent in kind gives way to money rent, these small-scale peasant farmers, the petty mode of production in agriculture, become more and more clearly independent...As money rent establish itself, not only do the traditional personal relations between lord and peasant change into more objective impersonal money relations, but...the part of the surplus labor which is set as fixed money rent becomes relatively smaller, with the advance of labor productivity and the consequent fall in money-value...its value became so low that in effect the peasants were released from the obligation of paying it.”

Takahashi (1952: 329) continues:

“The formation of this sort of independent self-sustaining peasants—historically, the typical representative is the English yeomanry—resulted from the disintegration process of feudal land property and established the social conditions for money rent...The peasants were in the position of commodity producers who simply had to put themselves always in contact with the market, and whose position as commodity producers brought about the inevitable social differentiation of that condition, the petty mode of production.”

These better off independent yeoman farmers of northwest Europe were in a unique advantageous position in the emerging capitalist world-economy. In the context of high urban density, the intensification of farming was characteristic of the medium-sized

yeoman farmer who could take advantage of those markets (Moore 2000). Wallerstein (1974: 128), drawing on Takahashi (1955), explains that although it may be an exaggeration that the yeoman farmer was the catalyst for the end of feudalism, “it is doubtful that one could have had a capitalist system without him”. Wallerstein (1974: 116) explains their position:

“Given the increase in population and the decline in wages, it would then follow, as Marx said, that these yeoman farmers “grew rich at the expense both of their laborers and their landlords.” They usurped (by enclosure) the lands of the former, arguing publicly the need to guarantee the country’s food supply and then hired them at low wages, while obtaining at fixed rentals more and more land from the owners of large demesnes...they became a significant economic, and hence political, force. Their economic strength lay in the fact that they had every incentive to be “entrepreneurial”. They were seeking wealthy and upward mobility: the route to success lay through economic efficiency. But they were not yet burdened down either by traditional obligations of largesse or status obligations of luxury spending or town life.”

Class differentiation advanced under the crisis conditions of feudalism, allowing yeoman farmers to possess their own land while employing wage laborers. Yeoman farmers increased their possession of land from 20 percent in the fifteenth century to over 30 percent in the seventeenth century (Kriedte 1983: 60). Poorer peasants, however, did not have the luxury of owning larger plots of land, a difficult problem when dues in money and tax exaction were imposed upon them. Poorer peasants became wage laborers for yeoman farmers, large capitalist agrarian estates, and/or joined the ranks of the urban proletariat.

As a class, yeoman farmers became foundational to the English agricultural revolution, focusing primarily on sheep and cattle farming. Unable to meet its means of survival as commons were eliminated, yeoman farmers relied on cheap grains from the Baltic and beyond. Market-dependence on the means of subsistence, as well as rises in

wool prices and meat consumption, was a pre-condition for yeoman farmers specializing in sheep and cattle. Wool became a cheap input for Britain's textile industry, a leading sector of economic growth. The conversion of arable to pasture land ensued throughout northwestern Europe, eliminating large tracts of land. Agronomic thrusts of specialization in livestock and wheat necessitated more frontier land, impelling ecological imperialism far beyond the English farm that registered successive bouts of soil exhaustion and deforestation (Wallerstein 1974; Moore 2017).¹⁴ Advancing deruralization occurred as the "sheep ate men", giving rise to a shortage of food that necessitated the imports of Baltic grains. Emerging from a combination of feudal property relations, economic opportunities to serve towns, and class differentiation the yeoman farmer has been a historic figure of historical capitalism that has left a lasting legacy on the development of capitalist agriculture. If northwestern European yeoman farmer met his counterpart the coerced cash-crop labor in the periphery, what of his wife and the household?

It is not clear of the transformation of the yeoman's farmer's wife, but as a property-owning class they commanded the labor their wives and children. The state and church targeted poorer peasant women who had been central to large-scale peasant movements around Europe during the feudal crisis. Prior to the transition to capitalism, women's autonomy over their sexuality and reproduction posed an obstacle to landlords and the state who were struggling to secure income due to the demographic collapse (Federici 1998). Prior to capitalism, women had acquired knowledge on contraception

¹⁴ Capitalist commodity production, both agricultural and industrial, cleared forests on an unprecedented "scale, speed, and scope" (Moore 2015: 182). What took feudal Europe centuries for large tracts of forest clearance, took merely decades for capitalism (Moore 2015).

through generations, which ensured autonomy over their bodies. During the transition to capitalism, and for two centuries after, the state, church, and medical profession began early modernity's witch hunt, which sought to discipline women's bodies, specifically their sexuality and reproduction. The witch hunt, where thousands of women burned at the stake throughout Europe, became an important development in eliminating women's autonomy, while giving men who had lost access to land, women's surplus. Women in cottage industries produced for merchant capitalists, but the income they generated was reserved for their husbands (Mies 1986). To be clear, the witch hunts, an important process of primitive accumulation and gendered differentiation, was part of modernity, not a pre-capitalist order (Mies 1986; Federici 1998). Large-scale violence at "home and abroad" was essential for remaking women as "unproductive" domesticated housewives in the modern world. From then on, an asymmetrical exploitative gendered division of labor was solidified and later generalized.

During early modernity "women, nature, and colony" were designated outside of the civilized world. While prior to capitalism, there was a partial belief in separation of nature and society, during early modernity the small civilized population, namely property owning white Big Men and Small Men, generalized the belief that the rest of population was uncivilized. This was a highly uneven process both in terms of space and time. Women in the centers of accumulation became domesticated through marriage and family as part of a new gendered division of labor that further obscured their forms of paid and unpaid. This was violently produced through the criminalization of infanticide and sexuality before and outside of marriage. While women in the peripheries became forced or enslaved labor. Designating "women, nature, and colony" outside of capitalist

civilization justified violent raids, rural expulsion, and slavery as a means of appropriating surplus. The appropriation of non-valued forms of work performed by “women, nature, and colony” made possible the production of value and world accumulation (Mies 1986; Federici 1998; Moore 2015).

Importantly, the origins of housewifization are to be found in the origins of capitalism. That is, primitive accumulation and the rise of a proletarian class was made possible through the disciplining and regulating of women’s bodies. Maria Mies (1986) outlines two major stages of housewifization in the history of capitalism. The first stage, during early modernity, entailed the colonial appropriation of luxury items for the ‘ladies’ of elite classes of the core. The second stage occurred in the nineteenth and twentieth centuries where housewifization was generalized to the proletarian class. What is missing from Mies (1988) formulation of the history of housewifization-proletarianization is the town-country dynamic within core countries. One of the central objectives of this study is to explain this dynamic in the United States in nineteenth and twentieth centuries.

The reorganization of the capitalist world-economy in the early nineteenth century emerged through the competitive colonial empires of Britain, France, and Holland. Following the collapse of the French empire, Britain’s commercial, financial, and industrial supremacy consolidated the world market around the demands of state power and world accumulation. Britain’s financial supremacy was evident in the expansion of loans across the world-system and London’s ability “settle trade balances among states indirectly” (Tomich 2016: 61), permitting a transformation in world division of labor and global exchanges. British hegemony would impose a new way of organizing the capitalist world-ecology through the production of nature, state power, and world accumulation.

Britain's production of nature and accumulation strategies, financed through British banks, unfolded through a qualitatively different world division of labor than that of the Dutch who were losing control of the world-economy. While population continued to rise in the eighteenth century agricultural productivity stagnated in Britain. The transition from a political-colonial controlled world market of exchanged shifted to an economically structured world market, whereby Britain enforced free trade globally and unevenly. Even during periods of protectionism Ireland, in part an exception, remained an important source of agricultural imports. In part, this was due to the nature of semi-perishable agricultural goods that could not be imported from longer distances (Peet 1972). In the British West Indies sugar production increased significantly throughout the late eighteenth and nineteenth centuries, and by the first quarter of the nineteenth century British colonies accounted for almost half the world's supply of sugar (Tomich 2016: 63). However, slave emancipation in the British Caribbean would undermine the strength of its colonies, opening the door to its competitors who were reconstituting a "second slavery" (Tomich 2016). As the requirements of British capital accumulation emerged, competition between Caribbean sugar frontiers intensified, leaving older uncompetitive sugar islands behind while new sugar frontiers reigned. Not only was Britain the greatest consumer of sugar, but it also controlled "the reexport sugar market", a process that was enabled through its economic strength in its ability to "penetrate the market of other colonizing powers" (Tomich 2016: 63). British hegemony unified and restructured sugar, slavery, and colony, increasing riches for planters, who suffered with intractable debt, while exploiting African slaves and pressing the physical limits of sugar monoculture in succeeding frontiers.

Cotton-hungry British manufactures linked cotton producers around the world. No later than the 1820s, and surely by the 1840s the United States plantation South was producing more cotton than any region around the world, outcompeting producers in India and Egypt (Ponting 1991). One observer noted that 3.5 million people in the United Kingdom were employed in the cotton industry, and that the system depended on the political economy of the United States cotton South (Beckert 2014: 121). In 1860 cotton accounted three-fifths of all United States exports as cotton production increased over 170 percent over the previous two decades (Bauerly 2015: 104). By all measures the United States was the main supplier of cotton for Britain's textile industry, which was the leading sector of the economy (Hugill 2009: 45).¹⁵ In the mid-nineteenth century the plantation South was producing two-thirds of the world's cotton supply (Mosley 2010: 64). Mexican cotton hybrids proved superior for growing in the Mississippi Valley and the Atlantic states as daily picking rates dramatically increased and were more disease resistant (Olmstead and Rhode 2008). In the United States South, cotton plantations were organized to feed Britain's expanding textile industry.

First in the Netherlands, and then in Britain, did agricultural productivity double. Throughout feudalism agricultural surplus was minimal. From the sixteenth through the eighteenth century agricultural productivity doubled in the centers of world accumulation, starting with the Netherlands in the sixteenth and seventeenth centuries and then Britain in the seventeenth and eighteenth centuries. Market-dependent farmers

¹⁵ America's total exports in 1860 were worth \$400 million, which nearly half of went to Britain, and of that half almost all was from cotton (Hugill 2009: 45). United States exports rose from "3,000 bales in 1790 to four-and-a-half million bales by 1860" (Ponting 1991).

turned to specialization and innovation to stay competitive, a process that was enabled through monocultures abroad. Agricultural surpluses supplied cheap inputs to industrialization, especially in the growing textile industry in Flanders and England. Agriculture also supplied a redundant population to industrialists seeking cheap labor. However, as has been suggested here, agricultural revolutions unified and transformed ecologies near and far, itself made possibly through a revolution in transportation. Agricultural productivity advanced all the while an increase in the global population proceeded throughout the early modern era of capitalist world-system.¹⁶

A Developmental Crisis in British Hegemony

By the end of the eighteenth-century Britain's agricultural revolution was showing signs of decline. Much of Europe, too, was experiencing decline in yields. Yield growth stagnated that when combined with lack of viable land threatened English industrialization (Moore 2010b). To be sure, British industrialization was tenuous until the 1840s (Hobsbawm 1968). The relative exhaustion of agriculture in Britain would limit industrialization by lowering the rate of exploitation and increasing the household food bill. Productivity declines in agriculture resulted in higher prices for farmers and landlords at the expense of industrial capitalists (O'Brien 1977). At the same moment that English agriculture was in decline, several of its colonies were being tapped. Compounding the problem was the "major balance-of-payments deficit" (Duncan 1996: 84) Britain experienced after 1822 (Hobsbawm 1968: 54-55). While England had dominated agriculture in the eighteenth century, by the end of the century they had

¹⁶ In Europe the population increased from "71 million in 1600 to 145 million in 1800" (Chew 2001: 134).

become a major importer of meats and grains. In 1812, the price of wheat in England was twice the price it had been a decade earlier (unlocking the agricultural economics of the 19th century). “Food prices increased over 200 percent, four times faster than the industrial price index” (O’Brien 1985: 776, cited in Moore 2011: 125). Stagnating agricultural productivity, then, served as a brake to industrialization.

While incomes and rents increased for capitalist farmers and landlords in Britain, enclosing commons continued apace, forcing landless peasants into mills and mines. As with each round of dispossession and displacement food shortage became a social problem that came to a head with a working-class reproduction crisis in the 1830s-1840s. Deruralization coupled with food and raw materials imports fueled Britain’s first phase of industrialization. Although imports had increased, they were not cheap enough for an expanding proletarian class. Part the problem of Britain’s standing in the world-economy was that while the production of capital goods expanded there was a corresponding rapid decline in returns in the domestic market (Arrighi 1994).

By the first quarter of the nineteenth century, the British centered capitalist world-economy faced a developmental crisis (Braudel 1992: 77). The cotton boom of the early 1820s, linked to slaved produced cotton and a series of cotton-based innovations in the Arkwright era, enabled mill-owners to realize profits of 50 percent or more (Malm 2016: 175). The realization of massive profit margins from export markets allowed mill-owners to obtain cheap money from British banks to build and modernize existing cotton mills. By 1825, however, what became the first structural crisis of industrialism capitalism centered on cotton, soon spread throughout the rest of British economy (Malm 2016). Cotton profit margins shrunk drastically as too many capitalists competed for their share

of profits (Hobsbawm 1986: 54). The problem stemmed primarily from the overproduction of cotton combined with a contracting export market (Malm 2016). Sluggish domestic demand had also occurred, and was likely exacerbated with the “hungry thirties and early forties” (Hobsbawm 1968: 54). The cotton crisis continued through the 1820s, but by the 1830s the railroad boom had generated economic optimism for mill-owners that the demand from export markets would return. However, economic growth was slow as the cotton crisis transformed into a general industrial crisis reaching its apex in 1841-42 (Malm 2016). A business paper, the *Circular*, “concluded that the glorious era of manufacture and commerce was approaching a complete end” (Malm 2016: 174).

In the center of world accumulation, Britain’s working-class faced unsustainable levels of exploitation that gave rise to social unrest. A wave industrial strikes unfolded in the first quarter of the nineteenth century that included carpenters, colliers, rope-makers, wool-combers, and more (Malm 2016: 181). The acceleration of rural to urban migration led to a long-lasting housing crisis, in which families paid high rents for squalor conditions, a breeding ground for diseases and an ensuing cholera epidemic. The working-class in the nineteenth century were working roughly 500 more hours a year than the working-class in the eighteenth century (Secombe 1993: 27). In the industrial centers life expectancy declined to record lows, unseen since the Black Death (Malm 2016: 184). As part of the semi-proletarian class, women and children of all ages were employed in the ‘Satanic Mills’, a product of two overlapping processes—generalized low wages and the gradual displacement of women’s putting out work by capitalist manufacturers. The wages they earned were kept by their husbands and fathers.

The limits of accumulation and the crisis of the reproduction of the working-class was several decades in the making, coming to a head in the 1840s. “The immense rural exodus of this century masked the underlying contradiction in the bowels of the new mode of production. Strewn around the sites of its most dynamic growth, capitalism was busy piling up the heaps of wasted humanity in teeming slums” (Seccombe 1993: 78). As the name implied, the hungry decades fueled the resistance of the starving working-class.

The developmental crisis of the nineteenth century instilled fear in capitalists of narrow profit margins compounded by working-class anger. The solution to advancing industrialization-proletarianization and capital accumulation was twofold. A great compromise between industrial capitalists and working-class men to exclude women and children from industrial manufacturing ensured the political stability of the working-class through increased wages and externalizing the costs of reproduction onto women as part of the “patriarchy of the wage” (Federici 1998). Unions fought for a ‘family wage’ whereby the ‘male-breadwinners’ wage would cover the costs of the reproduction of the family. While wages increased for men over the nineteenth century, they were never enough to cover the full cost of reproducing the means of subsistence, forcing women to scavenge, beg, and barter (Seccombe 1993). Women’s outwork disappeared by the 1850s and were regulated to homemaking. “In this process, the sphere where labour power was reproduced, the house and the family, was ‘defined into nature’, but private, domesticated nature, while the factory became the place for the public, social (human) production” (Mies 1986: 69). Compulsory education forced children into school longer. Capitalists shifted from an “extensive to intensive mode of consuming labour-power, based on a reduced work-week, and a quicker, steadier pace of work under close supervision”

(Secombe 1993: 82). Productivity gains advanced as cheap coal fueled industrialization while tempering the growing cost of timber imports. In short, capitalists shifted from relying on strategies of extracting absolute-surplus value to relative surplus-value. While cheap energy was a crucial element of “fossil capital” (Malm 2016), the solution to the limits of capital accumulation British hegemony and other industrialized countries was to advance the process of proletarianization-housewifization.

The second solution to advancing industrialization was unilateral free-trade, specifically to increase the flow of cheap food and fiber from colonies and settler colonies. The Corn Laws and the Navigation Acts meant that Britain would sacrifice its farmers to the world market and depend on food supply from overseas sources (Silver and Arrighi 2003). Cheap grain from all over the world flowed into Britain, that enabled the rate of exploitation to increase, ensuring Britain’s industrial supremacy. India, the ‘crown jewel’ of the British empire, turned into the “pivot” of Britain’s commercial and financial power. Silver and Arrighi (2003: 336) explain, “India’s balance of payments deficit with Britain and surplus with the rest of the world enabled Britain to settle its deficit on current account with the rest of the world. Without India’s forcible contribution to the balance of payments of Imperial Britain, it would have been impossible for the latter ‘to use the income from her overseas investment for further investment abroad, and to give back to the international monetary system the liquidity she absorbed as investment income’”. From 1750 to 1800 Britain received £2 million every year from India (Braudel 1992: 581). Surplus appropriation from India, then, enabled global investments that strengthened Britain’s hegemony. In this way, the advancement of industrialization in nineteenth century Britain necessitated proletarianization-

housewifization and the recomposition of far-flung frontiers that could controlled the flows of cheap natures.

Following world-systems analysts (Arrighi 1994; Bunker and Ciccantell 2005; O’Hearn 2005; Moore 2015), this historical account suggests successive cycles of accumulation necessitate the emerging hegemon to appropriate an ever-increasing surplus in the phase of material expansion, a process that occurs internally and externally to emerging hegemons. Under British hegemony the phase of material expansion was made possible through the nineteenth century railroad revolution, a process that accelerated the flows of cheap natures from Britain’s own hinterlands, as well as the world hinterlands. By the 1830s British track laying began, a mere decade later rail infrastructure was completed. In 1840, there were 1,491 kilometers in tracks across continental Europe. By 1860, there were 33,405 kilometers connecting western and central Europe (Secombe 1993: 81). British hegemony initiated canal and railroad projects from Asia to the Americas, forcing colonies and settler colonies to bear the cost of developing and completing internal transportation infrastructure, itself a process that engendered primitive accumulation and increased taxation and debt (Bunker and Ciccantell 2005). Over the nineteenth century world accumulation and world nature unfolded through the railroad revolution that constituted successive famines across Asia (Davis 2001) and broad-based economic growth in the United States. The restructuring of the nineteenth century world market centered around British hegemony, tempering the hardships of proletarianization, and advancing world accumulation through world nature.

With declining profit margins, wealthy capitalists, including landlords who were also facing declining returns, began investing in transportation infrastructure in the

United States. British investments in the United States internal improvements ensured the successful completion of canals, but especially railroads. During the early 1830s of rising agricultural commodities, “40 million dollars of American state securities were purchased abroad...After 1834 the pace increased...more than 107 million dollars in state securities went abroad and the state pursued an unrestrained expansion in internal improvements, with their bonds finding a ready market among English investors” (North 1956: 502). Investment slowed in the 1840s, but when agricultural prices began to rise again British and German investors purchased railroad securities.

The fits and starts in the construction and development of Illinois Central Railroad was a result of lack of capital. British and international investors enabled the further construction of the Illinois Central to penetrate the agrarian heartland of the Grand Prairies. While the state of Illinois had failed to service its debts to international creditors from the 1830s internal improvements, leaving many investors infuriated, promoters of the Illinois Central Railroad convinced British investors of Devaux & Company to loan £1,000,000. British investors acquired \$5,000,000 in bonds between 1852 and 1854. European investors also purchased stocks in the Illinois Central so that in 1856 over 840,000 shares of stocks were held in Europe, “while \$12,000,000 worth of the bonds was held abroad, mostly in Great Britain” (Gates 1934: 76). The Illinois Central in turn offered credit to would-be settlers, usually with higher interests, a justification for the higher quality land owned the company.

International capital investments were not exclusive to the railroad revolution. During the settlement period, international investors supplied capital to Midwestern merchants in operating small meatpacking houses in the Midwest. Meatpacking quickly

became a leading industry throughout the Midwest, as local merchant-packers and farmers worked cooperatively. More than wheat and corn, pork products brought the greatest returns to farmers (Hudson 1994). Although early pork packing houses required little capital investment, large sums of capital were required to purchase hogs, pay wages, and to ship pork products to distant markets (Walsh 1977). Midwestern merchant packers with limited capital obtained loans from eastern and international investors. The transition from merchant packers to industrial packers was facilitated through much needed capital and expertise of international packers, especially from Britain and Ireland (Walsh 1977). Importantly, during the mid-nineteenth century international capital investments fueled the transition from small rural packing plants to large industrial urban packing plants. To be sure, this was a joint effort with eastern capitalists, but it is doubtful that without international capital investments that the origins and transition in the Midwestern meatpacking industry would have occurred as rapidly. The next chapter will examine the role of American merchants in the transition to petty commodity production.

The renewal of capital accumulation in Britain had occurred in the mid-nineteenth century as Britain became the workshop of the world and London the world's entrêpot. Britain had successfully transcended capital's developmental crisis through frontier-making projects at home and abroad. At home the proletarian household was transformed into the modern form with the man as the breadwinner and the woman as the housewife. Abroad, there was a corresponding increase in the flow of cheap food from colonies and the United States. Britain's economic ascendance was interdependently produced through exchange relations resulting in a growing demand for United States commodities. The

United States could fulfill that demand with its expansive ‘fresh’ frontiers. Indeed, as we will see in the following chapter, it did just that.

Conclusion

The transition from feudalism to capitalism marked an epochal transformation in the organizational development of civilization. There are several insights to glean from the transition debate. Namely, what were the principle forces that gave rise to a new system of surplus appropriation, what were the pre-existing historical conditions, what are the life-making and environment-making areas of human organizations animating civilizational change, and in what ways do inequality operate as a cause and consequence for explaining long-term, large-scale social change. Perhaps equally important the transition debate may tell us the nature of the crisis of our times. The object of this chapter was to explain from a world-ecological perspective the historical origins of capitalism, agricultural revolutions as a product and producer of global socio-ecological change, and the developmental crisis and renewal of British hegemony.

Our concern here going forward is the origins, development, and crisis of the Midwestern family farm. If we are to understand the transition to petty commodity production in the Midwest, then, we need to understand historical capitalism as a patterned process of agrarian change and proletarianization-housewifization over the *longue durée* of the capitalist world-ecology. In doing so, I seek to move beyond ideal type conceptions of capitalism. Federici (1998: 98-99) makes clear that “It was only in the nineteenth century – in response to the first intense cycle of struggling against industrial work – that the “modern family” centered on the full-time housewife’s reproductive labor was generalized in the working class, in England first and later in the

United States". World accumulation and world nature enjoined the transition to petty commodity production in the United States, working through the plurality of time. In turn, the transition to petty commodity production in the United States would fundamentally transform world accumulation and world nature over the nineteenth century.

While primitive accumulation, both in terms of coerced displacement and dispossession via class differentiation, was pivotal to the rise of capitalism, we must understand how the pursuit of power, the production of nature, and capital accumulation operated dialectically beyond the origins. This permits us to reconstruct historically how state powers and capitalists sought to remake nature (including humans) into cheap nature, as parts reconstituting the varied forms and patterns production and reproduction forming the totality of the capitalist world-system. Such a historical reconstruction requires that we take seriously the different phases of accumulation, competing world powers, and varied geographies and natures of the gendered household.

Chapter 3: The Making of the Modern Corn Belt in the First American Agricultural Revolution

Introduction

By the 1890s the Slemmons family had been farming in Johnson County, Iowa for nearly half a century. A year in the life John W. Slemmons is detailed in his diary. Just six miles outside of Iowa City, they worked, socialized, and lived like many nineteenth century farm families. At the “Terrace Mound Farm”, the Slemmons were the typical diversified farm that raised corn, wheat, oats, hogs and cattle. While John W. Slemmons details the comings and goings of friends and family, grinding corn and oats as feed, working with his sons in the field, regularly attending church and agricultural meetings, and visiting town to market hogs and butter and purchase household items, his wife Agnes Slemmons is only mentioned half a dozen times in the entire year of 1892. Aside from cleaning the coal house, Agnes, known as “Ma”, was mentioned only when visiting town to market butter and purchase household items. Marketing butter occurred several times each month throughout the year. Prices received for butter, however, are not detailed. When John, with the help of Frank Danner, marketed 32 hogs in January he received \$282. The absence of Ma in John’s diary reflects how women’s daily labor was invisible. Ma showed up when marketing and purchasing commodities or attending parties. Interestingly, John knew exactly how much money he received for his hogs, yet no account was detailed for the prices received for Agnes’ butter. The Slemmons were a middling farm family, or in Marxist terms petty commodity producers, who owned 160

acres, “shorthorn cattle, Poland China swine, and Percheron horses” (Slemmons 1892). According to John’s diary, “his” gross income in 1892 was \$2,169.19 with a net total of \$328.24, which was “well above the national farm average” (Slemmons 1892). It is not clear whether Agnes income was included in the gross income of the household.

In 1858, the St. John’s moved from Walton, New York to Osage, Iowa. Isaac St. John, the patriarch of the family, had a failing tannery and decided to move the family to the land of milk and honey. The St. Johns were also a middling farm family. Twenty-year-old Mary St. John, the second eldest daughter of five children, received a teaching certificate almost immediately arriving in Iowa. We examine a day in the life of Mary. Schwieder (1977: 157) notes a typical day for Mary: “Baked two pies, two loaves of bread and a fowl and 2 Johnycakes [sic], churned, mopped, Mary washed some calicoes, rinsed our white clothes, iron[ed] some of them.” A month later, Mary notes another typical day: “Finished ironing, baked bread and a cream pudding, cooked a chicken pot pie, corn and potatoes for dinner, mopped, etc. Mrs. Seeley came early in the morning...Have dressed 12 pigeons and 18 chickens today.” Aside from the endless domestic work and household production Mary engaged in on a daily and seasonal basis, what stands out in her diary is that in more than half of all the entries she mentioned the work of her father and brothers.

What can be gleaned from the diaries of John W. Slemmons and Mary St. John given that both were part of middling farm families in Iowa? First, while farming and householding in Iowa involved relentless work to ensure success, families regularly had visitors and they themselves visited neighbors and family. For agrarian households socializing was usually mediated through work exchanges. Second, men and women’s

work was differentially valued. John W. Slemmons failed to acknowledge the work of his wife and daughters, only mentioning when marketing and purchasing commodities.

While annotating her daily work patterns, Mary St. John regularly acknowledged the work of her father and brothers. To put it bluntly, men's work was valued over women's work.

The daily and seasonal work patterns of nineteenth century farm men and women were not bounded exclusively to the spatio-temporalities of the household and farm. The Midwestern agrarian household was also bounded to world time and world accumulation that centered on British hegemony. As the previous chapter argued the crisis and renewal of capital accumulation of British hegemony found its solution in the frontiers of the United States. To further explain the origins and development of petty commodity production in Illinois and Iowa we need to analyze the ways in which the socio-ecology of farming and householding developed in relation to American capitalism in the capitalist world-economy.

The following chapter explains three interrelated developments. First, I explain the origins of the transition to petty commodity production as product of world-ecological transformations that included the consolidation of British hegemony (discussed in chapter 2), farm-making, deepening of market-dependence, and householding. Second, the epicenter of the first American agricultural revolution was in northern Illinois and eastern Iowa, along with southern Wisconsin. The origins of the agricultural revolution are found in the Midwest prairies but found its fullest expression in the Great Plains. Finally, I explain the origins of the modern Corn Belt and its attendant outcome of the petit bourgeois yeoman farmer that centered in central and northern Illinois and the eastern

half of Iowa. I argue that the outcome of the nineteenth century agricultural revolution was a relatively prosperous, dynamic, and stable farming region in the heart of the Corn Belt.

While chapter two centered on the transition from feudalism to capitalism and the rise of British hegemony, chapter three examines the “transition to American capitalism” or what might be called the American agrarian question. While scholars have focused primarily on the northeast with their explanation of the transition (Merrill 1990; Vickers 1990; Clark 1991; Kulikoff 1992; Osterud 1993), another group has focused on the Midwest in their explanation (Headlee 1991; Byres 1996; Post 2011; Bauerly 2016). I seek to contribute to the transition debate by incorporating a world-ecological framework for analyzing questions of gender, class, geography, and ecology. A world-ecological framework moves beyond ideal-type conceptions of capitalism in favor of explanations that explain cumulative and cyclical configurations of humans and the rest of nature over the *longue durée* of historical capitalism. World-ecological agricultural revolutions fundamentally transformed the spatio-temporalities of the capitalist world-system. World time, world space, and world nature formed an organic whole constituting the American agrarian question.

In this chapter, I explain the origins and development of the Corn Belt family farm in the nineteenth century. It begins with the obstacles to advancing industrialization in the United States. This fundamentally turned on the land question or the ‘Indian’ question. Resolving the land question resolved Britain’s developmental crisis while also advancing industrialization in the United States through the violent construction of a fresh frontier to produce cheap natures in the form of food and raw materials. Although

technically no longer a colony of Britain, the United States and Britain were inextricably linked through economic interdependence, first in the in the South and Northeast and then in the Midwest. Capitalist development moved beyond the stage of early modernity, advancing the scale, speed, and scope of socio-ecological change. What took centuries to transform independent commodity producers to petty commodity producers in the northeast, took only several decades in the Midwest. Farm-making was an extra-territorial affair, incorporating cheap natures into the agrarian web of life. Next, I explain farm women's double burden that advanced the transition to petty commodity production. The unpaid work of women, children, and the rest of nature enabled farm families to purchase all the important mechanical reaper that made bread cheap again. Following that, I examine the first American agricultural revolution originating in the Midwest and finding its fullest expression in the Plains. The first American agricultural revolution, like the Dutch and English revolutions, appropriated cheap natures from far and wide, and as it developed transformed ecologies near and far. Lastly, I look at how the Corn Belt emerged and its outcome for petty commodity producers. The Corn Belt family farm was in a unique world-historical position that I characterize as dynamically stable based on the interrelations of household, work, and the market.

Frontier-Making as Environment-Making in America's Midwest

Over the long nineteenth century both the world's arable and pasture lands more than doubled, increasing from "400 million to 950 million hectares" and "950 to 2,300 million" respectively (Cunfer and Krausmann 2016: 355). From the American Midwest and Plains to South America's pampas to the Russian steppes, these regions became frontiers of cheap food. Cunfer and Krausmann (2016: 355) state that "the most important

agricultural development of the nineteenth century was a massive and rapid expansion of farmland in the world's grasslands...feeding the nineteenth century's 60 percent increase in world population". Such great transformations, however, did not occur in a vacuum. Rather, there were part of the long-term, large-scale social change constituting the capitalist world-ecology.

The 'Indian' Question

From the long sixteenth century to the nineteenth century European colonizers and settlers violently dispossessed Native American tribes. For the first centuries of contact Europeans exposed Native Americans to a variety of diseases, including cholera, smallpox, and measles that led to demographic collapse, reducing populations anywhere from a third to a half (Byers 1996: 193). As with the crisis of feudalism, the demographic collapse in the New World became a force in the reorganization of work, reproduction, and society. Successive waves of dispossession of Native Americans were followed with waves of broken treaties and land policies that primarily benefited capitalists and the state. Native American tribes were an obstacle to capital accumulation, necessitating their removal. While primitive accumulation in the United States did not occur as it had in the transition from feudalism to capitalism in Europe, primitive accumulation proceeded nonetheless, with the principle target Native Americans.

Even after centuries of disease and unequal exchange, the land question still had not been resolved. While disease ravaged Native American populations for nearly three centuries, the techniques of expulsion became more deliberate and brutal in the eighteenth and nineteenth centuries. In 1803, President Jefferson added over a million square miles to the United States with the Louisiana Purchase. The newly purchased land

became a dumping ground for dispossessed tribes. In 1830, the Removal Act was signed, giving President Andrew Jackson the green light to deploy troops to systematically force the “Five Civilized Nations of Indian tribes” onto a designated territory (Byers 1996). Thousands of died on the journey alone in what became known as the ‘Trail of Tears’. President Jackson, perhaps more determined than any prior president, sought to eliminate natives and achieve manifest destiny. By way of the federal government the Black Hawk War (1828-1832) had signaled the expulsion of Native Americans and the opportunity for capital accumulation to proceed in the Mississippi Valley. No later than the 1840s had most tribes been removed from the Midwest and exiled onto the Plains (Prince 1997). While Native American populations were removed from the Midwest, the region experienced an 85 percent increase in population between 1820-1830 (Prince 1997: 151). Rough estimates suggest that the Native American population stood around 3-4 million in 1492; by 1860 the population had been reduced to 300,000 (Byers 1996: 207). The land and “Indian” questions would be resolved with the violent force of the state and capital’s need to accumulate.

The origins of the settler frontier were a clash of forms of living, knowing, and doing. In 1887, the General Allotment Act or what is more commonly referred to as the Dawes Act, institutionalized the elimination of property held in common. Tribal land that was once held in common was now deemed to be owned by individual families. While the Cherokee resisted individual ownership of land, the state enforced the new law of the land to transform “reservation ‘Indians’ into individualistic farmers” (Byers 1996: 203). This was not simply a solution to the land question, but it was a project to eliminate tribal authority and native religions. In short, the Dawes Act signified the final chapter in

resolving the land question in a long history of lies, deceit, dishonesty, and violence. The federal government had resolved the land question by fundamentally restructuring social property relations.

We will return to the important role of Native American tribes transforming environments that enabled white settler colonialism to develop on the frontiers. For now, the point remains that the origins of capitalism and capital accumulation in new territories has been premised on the violent acts of the state and elite classes. As discussed in chapter two, the transition from feudalism to capitalism entailed a fundamentally new way of organizing nature, both in its perceptual and material forms, and concomitantly who's lives and forms of work were valued. Capitalist development, then, unfolds through the interpenetration of opposites, 'progress' and 'retrogression' (Mies 1986) as constituting the co-production of nature, the pursuit of power, and capital accumulation.

State, Capital, Nature, and the Labor Question

Remaking the American landscape was an environment-making project to exclude certain forms of nature (Native Americans, bison, fire regimes, commons) as emerging forms of nature (capitalists, land, and white settlers) were put to work with the incorporation in what would become the Midwest frontier. To restructure the social relations of property, federal land offices were set up around the growing nation-state to auction off land to pay down debts incurred from the American Revolution. Under the Land Ordinance of 1785, land throughout the young nation was surveyed and mapped in order to create a system of private property. Surveyors were instructed to note property boundary lines, soil qualities, forest cover, location of mines and salt licks, intersecting waterways, etc. (Prince 1997). Surveying required highly skilled professionals that could

navigate harsh environments while measuring to the best of their abilities the uneven development of land and resources. The control and simplification of nature unfolded through the zone of abstract social nature whereby the state, capital, and science rationalized, delineated, and made legible land and resources. The great colonizing projects of world-history have required map-makers and surveyors. It was also the case in the Midwest.

While surveyors mapped the qualitative differences of the American landscape, the commodification, and thus quantification, of land functioned as a strategy of debt repayment and capital accumulation. In the nineteenth century land sales were primarily used as a strategy for revenue generation. Between 1800 and 1820 Congress mandated that public land sold be sold for at least two dollar per acre with a minimum purchase of 320 acres. The minimum acreage declined to 80 acres by 1817, but at two dollars per acre was well out of the reach for most would be farmers (Gates 1960: 55). With no limit on the amount of land one could purchase, land officers were incentivized to sell to fewer wealthy investors who would purchase hundreds and thousands of acres compared to many poor investors as revenues were based on the proportion of land sold (Gates 1960). While state surveyors continued to map and actively construct the frontier, capitalists and landholding companies were not far behind, in some cases were taking the lead, seeking to profit from landholding (Bogue 1963a). Aided by cheap credit from banks and high agricultural prices successive land booms emerged in 1818-1819, 1836, and 1855-1856 (Gates 1960). A recurring pattern of cheap credit and high agricultural prices went hand in hand with land booms that were followed with severe contractions in farming. By the

1830s, 28 million acres of public land was sold off to private individuals and companies (Bauerly 2016: 38).

The government's wholesaling of public land continued apace as a process of defining nature. With the 1850 Swamp Land Act the federal government gave over 64,000,000 acres to states in the hope that they would drain marshy and flooded lands for internal improvements and agricultural purposes (Gates 1960: 78). Wetland prairies were said to breed malaria, mosquitoes, severe fevers, and were generally seen as unhealthy environments (Prince 1997). They were problematic for farmers whose fields could be flooded for long periods. The struggle to define nature was expressed in the conflicting interests of the states and the federal government. States employed surveyors to map out swamplands that then had to be approved by federal government officials. States often claimed there was more swamp land than the federal government would designate under the act. Land offices sold most of the designated swamp land to speculators for as low as .10 cents an acre (Gates 1934: 102). States eventually used proceeds to build roads, create schools and colleges, and reduce debts. While the intended purpose of the act was to drain the wetlands to make farmers more productive, most did not have the capital or were willing to pay for drainage. However, proceeds from the sales enabled the development of community institutions. In this way, debt-led development compelled the drive to map, measure, and quantify land, which in the case of swamp land, entailed revenue generation to construct communities throughout the wetlands of the Midwest.

Cheap land was almost given away to speculators. To induce men to enlist in the War of 1812, Congress passed acts to give land to those men returning from war in the hopes they would farm. Congress guaranteed 160 acres to each man who fought in the

war. These “military tracts” existed in Michigan, Illinois, Arkansas, and elsewhere. In Illinois, there were 3,500,000 acres of military tracts set aside for veterans (Bogue 1963a: 39). Many of the veterans did not bother to cultivate the land they were assured and eventually sold to speculators for well below the government minimum. John Tillson, from Illinois, purchased more than 290,000 of military tracts, while two wealthy speculators from New York acquired over 130,000 acres in Illinois (Bogue 1963a: 39). Evidence suggests that most of the military tracts were not developed by veterans of the war, but were purchased cheaply from speculators (Gates 1960; Bogue 1963a). The two decades prior to the Civil War over a half million veterans were offered “40 to 160 acres each and totaling more than 57,000,000 acres” (Danhof 1941: 330). Most of the military tracts were sold below the government minimum of \$1.25 through brokerage houses in New York and Washington.

Mercantile capitalists turned speculators appropriated large landholdings through their fortunes on the world cotton market. New York merchants facilitated southern slave-produced cotton trade with Europe. By 1820, the United States had surpassed India’s as the world’s leading cotton producer, fueling Britain’s ‘empire of cotton’ (Ponting 1991; Beckert 2014).¹⁷ American merchants accumulated wealth of the world cotton trade, and built sound international credit, that they in turn invested in land speculation in the Midwest (Post 2011). Slave produced cotton in the plantation South linked to British and continental European industrialization and proletarianization through American merchants spurred economic development in the Midwest. In this way,

¹⁷ Cotton accounted for 54 percent of the total value of American farm exports (Schlebecker 1975: 74).

we can see how historical patterns of production and investment concentrated in the centers of accumulation facilitate the incorporation of new frontier spaces constituting the world-economy. The building of international credit enabled vast amounts of capital, particularly from Britain and Germany, to fuel infrastructural growth, particularly in railroading building and meatpacking.

As agricultural commodity prices increased financial investments and lending increased. Midwestern banks, whom themselves borrowed from banks in the northeast and Britain, facilitated lending to capitalists and eventual settlers. In the 1830s, during the peak of speculation, the Public Land Office sold more than 17.7 million acres, much of which was sold to speculators (Post 2011: 84; Post 1997). In 1837, as part of the developmental crisis in Britain, a massive contraction of credit from the Bank of England facilitated a chain-reaction across the Atlantic that abruptly ended expansion. Northeastern banks reduced credit and weaker banks in the Midwest collapsed. When the bubble burst and the crisis hit in 1837, farmers who purchased land prior to the crisis were left with large mortgages, large debts accrued from the purchase of livestock and farm equipment, and were required to pay for rising state property taxes. Speculators and landholding companies waited until land values bounced back from the crisis. When land values did bounce back farmers purchased land from speculators at a much higher price than the federal minimum of \$1.25 per acre (Post 1997: 222). In Iowa in the two decades leading up to the Civil War roughly 80 percent of farmers purchased land from speculators, not the federal government (Post 2011: 85). By the 1862 Homestead Act roughly two-thirds of privately held land was held for speculation (Swierenga 1968: 45).

As we will see, cheap credit via banks and the state were a central force in reshaping farming and agriculture in American capitalism.

Speculators purchased land with the intent of quick returns on investment, not to improve land. Land improvement for agricultural purposes was a risky investment for most speculators. As early 1840s, perhaps sooner, landowning speculators were forced to pay property-taxes in most states. The state of Illinois facing growing debts, “increased taxes 20¢ per \$100 in 1841, to 58¢ per \$100 in 1845, and 67¢ per \$100 in 1848, a jump of over 70%...In Iowa, property-tax rates increased 66%, from 76¢ per \$1,000 assessed in value in 1854 to \$1.25 per \$100 in 1860” (Post 2011: 89). Speculators sometimes evaded taxes, but eventually they were obligated to pay. No longer able to avoid property taxes, landholding speculators began lending credit to squatters and tenants that sought eventual farm ownership. Assessors appraised settlers at a higher value due to improvements on the land (Bogue 1963a). Squatters and other settlers received loans from speculators with high interest rates. Data on how many speculators loaned credit to settlers is limited. However, we can say with fair certainty that commodifying the land was a class project initiated by capitalists and the state.

While speculation throughout the Midwest was generalized, it ran amok throughout Illinois and Iowa. In Illinois, leading up to the 1837 depression, speculators purchased large landholdings in an accelerated fashion, and again in the boom years of the 1850s. In Iowa, speculators took advantage of the rising land values occurring in the 1850s, purchasing more land than in previous decades (Bogue 1963a: 41).¹⁸ Between

¹⁸ Iowa was the leading state in the United States for land purchasers. During the 1850s more than 12,000,000 acres were sold in Iowa at or above the \$1.25 minimum. Second in land purchased was Missouri at 7,500,000 acres (Danhof 1941: 330).

1849 and 1856 speculators purchased more than 6,000,000 acres of the 12,000,000 acres of public lands in Illinois (Gates 1931: 228). In Iowa during the 1850s more than half of the 25,000,000 acres of land that passed into the private hands were owned by speculators, with many residing outside of the state (Gates 1964: 67). Eastern investors, often associated with universities like Brown and Cornell, purchased great quantities of land throughout the prairies. According to Gates (1964: 68), “Never had there been such a concerted rush for land as occurred between 1853-1858 and never had speculators acquired such a large volume of land within one state as they secure in Iowa in this period”. At the closing of the frontier surveyors had surveyed and distributed over 71,500,000 acres, divided almost equally between Illinois and Iowa (Bogue 1963a: 29). Under the famous Homestead Act of 1862 settlers “acquired little land in Illinois and less than a million acres in Iowa” (Bogue 1963a: 30). The concentration of land ownership in hands of wealthy investors and speculators would structure the historical trajectory of farming in the Midwest.

Land speculation in the United States ran ahead of railroad development, but railroads were transformative to the frontier. The land business was one of the leading sources of economic growth in the nineteenth century in the United States (Gates 1934). The Illinois Central Railroad, as Gates (1973) claimed, was the greatest economic enterprise at the time, actively constructing markets to serve farmers and proletarians. Unlike many of the early speculators in the Midwest, the Illinois Central Railroad sought to create farming regions throughout the Midwest to serve domestic and international markets. The long-term profitability of the Illinois Central, and railroad companies in general, required the increased production and circulation of commodities. The Illinois

Central ran the first north-south line through Illinois, opening the vast Grand Prairies to farming where large areas were water-logged. In 1860, average population density for Grand Prairie counties were around 11. By 1870 population density had doubled (Atlas of the Historical Geography of America). The value of land increased significantly over the 1840s, but especially in the 1850s. Illinois Central was selling prime Illinois farmland for as high as \$20 an acre in a period when government sales of public lands were less than half that (Gates 1934). In part, railroads realized available land was becoming scarcer, but also that the development of rail tracks through the region would inevitably increase the value of land.

Railroad development in the mid-nineteenth century was pivotal to the transformation of Midwestern meatpacking. The restructuring of the meatpacking industry is best illustrated through Chicago superseding Cincinnati as the livestock butcher of the world, a classic case of an emerging frontier contributing to the exhaustion of the premier frontier. Cincinnati, proudly named “Porkopolis” for being the largest pork packing center in the United States in the 1830s, was situated near several major rivers that connected farms from Kentucky, Ohio, and Indiana.¹⁹ Porkopolis’s hinterland of livestock was tied to the river-based system of transportation. In those early years’ pork packing was done on a small scale by merchant capital. Pork plants were numerous

¹⁹ What made Cincinnati special was the development of the “disassembly” line that was to be the foundation of mass production manufacturing in the twentieth century. A highly specialized division of labor, later improved on by Chicago packers, advanced labor productivity for packers. Additionally, Cincinnati pork packers were able to process traditionally unusable body parts into commercial products like lard, glue, brushes, candles and soaps (Cronon 1991: 229). Chicago would later on mechanize the disassembly line to increase productivity on a never before seen scale. Prior to the Civil War the center of the pork packing world was Cincinnati.

across the Midwest along the Mississippi and Ohio rivers because of the lack of refrigeration and hogs poor disposition to travel long distance. While small packers were handling a few thousands hogs a season (winter to early spring), Cincinnati packing houses produced 230,000 hogs, which was 22 percent of the region's total packing (Walsh 1982: 48). Even in 1850 Chicago only processed 20,000 hogs compared to Cincinnati's 334,000 hogs (Cronon 1991: 229). Following the panics of 1857 and 1873, the meatpacking industry went through an uneven process of concentration and centralization, eliminating smaller merchants, and restructuring the industry which had become the leading branch of American manufacturing (Walsh 1982). Following the Civil War, the "Big Four Packers"—Swift, Morris, Armour, Hammond—had controlled the industry, specifically retail outlets, livestock prices, and profit margins in which the federal government ineffectively regulated (Fink 1998). Early meatpacking operations were local and small and lacked economies of scale. The upcoming capital-intensive packers, the "Big Four", began to restructure how livestock were produced, marketed, and traded. Railroads played no small role in this development. Chicago as the meatpacking frontier was at the center of these developments.

Several factors undermined the dominance of Porkopolis. What made Cincinnati the center of pork packing was its geographical advantages in its location to major navigable rivers that connected Corn Belt families, predominately the old Northwest, who supplied hogs from hundreds of miles away. This advantage was now an obstacle with the coming of the railroad revolution, opening Cincinnati to greater competition out west. Such transportation revolutions have been fundamental to displacing premier frontiers and giving rise to new frontiers by way of incorporating fresh cheap natures

(Marley 2016). A second element was that most leaders of the industry were merchant capitalists who were less aggressive than industrial capitalists that would come to dominate Chicago and specialize in meat processing. Industrial capitalists overall were gaining greater control over the economy, and thus were restructuring economies and ecologies to meet their profit needs. Lastly, farmers in the surrounding region of Cincinnati shifted from livestock to grain farming, concentrating on selling cereals (Walsh 1982). The new Midwest, Illinois, Iowa, and Missouri greatly expanded livestock farming beyond the levels of the old Midwest. These farmers marketed to mid-size cities and eventually to Chicago. Agro-industrialization, then, developed through rural and urban inter-regional competition, producing cheap nature complexes from greater distances while undermining older complexes.

While Post's merchant capitalists were a crucial link in resolving the land question and the determination of social property relations in the Midwest, it is not sufficient for explaining the complete transition to petty commodity production. Recall, from chapter two, the emergence of British hegemony and its limits to accumulation necessitated, indeed constituted, geographical expansion, incorporating cheap natures far and wide. In the process of securing cheap natures British infused capital initiated economic development in the United States. During the nineteenth century Britain was the most important international source of capital investments for the United States infrastructural and agricultural development (Hugill 2009). This was no neo-Smithian moment. Ascending hegemony, like Britain in the eighteenth century, required a systemwide expansion in the appropriation of cheap natures. By the turn of the nineteenth century British agriculture and concomitantly industrialization and proletarianization was

showing signs of exhaustion. By the 1830s a developmental crisis had matured in British hegemony. The exhaustion of Britain's agriculture turned on its own agrarian class relations and intensified the metabolic rift between town-country. Resolving the developmental crisis of Britain's hegemony and the renewal of world accumulation pivoted on the geographical expansion of the capitalist world-economy. As American merchants privatized the frontier, British merchants quickly capitalized on these opportunities. The Midwest was never solely America's frontier, it was one of many world frontiers constituting the modalities of world accumulation and world nature.

A Frontier of Cattle Kings, Landlords, and Tenants

Before delving into the transition from independent to petty commodity production, it warrants examining the role of capitalist "farmers" in Illinois and Iowa. Wealthy farmers immediately purchased the best farmlands around central and northern Illinois. This area contained high quality productive dark brown silty soil with brown subsoils, access to nearby rivers, and a healthy supply of woodlands. While speculators, railroads, and landholding companies were powerful forces in the making of the frontier, capitalist farmers were pushing the limits of farming in new ways.

The most well-known group of capitalist farmers were the notorious 'Cattle Kings'. As early as the first quarter of the nineteenth century, cattlemen acknowledged the "lush prairie grass" that made Illinois, and eventually Iowa, the 'feedlot empire' (Whitaker 1975: 19). As early as 1820s, feeders via merchant packers were shipping their livestock to New Orleans and to eastern markets. The cattle feeding business has always been a frontier-making project. In three successive stages a historical pattern had emerged: range country, feedlot, and market (Whitaker 1975). Range country, always

pushing westward onto fresh grazing areas, shifted from Ohio and Kentucky to Illinois and Iowa, and then finally to the Plains. Likewise, feedlot had followed a similar trend, moving from eastern to western states. Although, interestingly enough, Illinois and Iowa were able to remain the feedlot empire for more than century, in part due to its favorable ecological conditions for producing cheap feed—corn and oats. Feeders in Illinois could fatten cattle on cheaper prairie grass and corn at a much lower cost than feeders in Ohio and Kentucky. Land values in Illinois were lower than Ohio, incentivizing cattlemen to move westward. While eastern and international markets were important, western markets open with successive mining booms.

Cattle kings purchased large tracts of land for raising feed grains to raise livestock, like cattle and hogs. According to Gates (1973), these feedlots of the 1830s and 1840s were the early bonanza farms. These farmers could not realistically farm thousands of acres individually so they hired labor and leased land to tenants. Difficulties in managing wage laborers encouraged stockmen to lease land to tenants. Tenants mostly engaged in raising corn and small-grains as feed for the stockmen's cattle and hogs. Cattle king John Sudduth from Springfield, Illinois had three farms. On all three farms, likely farmed by tenants and wage laborers, 3,000 acres of corn were planted. Sudduth fattened between 600 to 1,000 cattle on the corn from the three farms, and imported more feed from other farmers (Gates 1973: 196). By 1840 central Illinois had established itself as a feed grain growing region for its wealthy cattle kings. With each successive frontier shift from range country to feedlot there was a corresponding increase in the appropriation of cheap natures. However, some cattle kings dominated the industry because of their ability to secure cattle that fattened quicker on less feed. The tendency,

however, has been that capitalist farming was a resource- and capital-intensive project that increased the organic composition of farming that in turn required the greater appropriation of cheap natures.

The boom and bust cycle cattle kings experienced during the nineteenth century, created many losers and few winners. High meat and grain prices during the 1850s and 1860s made many cattle kings profitable. The high prices of cattle outstripped the slower increased costs of production. However, in 1873 agricultural prices bottomed out, forcing some landlords who had borrowed heavily out of farming (Gates 1973: 201). The problem for the cattle kings turned landlords of Illinois and to a lesser extent in Iowa was that the cattle business tended to increase the value of land. This also impacted middling and poorer farmers who were struggling to purchase their own land. The increasing cost of land prohibited many from profiting from breeding and raising cattle, especially with competitive cattle businesses to the west contained cheaper land. High land values in Illinois and Iowa forced specialization in feeding operations (Gates 1973: 199). Isaac Funk and Jacob Strewn were both millionaires when they died, while John Alexander faced economic disaster as his cattle were infected with Spanish fever (Bogue 1963a: 94). On the whole, there were more losers like Alexander than winners like Funk and Strewn. The cattle business was for the wealthy who could afford the cost of investments in land, cattle, and feed, not for the middle or poor farm families.

Isaac Funk, one of the more famous cattle kings, moved from Ohio to central Illinois in 1826. By the 1840s Funk purchased over 27,000 acres of farm land in McLean County, Illinois (Prince 1997: 133). Funk, like other feeders, began reaching westward to Iowa and Missouri and to the south in Texas for cheaply sourced stock. These common

stock cattle processed the corn faster than the cattle from the Corn Belt, turning corn into fat at a quicker rate. He and others would purchase cattle at a year old, fatten them for less than a year, and then sell to agents of industrial meatpacking firms. Reports suggest that stockmen were profiting \$24 a head of cattle (Whitaker 1975: 22). By the mid-nineteenth century Funk was selling cattle in large masses to the meatpackers in Chicago. McLean County became an important Illinois county for the production of cattle. In the 1860, it raised 19,708 head of cattle, and by 1890 was raising 51,781 head of cattle (Atlas of Historical Geography of America). Selling around a 1,000 cattle a year, and perhaps even more hogs, to Chicago's meatpackers, Funk was able to obtain loans and purchase more cattle from far and wide. After years of working and building trust with meatpackers, Funk began operating on a contract with one Chicago packing company (Whitaker 1975). Funk was a forerunner in the prairies in many ways: purchasing more land than most, having a keen eye for buying stock, and signing contracts with food processors. Funk's accumulation of wealth enabled him to purchase more than 4,863 acres from the Illinois Central Railroad and 8,000 acres from the government (Gates 1973: 204). The Funk family dynasty would continue to shape Midwestern agriculture well into the twentieth century.

While cattle kings-landlords purchased many hundreds of thousands of acres throughout the Midwest in the nineteenth century, how common was tenancy? By 1860, one in five farmers were tenants in the Midwest (Post 2011: 86). From 1880 to 1900 tenant rates in the Midwest were on average lower than the United States average by around six percent (Wright 1988: 186). In 1880, 31 percent of tenants farmed in Illinois and around 24 percent in Iowa (Bogue 1963a: 62). In 1900, 39 percent of tenants farmed

in Illinois and 35 percent in Iowa (Atlas of Historical Geography of America). Data on tenancy rates prior to 1880 are sparse. The highest rates of tenancy were areas with the greatest concentration of landownership, which happen to be the areas with the most productive soils. The highest rates of tenancy were in central Illinois, with the lowest rates in southern and extreme northern Illinois. Tenancy rates were lower in northern Iowa. On the whole, in Illinois and Iowa, many tenants accumulated enough cash to climb the agricultural ladder to owner-operators (Bogue 1963a; Gates 1973). Those failed to accumulate the necessary resources moved further west. We can deduct from prior research that those farmers that were able to purchase their own land in Illinois and Iowa were better off resource wise. We might call this class the “petty bourgeoisie” of petty commodity producers, analogous to those English yeoman farmers that emerged in a better position during the transition from feudalism to capitalism.

This section has sought to demonstrate how the state and capital were dominant forces in the organization of nature on the frontier. The democratic intention of Jefferson to give land to yeoman farmers was an ideal that did not hold historically. Wealthy speculators seeking to turn quick profits bought up land as the state dispossessed Native Americans. Over the nineteenth century an agrarian class structure of landlords (cattle kings), tenants, and petty commodity producers emerged. Its development, as the next section discusses, engendered a world-ecological agricultural revolution.

Sodbusters: Farm- and Environment-Making on the Frontier

Farm-making on the American frontier was an environment-making process that incorporated ecologies beyond the point of production, including plants, livestock, white capitalists and settlers, and raw materials. Without a doubt, the making of the Corn Belt

was an extra-territorial project whereby humans and the rest of nature flowed into the fields and households of the region. Beyond the external cheap natures flowing into the Midwest, we must also explain the dynamics of the farm enterprise and household as inseparable to gender, ecology, and geography produced cheap food. If, as Post (2011) claims that we must explain the social conditions of existence for petty commodity production to explain its origins and development, then he fails to fully appreciate the contradictory unity of production-reproduction and geography-ecology. If we are to understand the transition to petty commodity production we must explain the agrarian household as a gendered and ecological form of production and reproduction. The following section explains the dynamic of the gendered division of labor that constituted the transition to petty commodity production.

Ecologies of Extra-Territorial Farm-Making

Farm-making was perhaps the most difficult transition in the life-cycle of the family-operated farm. It required capital, sweat equity, cooperation, forward thinking, and more. But before the construction of the farm the household had to make a long and difficult journey. Prior to leaving westward in a horse-drawn covered wagon, farm families spent between three months to a year preparing—selling or giving away goods to family and neighbors, men trained a team of horses and constructed the wagon, while women sewed a cloth roof and organized the mobile household (Riley 1981). Men overwhelmingly made the decision for the family to settle the western frontier. Women were reluctant to homestead in unforgiving conditions (Schwieder 1977). Neighbors prepared food and held large festivities for the departing family. The family would carry

with them a set of resources and knowledge gained from years of familial networks and neighborly exchanges that would assist them in their journey.

Settlers traveled by horse-drawn wagon along the National Road that stretched from Maryland to Illinois. Travel by covered wagon was cheaper for families than by rail or boat, but took considerably longer. For migrating farm families, the advantage of the covered wagon was that they could bring household items and farm implements. Some families inevitably brought with them too many household items, forcing them to scatter those items along the wagon-train highway. In Iowa before 1840 settlers via wagon “outnumbered those entering by steamboat nine to one” (Richman 1931, cited in Smith 1990: 196). After 1840, steamboats became the more popular form of transportation. During the migration boom of the 1850s the steam ferry at Rock Island was making 100 trips daily (Smith 1990: 196). This is not to suggest poor farm families were the ones that utilized wagons for transportation. In fact, poorer farm families did not have the capital to migrate west. Migrating westward was prohibitively expensive, associated costs included “transportation, animals, tools, seeds, provisions” (Riley 1981: 12). Most of the families that migrated west had built up resources and had established themselves as a farming unit. Farm men were generally not too young where they did not have the capital and resources, yet they were generally not too old where the move would have been difficult (Bogue 1963a). If feasible most families waited until children did not require so much care work.

The horse-drawn wagon that would be the family’s shelter for the journey had a gendered division of labor. Men took the reins, managing and driving the horses over well-worn rough paths that the migrating families before them had taken. Women cared

for the children, regularly organized the wagon for sleep arrangements, and prepared food. It was preparing meals that was the most difficult task for women. Unlike the kitchen she had left, where she had all the proper cooking appliances, on the wagon she had to develop her creativity under less than ideal conditions. Kitturah Belnap was exemplary of the creativity of pioneering women in her making of butter. At night, Belnap milked the cows placing the milked filled buckets under the wagon overnight. By the morning, she skimmed off the cream and placed in a churn. Placing the churn on the wagon, the family road all day over bumpy roads and by the end of the day Belnap had produced a tasty stick of butter (Riley 1981: 25). What also made cooking food difficult for women was the lack of wood on the prairies, a formidable problem for farm-making as well. When women were short on supply of wood she turned to mixing together “hay, prairie grass, or slough grass” as a fuel for cooking (Riley 1981: 25). Preparing breakfast or dinner a camp-fire could easily be interrupted by rainfall. The production of fuel was perhaps the most taxing task of the journey that fell primarily to women.

Based on work patterns the journey was considerably more difficult on women than men. When the family stopped, women were expected to cook meals, wash clothes, care for the younger children, while men would mend harnesses and rest. After women cleaned up the meal and reorganized the wagon, the family continued the journey, where she remained busy sometimes driving the horses or herding livestock, caring for the children, and improving the general living environment in the wagon. Women’s diaries indicated that although women took on a greater burden of reproductive work, they rarely complained of the hardships or inequity that characterized the gendered division of labor (Riley 1981).

When the family arrived to their plot the physical environment did not simply exist, it was made. Braudel's (1995) slowest structures of time, that of physical geography-nature, were crucial in the development of farming and agriculture in what would be the Midwest. During the ice age four glaciers, the Nebraskan, Kansan, Illinoian, and the Wisconsin, had deposited rock debris and carved out rivers. The Holocene period, following the Ice Age, had experienced alternating climatic shifts between cool-wet and warm-dry conditions and an overall change in the patterns of soil and vegetation (Hudson 1994: 15). As a result of glaciation and burning of woodlands, along with agricultural practices, by Native American tribes, the ecology of Illinois and Iowa was always shifting, reflected in the patterns of plants, soils, animals, waterways, and human activity. While on the whole soil quality was made favorable for farming, soil composition, along with landscapes, were uneven. The rough and uneven terrain of the Ozarks buttressed southern Illinois, while gently rolling hills and low-lying flatlands characterized central and northern Illinois and major parts of Iowa (see figure 1).

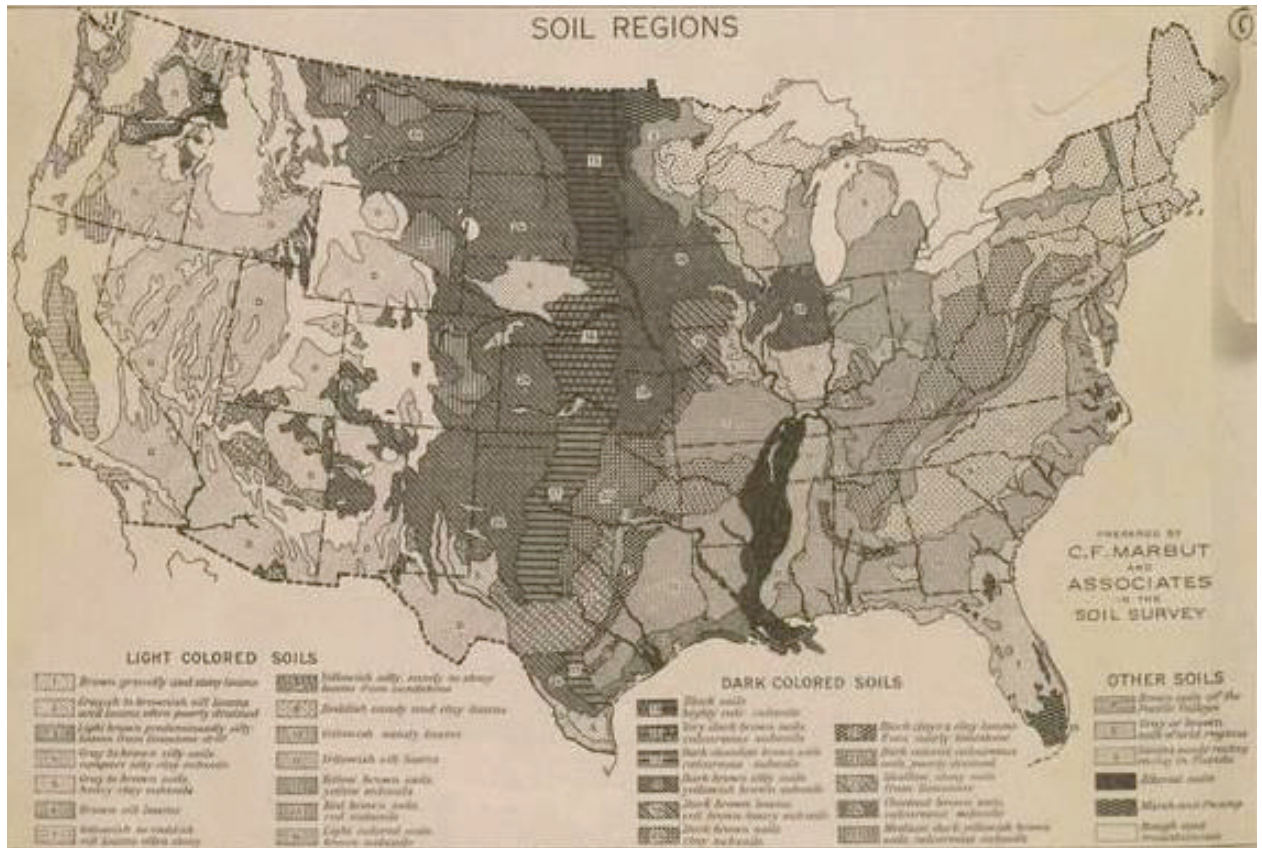


Figure 1
Digital Scholarship Lab, University of Richmond, *Atlas of the Historical Geography of the United States*.

Structural time-space was enjoined with conjunctural time-space in the making of the Midwest. Native American tribes regularly practiced setting fire to forests to drive out big game (Saur 1950, 1958). Burning of woodlands provided bison with rich grasslands to feed upon. Bison served multiple purposes to the socio-ecology of various groups. As grasslands advanced and retreated herds of bison moved, making large trails for groups of people to move more freely. Bison themselves were excellent carriers of plants, which developed wherever bison migrated (Hudson 1994). The perennial vegetation of the prairies generally has longer root systems than domesticated crops, allowing greater access to nutrients in the soil at deeper levels, resulting in the greater build-up of biomass than possible with domesticated crops (Glover et al. 2010). As burning continued for

centuries woodlands retreated and prairies expanded. The retreating of woodlands would be initially problematic for would-be settlers who relied on cheap plentiful supplies of nearby wood, but the bioaccumulation of soil nutrients was formative in farm productivity.

In the nineteenth century capital accumulation, state-power, and the production of nature formed an organic whole, operating through time and space. A historically specific configuration of humans and extra-human natures mobilized the socio-ecology of the Prairies and Plains, transforming swamps and wetlands into major agricultural zones. While the decision on where to homestead had been structured by land policies and speculation, settlers arriving in Illinois and later Iowa had three ecologies to begin the farm-making process: woodlands, prairies, and savannahs. Savannahs were said to have represented the best of both worlds in that prairies were available for grazing livestock and wood could be harvested nearby. Wood was a crucial resource in the farm-making era.

We must consider the obstacles and opportunities in the socio-ecology of the region before assuming that the march of civilization was a westward linear process. Southern Illinois was settled in the 1820s and was inhabited much longer with subsistence producers. Northern Illinois and the eastern third of Iowa were settled in 1840s. In the 1860s, and no later than the 1870s, was all of Iowa formed. Importantly, the Grand Prairie of Illinois was the final region to be settled (Bogue 1963a: 8). The Grand Prairie of Illinois “was originally a vast expanse of monotonously level grassland” (Hart 1991: 128). Settlers bypassed this region because it had inadequate supplies of wood, drinking water, and transportation. Moreover, the area was very inhospitable with its

concentration of mosquitoes and higher rates of malaria (Prince 1997). The Illinois Central Railroad, after receiving a federal grant of over two million acres, sought to open and settle the Grand Prairie, in what would become the heart of Illinois agriculture (Bauerly 2016: 50). Although the last region to develop, settlement of the Grand Prairie of Illinois was accelerated through the 1850s and was fully settled by the 1880s. Settlement acceleration occurred in a world-historical set of developments, including an increased demand of wheat from Europe, transportation revolution in canal- and railroad-building, and the great drainage projects.

In Iowa, most the state was covered in tallgrass prairies with smaller mixes of woodlands. Settlers first arrived in southeastern Iowa in the 1830s after crossing the Mississippi River that bordered Illinois and Iowa. Concentration of settlement along the Mississippi River provided several advantages for settlers. The Mississippi River was a crucial transportation network bounding Iowa to northern timber frontiers and southern markets that that consumed and reexported its farm commodities. Iowa's settlers, like the settlers of Illinois, some of who migrated to Iowa, moved into regions that contained a mix of prairie in woodland, although with much less timber available. Settlement moved from southeastern Iowa, angling across the state, and completing settlement in the northwestern section of Iowa by 1870s with large-scale drainage of wetlands (Schwieder 1996).

Our concern for this study is the tallgrass prairies of central and northern Illinois and most of Iowa, a region that was the epicenter of two agricultural revolutions. Within this ecological boundary existed wetlands and drylands. West of the Ohio River valley opened to grassland prairies, including the Grand Prairie and beyond. Soils were highly

fertile, and unlike the woodlands, were many feet deep. The tallgrass prairies were a rich mosaic of grasses and forbs that formed a deep, extensive root system. The physical environment of the Midwest, primarily Ohio to Iowa, was quite favorable for developing highly productive agriculture. Annual average rainfall ranged 30 to 40 inches, doubling the precipitation in the Great Plains (Schwieder and Fink 1999: 184; Hart 1991: 143). Not only is there sufficient rainfall for growing a variety of crops, but that rainfall is consistent throughout the summer months. Inconsistent rainfall and lack of access to water were constraints to Plains farmers (Cunfer and Krausmann 2016). The silt-loam soils that developed under the prairie grassland are ideal for farming. One study on Iowa soils classified 26 million acres as Grade 1 agricultural land (Marbut 1934), which “correlates well in amount and distribution with the black, fertile, prairie soils” (Smith 1990: 198). The rich soil can store moisture for long periods of time. Although the landscape is characterized by both eastern woodlands and grasslands of the prairies, soils ranged from a lighter color in the east to a black coloration (black color is an excellent indicator for high content of organic materials) in the prairies, an indication of uneven soil types, yet across the Corn Belt rich soil was highly fertile compared to eastern soils (Bogue 1963a). Soil-building of this variety accumulated occurred over thousands of years from a residue of prairie vegetation with expansive root systems (Smith 1990).

Disadvantages abound in the prairie lands. The open prairie grasslands were treeless, the soil was impenetrable, and settlers were plagued with fever and ague. Prairies fires were common (Whitney 1994). Timber had to be imported from the Great Lakes region for the construction and maintenance of farms in the prairies (Cronon 1991). Malaria and other diseases persisted as low-lying swamp lands created ideal

conditions for mosquitoes. The poorly drained black-soils of the Grand Prairie were not farmed until the mid-nineteenth century, even while western regions had developed farming in a major way. Poorly drained prairies would be a persistent problem until the last two decades of the nineteenth century. Given this, ironically, the difficult farming conditions during the first phase of white settlement would condition large-scale transformations across the landscape, turning obstacles into opportunities and creating one of the most productive farming region in the world. Braudel's (1995) plurality of time through space enables us to see the dialectic tension between geophysical environments and civilizational-making projects.

While the socio-ecology of the Illinois and Iowa prairies were favorable, farm-making was expensive and difficult. Recall, large portions of the best lands had been purchased by speculators, cattle ranchers, and wealthy farmers. Even lower quality land was expensive. By 1830 land-speculation had driven up the cost of farm-making, often beyond the means of most farm families. To purchase 80-acres of Illinois land, clear and fence land, tools and livestock, and to construct housing could cost between \$500 and \$600. Over the next several decades, as speculators and land-companies maintained a concentration of land, 80 acres of land alone in Illinois cost over \$1,000 (Post 2011: 85). In Iowa, the cost of farm-making was less, but not much (Danhof 1941). The result was that most farm families, even with modest means, were forced to "borrow money to purchase land and capital-equipment" (Post 2011: 86). Speculators and landlords, then, transformed natures from cheap to dear with the privatization of landholding.

Speculators and land-companies were enthusiastic about lending money to farm families, but rarely offered cheap credit. Land-speculators and their agents signed up

settlers at the Federal Land Office. Settlers were then given one year to pay in full of the newly acquired land with high interest rates ranging from “20% to 50%” (Post 2011: 86). Additionally, most settlers had to purchase other materials, including draft animals and livestock, seed, and implements which usually occurred through merchants and bankers on short-term loans. The result was that settlers were forced to specialize in cash-crops, usually wheat and corn-hogs.

As might be expected, for those unable to obtain credit, usually younger less-established settlers were forced into tenancy. Frederick Law Olmstead stated that “laboring man, who has not one thousand dollars at command will probably find his account in first accumulating the sum by working for others” (Danhof 1941: 325). Tenancy occurred immediately with the newly established frontier and, as we saw, was relatively stable throughout the nineteenth century.

The high costs (monetary and energy) of farming in the prairies did not end with the purchase of the land. Clearing forests remained the most labor-intensive and expensive activity settlers and would-be farmers would perform. The most common practice was cutting timber and brush into “windrows during the winter,” and after two years that timber would be used for rails and “the remained burned” (Danhof 1941: 340). This method cost around \$10 per acre. The quickest method for clearing the land was chopping the timber in the spring after trees had been girdled the previous fall that would ensure a more complete burning. This method cost around \$14 or \$15 per acre. Stump removal was no easy task, requiring a team of horses or oxen to pull decayed stumps from the ground. This process of “hacking, grubbing, and burning” did not last a few years, but occurred over at least a generation (Nelson 1995: 11). After the initial clearing

farmers contracted teams to break the soil. In the more forested areas breaking the soil ranged from \$3.50 to \$5.00 per acre, while on the outskirts of the timbered areas soil-breaking cost between \$10 to \$12 per acre (Danhof 1941: 341). To save money, farmers of modest means usually cleared the land themselves, although the cost of breaking soil could hardly be avoided. However, most settlers were under the gun to make good on debts and feed their families.

Settlers from the east had not experienced the soil conditions of the open prairies. The deep dark soils of the prairies housed an expansive intractable root system that challenged conventional iron plows which could not scour. Breaking the heavy prairie soils was physically demanding and expensive, requiring up to six oxen, at least two men, and capital. Custom plowing by wealthier farmers and landowners was common in the farm-making era, at a rate between \$2.00 to \$4.00 an acre (Bogue 1963a: 71). Custom teams could break one to three acres a day. By the 1840s, settlers were utilizing a John Deere steel plow to break intertwined root system. Twenty years later John Deere's plant in Moline, Illinois was producing 10,000 plows a year (Smith 1990: 198). By the 1850s plow manufactures imported steel from England that formed the moldboard. The lighter cast steel plows required fewer draft animals to haul. From 1833 to 1900 over 28.6 million acres of Iowa prairie was converted into agriculture, releasing unknowable amounts of stored carbon (Smith 1998: 94). What had been an ecological obstacle to farm-making had spurred economic growth in plow production while improving "soil- and labour-productivity" (Post 2011: 94), linking plow manufacturers in Illinois with steel manufacturers in England.

Like most aspects of farming there is a temporality involved in breaking prairie. Farm men were most likely to practice plowing. Through trial and error farmers learned that when breaking occurred in April thick grasses emerged in July. Breaking in the summer was problematic in that there was not enough time for the sods to rot before the fall. Eventually it was discovered that the best time of a year to break prairie was early or mid-May to July (Bogue 1963a). Breaking prairies at this time of year ensured that sod did not reappear in the summer but had sufficient time to decompose. If breaking is done improperly, in terms of timing and the work itself, productivity suffers. Debates raged on regarding the depth of plowing, whether it was more appropriate for the farmer to practice shallow or deep plowing. In the *Prairie Farmer*, Illinois farmer Mr. Hardup challenges L. Warren's recommendation for deep plowing, stating, "every year has brought additional proof to me that shallow breaking on the prairie is *most decidedly the best for all crops.*" (original italicized). Mr. Hardup goes on to say that deep farming is preferable after culture (weeding). In any case, farm-makers carrying debt could only afford to break several acres in a season, hence many rushed to plant sod corn. Capitalist farmers, because of their wealth, paid custom teams over several seasons so as not to rush the breaking process, ensuring higher rates of productivity when farming ensued (Bogue 1963a). In this way, prairie breaking was a socio-ecological project structured by agrarian class relations.

It is not an exaggeration to say the modern capitalist world-system was built on wood. From the Dutch shipbuilding and silver and sugar production of the early modernity to frontier North America, wood was life. In 1841, a writer in the *Union Agriculturalist and Western Prairie Farmer* wrote that major obstacle to prairie

settlement was a lack of access to timber (Bogue 1963a). No greater issue than fencing grabbed as much attention in the agricultural press. In 1860 Iowa farmers spent \$26,000,000 on fencing, inclosing 4,784,000 acres (Danhof 1944: 172). Estimates suggest that fencing cost about one-third of value of farms in the prairies. The voracious demand for wood was unsustainable on the emerging frontier, especially on the open prairies. Farmers traveled several miles to procure timber for fencing in their crops and livestock, a costly activity in terms of energy use. One study argued that the average one-hundred acre farm required “300 to 800 rods (1500-4000 m) of fencing” (Whitney 1994: 256). Resolving the timber-shortage unfolded through the incorporation of the timber frontier of the Great Lakes. As farm settlement advanced west of the Mississippi River into Iowa and beyond the “logging frontier cut its way through the pineries of northern Michigan, Wisconsin, and Minnesota” (Scarpino 1985: 19). Sturdy white-pines flowed down the Mississippi River, sometimes covering “ten acres of water and contain millions of board feet” (Scarpino 1985: 20). By the 1870s sawmills had sprouted up throughout Iowa’s hinterlands and along the Mississippi River. The farming frontier, then, became an important outlet market for the northern Midwest timber frontier.

Timber fencing was prohibitively expensive for most farmers. Farmers began a creative trial-and-error process with fencing. During the 1850s hedging was a common cheap form of fencing. Hedge fencing had been common in England and Europe, allowing immigrants to transplant their hedging methods to the prairies. Osage orange was the most common plant forming the hedge. A native plant of Arkansas and perhaps Texas, Osage orange was exported to the prairies as a cost-effective material of fencing. The initial outlay was “eight to fifteen cents per rod”, but many farmers complained of

the expensive upkeep (Bogue 1959: 119; Bogue 1963a: 78). Ditch, post-and-board and wire fencing were also common during the settlement period, but were more expensive. By the 1870s, barbed wire had resolved the fencing problem. J.F. Glidden and Jacob Haish began mass producing barbed wire in DeKalb, Illinois. DeKalb Fence Co. produced all sorts of wire fencing, but made a special line of fencing for hogs, an important and growing market in the Corn Belt (Prairie Farmer 1897). In the 1870s wire was priced at twenty cents a pound and by the 1890s had dropped to two cents a pound (Bogue 1963a: 81). Barbed-wire not only resolved the fencing question in the tree-deficient prairies, but was constitutive “in the creation of a multi-million dollar industrial complex, the American Steel and Wire Company of New Jersey, and the monopolization of 96 per cent of all barbed wire manufacturing facilities within one giant company” (McFadden 1978: 466). Once again, the socio-ecological obstacles to farming in the Midwest had generated new opportunities for agro-industrialization. The emergence of farming in the Midwest, however, was predicated on the external flows of cheap nature.

The frontier enclosures, then, not only took hold with speculation and landholding companies, but also through the physical enclosing of farmlands. Fencing was indeed revolutionary. In the open prairies, where timber was scarce and expensive, agricultural development accelerated. The biggest improvement was barbed wire’s ability to prevent cattle and other livestock from damaging crops. Farmers frequently complained of the damage of cattle on their corn. The enclosure of farmlands, as had been the case in England and elsewhere, increased livestock productivity, allowing breed improvement and greater efficiency in feeding (Hornbeck 2010). Illinois and Iowa farmers greatly expanded and specialized in livestock production. Concomitantly, land values across the

Prairies and Plains increased as private property became more delineated. Over the period from 1880 to 1900 there was an increase in overall production as more land came under the plow, as well as an increase in productivity. Most of these changes, however, occurred in the period between 1880 and 1890 (Hornbeck 2010). There is standing debate of whether barbed wire directly affected crop productivity or whether incorporating the drained wetlands was responsible for these changes. In any case, the fencing revolution transformed the ecology of the prairies by allowing the strict separation of crop and livestock, enabling the transformation of the prairies into the Corn Belt.

Farm-making was a continual process in which families constructed and maintained corncribs, barns, outhouses, etc. In McLean County, Illinois, the average value of farm lands and buildings per acre was \$9 in 1850. In Washington County, Iowa, the average value per acre was \$6 (Minnesota Population Center). Those farming in northern Illinois in the 1840s and 1850s and northern Iowa in the 1850s and 1860s were committed to producing wheat (Bogue 1963a: 124) (see graph 1 and 2). Spring wheat were said to have been most productive in these areas.

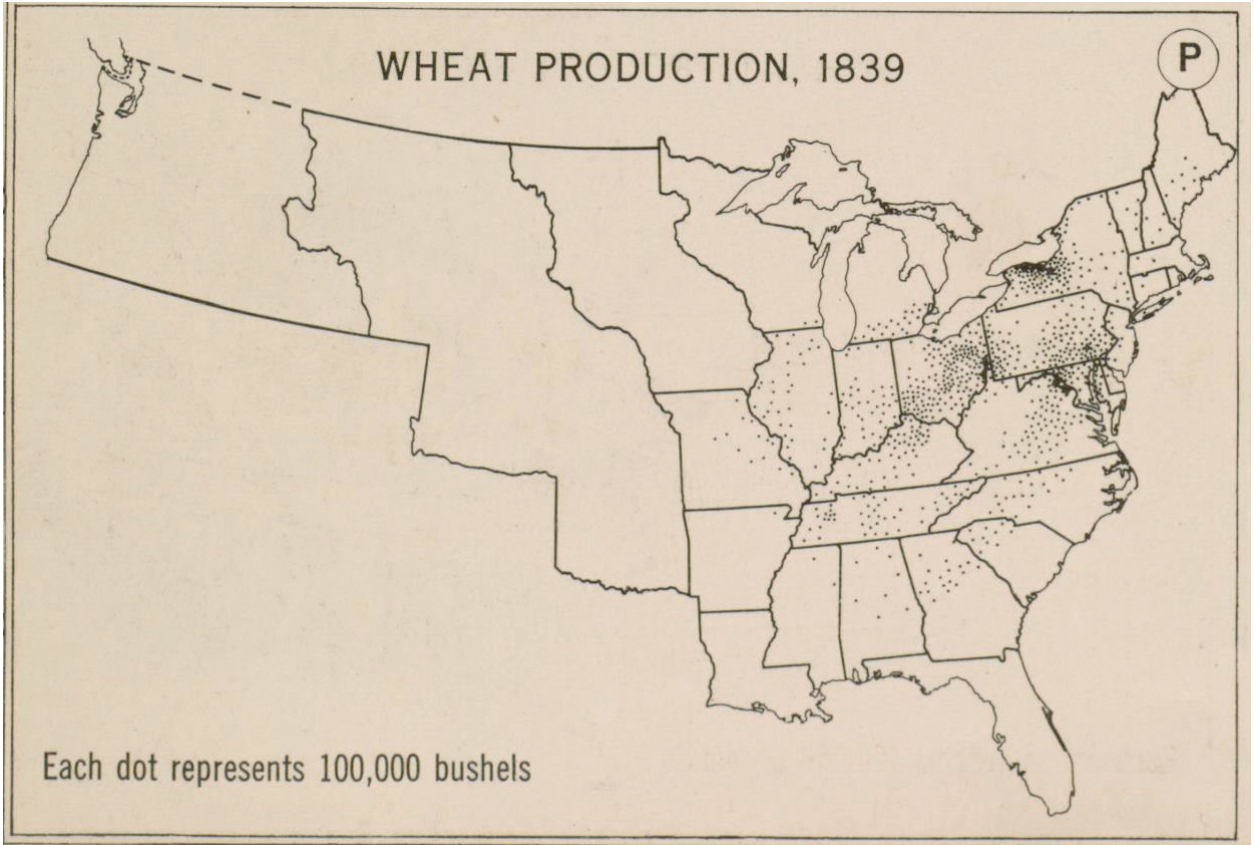


Figure 2
Digital Scholarship Lab, University of Richmond, *Atlas of the Historical Geography of the United States*.

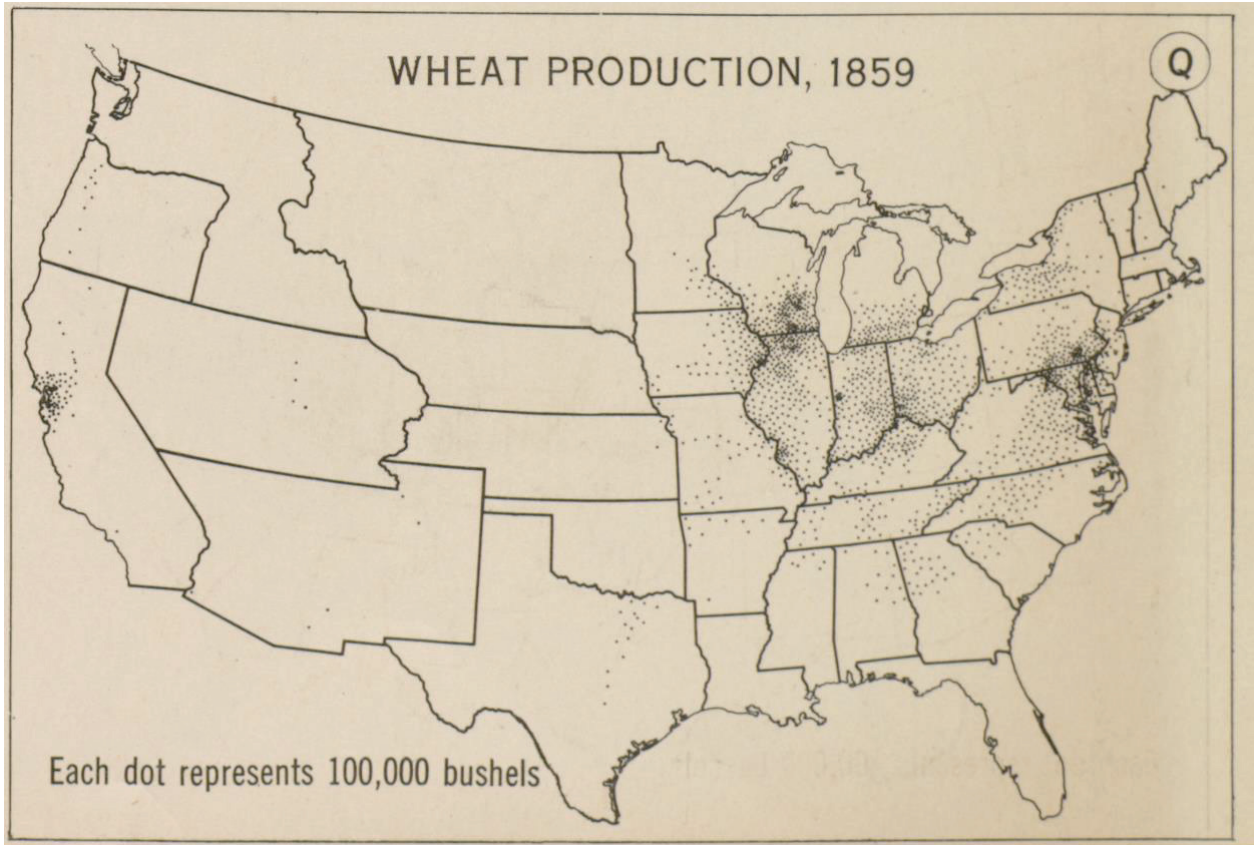


Figure 3
 Digital Scholarship Lab, University of Richmond, *Atlas of the Historical Geography of the United States*.

While central Illinois and central and southern Iowa are able to grow both spring and winter wheat, it is more profitable for farmers to raise corn and livestock (Abbott 1861). In central Illinois, Sangamon and Morgan Counties produced more than a million and nearly 800,000 bushels of corn in 1839, respectively, the most of any Illinois counties (Digital Scholarship Lab). In Iowa, many eastern and southern counties produced more than a million bushels of corn in 1859 (Digital Scholarship Lab). While the western migration of people and corn was evident throughout the mid nineteenth century, there was an intensification of crops, but especially corn and hogs.

Each region was dedicated to commercial farming as specialization ensued. Specialization, however, did not simply mean the elimination of mixed- or diversified

farming. In fact, diversified farming increased in the last quarter of the nineteenth century. Most petty commodity producers produced a myriad of crops such as wheat, corn, oats, barley, hay and livestock such as swine, cattle, and poultry. Diversity in commodity production protected farm families against the vagaries of market and nature.

Importantly, as this section and the previous section have made clear, land became commodified in the nineteenth century Midwest. Not only were speculators and landlords driving up the value of land, but the ecological conditions of the Midwest posed many obstacles to farming that when combined with the economic demands of the world-economy transformed natures from cheap to dear. For Midwestern farmers, the cost of entry into own-operated farms was high. The privatization of land and the corresponding increase in the cost of ownership of that land results in market-dependence or “sell to survive” (Post 2011). Undeniably, social property relations structured the transition to petty commodity production in the Midwest and Plains.

Women’s Double Burden in the Transition From Independent Production to Petty Commodity Production

The development of capitalist social property relations was only one, albeit an important, moment structuring the transition to petty commodity production. As the forces of production in farming were revolutionized productivity and specialization advanced. Those farmers that were able to mechanize and increase labor productivity were more likely to reproduce their conditions of existence. Those that were not able to successfully adapt to market-competition were forced to sell their land, joining the ranks of semi-proletarianized or proletarianized labor. The road to petty commodity production and proletarianization were fundamentally structured by the law of value.

According to Headlee, Byers, Post, and Bauerly, successful reproduction of petty commodity producers was conditioned on the ability of farm men to advance labor productivity, a process that resulted in the deepening of market-dependency. But if we are to fully to explain the transition to petty commodity production and its development, we must appreciate and historicize the paid and unpaid work of women and the rest of nature. Wallerstein and Smith (1992: 254) argue that “In a capitalist system, wages can never be the sole or even principal mode of payment of the vast majority of the world workforce. Wages must always be combined with other forms of income.” In a similar vein, Dunaway (1995: 92) states, “As it incorporates new zones of the globe, capitalism embraces two antithetical labor recruitment mechanisms (1) an historical proletarianizing of male into wage laborers who produce commodities for the market and (2) simultaneously historical generalization of non-waged labor that is overwhelmingly conducted by women in arenas that are never fully integrated into the cash economy.” While Wallerstein and Smith (1992) were focused on proletarian wages, it is not a far stretch to make the comparison of income derived from farm men’s commodity crops and women’s productive labor. In fact, Dunaway explains this development in the antebellum South. In the nineteenth century Midwest, the origins and persistence of petty commodity production operated through women’s double burden.

If we are to understand the necessary conditions of the operation of the law of value we must consider the work of women and the rest of nature. The dynamism of capitalism as a unique surplus appropriating historical system has forced households into joining together multiple productive and reproductive forms of work in the “economics of survival”. This is most clear in the case of the “farmer’s wife”. I argue that the transition

to petty commodity production in the mid-nineteenth century was a product and producer of women's double burden. The emergence of petty commodity production had as much to do with debt-driven farm-making and mechanization of grain harvesting, as it had to do with patriarchy, gender inequity, and undervaluing of women's work. As agrarian feminists have rightly pointed out, the experience and contribution of farm women has been left out of the history of agricultural development in the United States (Sachs 1983; Fink 1986; Kulikoff 1992; Jellison 1993; Osterud 1993; Adams 1994; Neth 1995; Schwieder 1996).²⁰ Our purpose here is to explain the transition to petty commodity production in the Midwest as part of an ecological, geographical, and gendered historical process.

The agrarian gendered division of labor, then, was also a moment structuring the transition to petty commodity production. As the initial farm-making stage passed, men and women engaged in different forms of work with differing demands. Men focused on crop production, mostly wheat, corn, hogs, oats, and hay. They mowed hay and weeded corn fields. In short, their work patterns were structured towards the production of primary farm commodities for market exchange. As Post and others point out, the law of value governed the relations of farm production for petty commodity producers, forcing farms to specialize commodity production, introduce new tools and methods, and accumulate capital. This was certainly true for most Illinois farmers by the 1840s, and no later than the 1850s in Iowa. Their survival, at least in part, pivoted on deepening market-dependence through obtaining credit to purchase "labour-saving tools and machinery"

²⁰ Bogue (1963a) seminal work on the transition *From Prairie to Corn Belt* does not include the experience and work of farm women. More than three decades later Hudson's *Making the Corn Belt* women are curiously absent from making the Corn Belt.

(Post 2011: 227) to advance labor productivity and temper the labor crunch associated with harvest season.

If nineteenth century Midwestern farming was made possible through high-interest loans, how did farmers service these debts? In a word, wheat. As “civilization crop”, wheat was both a domestic and international commodity, an almost guarantee in returns as bread and flour was essential for the proletarian diet. Midwestern farmers produced wheat for the national and world markets to service debts. After hogs, wheat fetched the best prices on the market. The nineteenth century wheat complex was a profitable opportunity for farmers and implement manufacturers, spurring economic development in the United States and Europe. The transition from independent household production to petty commodity production is most explicit in the production of wheat.

Wheat became the foundation of the transition to petty commodity production in the Midwest and the first American agricultural revolution. A confluence of forces was at play. First, as discussed in chapter two, British and much of European agriculture was stagnating, threatening the advancement of proletarianization. Second, and directly related, was the increasing reproductive crisis of Britain’s and Europe’s industrial working-class. In order for Britain to advance proletarianization under increasingly crisis conditions of the working-class, the Anti-Corn Law League abolished the Corn Laws in 1846 (Araghi 2009), opening import markets in grains. Russian crop failures opened the opportunity for American farmers to realize higher prices for wheat during the 1850s. Given the rising costs of housing and unions success in obtaining the male breadwinner wage, cheap wheat was a necessary condition for advancing proletarianization. Third, following Post (2011), the high cost of farm-making, related to both private property and

lack of cheap timber, created a large middling class of farmers in debt. The ‘economics of survival’ necessitated that farm families deepen their market dependence through commercialization and specialization, a process that compelled farmers to sell in order to survive. The solution for farmers was to produce more wheat for national and international markets.

Two farm-related developments that were fundamental to wheat as foundational to the twin processes of the transition to petty commodity production and the nineteenth century American agricultural revolution. First, Cyrus McCormick’s mechanical reaper was said to have “made bread cheap,” again (Olmstead and Rhodes 2008). Prior to the mechanical reaper, farmers used a hand-tool called a cradle to reap wheat. A reaper could yield between ten to twenty times more than the cradle (Mazoyer and Roudart 2006: 360). “With a cradle, one person could reap two to three acres per day, with additional labour being expended on raking and gathering the cut wheat. The horse-drawn, mechanical reaper combined the tasks of reaping and raking, increasing the acreage a single person could harvest to twelve acres per day, an increase in labour-productivity of approximately 75%” (Post 2011: 94). Horses replaced oxen for motive power as they were nimbler, faster, and “moved at a steadier-pace” (Danbom 1995: 112). Taken together, the wheat complex forming initially in northern Illinois, Iowa, and southern Wisconsin increased labor productivity, reducing “the number of worker-hours required to produce an acre of wheat from thirty-five in 1840 to twenty in 1880” (Danbom 1995: 112). While wheat acreage doubled over this period (Gates 1960: 287), women’s unpaid labor increased, having to feed ten men threshing team four or five meals a day for two to

three weeks. Indeed, the adoption of the mechanical reaper and use of threshing teams hardened the gendered division of labor.

The second and related development of making bread cheap was resolving the ecological bottleneck of wheat. Following the Mann-Dickinson (1978) thesis, Post (2011: 96) rightly points out that “the natural obstacles to capitalist social relations in agricultural made the adoption of the reaper necessary”.²¹ Wheat’s ‘production time’ is amongst the longest, upwards of forty weeks. The ‘labor time’, however, was rather short with the largest bottleneck in harvesting. The material demands of harvesting wheat required that the process be completed in two weeks, or else face spoilage and large crop failure. During harvest season the demand for wage-labor was high, constraining an already smaller labor pool. Soaking up all available proletarians in the countryside, capitalist farmers employed wage labor year-round paying out higher wages than was possible on smaller farms. The shorter temporality of wheat’s potential to spoil conditioned the purchase of mechanical reapers. The purchasing of the mechanical reaper meant increased mechanization (e.g. riding plows, harrows, and grain drills) (Danbom (1995), advanced specialization, and a hardening of the gender division of labor. Illinois and other Midwestern states were at the forefront of the origins of the first American agricultural revolution as part of a world-ecological revolution in the making. We will return to the revolutionary force in the next section.

²¹ The Mann-Dickinson thesis states that the disjuncture between labor time (planting and harvesting) and production time (when ‘nature’ takes its course) forces labor to lay idle, which “due to the seasonal nature of labor requirements...can give rise serious employment and recruitment problems” (Mann 1990: 39).

While the wheat complex appeared to be at the center of the transition to petty commodity production, women's double burden was the pre-condition of the transition. Two major developments shaped women and men's farm work in the nineteenth century. First, increased commercialization of farming restructured men's labor time around the production of commodity crops. This process has occurred in western Massachusetts in the early nineteenth century (Clark 1979) and several decades later in upstate New York (Osterud 1991). In the Midwest prairies, the transition occurred unevenly in the 1840s in Illinois and 1850s in Iowa. In the process, men spent less time performing subsistence work for home consumption and neighborly exchanges, although cooperative farming and exchange continued well into the twentieth century. Concomitantly, farm women moved *partially* out of the production of commodity crops, focusing more on domestic work and home production (Sachs 1983). As market-dependence grew among petty commodity producing households, however, men's productive labor became more valued, while women's productive labor was made invisible (Ankarloo 1979).²²

Second, home production was an essential income producing activity women performed. Home production, like butter- and cheese-making, selling or trading eggs, and sewing clothes to merchants and neighbors all generated income and/or lowered household expenditures. Household production increased during the nineteenth century as part of a combination of growing debts and cheap industrial manufactured household items were imported to rural towns. While household production was essential for the transition to petty commodity production, by the end of the nineteenth century industrial manufacturers began appropriating women's dairy work (Sachs 1983). Industrialization

²² On capitalist farms women rarely engaged in barn or field work.

in the nineteenth century unfolded initially through women's outwork and then later displaced women from productive labor. The increasing commodification of everything altered the income-producing activities of women's contribution to the agrarian household.

If farm men were working primarily with commodity crops, what were farm women doing? In a word, everything! From domestic work to household production to farming, women were crucial to the survival of the family farm. Diversity in the forms of women's work gave stability to the agrarian household, as much as diversity in farming gave stability to the vagaries of the market and weather. Without a doubt, the nineteenth century transition from independent farm production to petty commodity production passed through women and the rest of nature. And without a doubt, patriarchy and the double burden constituted that process in the mid-nineteenth century.

Farm men and women allocated their work among three domains: the fields, where men, with the "help" of women, were responsible for commodity crops; the barn, where men and women often worked together to care for livestock and maintain a garden; and the house, where women overwhelmingly performed domestic work, preparing food, cleaning, taking care of children, sewing clothes, etc. (Osterud 1993: 19). The spaces of work remained flexible, depending on the demands of household chores, livestock, and crops.

When the head of the household, the male farmer, could not meet the physical labor requirements of the field crop or livestock operation he called upon his wife and children to help out. "Helping out" was a short-term strategy the household utilized to limit expenditures on wages paid to hired men. Helping out entailed driving a team of

horses for plowing, picking corn, and putting up hay (Neth 1995). Gender expectations were such that farm wives free available labor could be called upon by their husbands at a moment's notice to help in the field, even while they were busy cooking, doing housework or gardening. Stopping or dropping what women were working on to help men indicated that what was important were men's work in commodity crops. For the most part, farm men did not reciprocate in helping women in domestic work. Household chores did not decrease when women helped men with livestock or field crops (Sachs 1983). Helping out involved completing domestic chores on top of working the fields.

To be clear, differences in the allocation of farm men and women's time in the field differed based on class and ecology. Women of the household of capitalist farmers rarely worked in the fields, concentrating their time on household production. Capitalist farmers utilized waged labor and tenants. In the Corn Belt labor allocation of men and women's work was diversified due to the diversity and demands of a variety crops. Planting and harvesting seasons women and children were essential sources of labor. One study concluded that prior to the Civil War, young children and teenage females labor contributions was "the equivalent of one and one-half to two months' wages of a hired hand in the Midwest" (Craig 1991: 75). While women in the Corn Belt contributed to labor in the fields, it was half as much as most specialized dairy farms (Craig 1991; Neth 1995). In the Dairy Belt, labor-intensive specialties like dairying required women to allocate significant time to barn and field work. There was greater equality between men and women on specialized on dairy farms as this required both men and women to work every day in the barns, milking, churning butter, and making cheese (Osterud 1991). In the Wheat Belt women and children worked less in the fields due to higher levels of

mechanization and an intense seasonal labor demands that could only be met with waged labor (Neth 1995: 22-23). The Corn Belt, as usual, was the middle ground between nearly gendered exclusive patterns of field work and the nearly full integration of women and children into crop and livestock production. The diverse middle ground of the Corn Belt ensured greater durability during successive farm crises.

Farm women's barn work generated necessary income for the family. Women regularly produced and sold butter, cream, eggs, and chickens (Schwieder and Fink 1999: 193). They marketed surpluses to pay for household goods, sometimes outside the cash nexus. Marketing entailed women transporting eggs to the local retailer who would ship the eggs eastward. Women often traded eggs for groceries and other household items (Fink 1986). Egg money allowed women to receive money if needed, or more often than not to trade for flour, shoes, or clothes. Local merchants would keep an account for each farm woman, but record keeping was casual and not precise. Merchants could extend credit for months for women. What became known as "egg money" was the product of women's work. Egg money was the equivalent to the grocery bill, but in some cases more than that (Neth 1995). Based on male diaries it seems that women's egg money was rarely accounted for in household income.²³ In part, this was due to the fact that as soon as women marketed their commodities they usually purchased household items. In the transition to petty commodity production, as men concentrated more energy into

²³ This could be a result of several factors. First, in most cases egg money was used immediately to purchase household items. Second, women's household production of commodities were frequently used in trade between merchants or neighbors, thus appearing outside of the cash-nexus.

commodity crops, women's work of "poultry-keeping and butter-making" (Osterud 1993: 22) were seen as nonessential and were periphery to the household.

Farm women's production of butter was an important economic contribution to the household. Women churned hundreds of pounds a butter a year in which they marketed throughout the year. When butter prices were low women marketed more cream, allowing flexibility in production and marketing. Iowan farm woman Emily Gillespie recorded in her diary on May 19, 1870, that "she sold 34 pounds of butter for \$6.80" and on the same day she purchased "2 ½ yards crash (62 cents), soap (25 cents), broom (35 cents) hat (34 cents), halibut (33 cents), cheese (35 cents, lemons (15 cents), salt (30 cents, and shoes for James (\$3.50)" (Nunnally 1989: 564). By women marketing their surplus butter they were able to pay for household items. But butter-making and marketing was not simply supplemental to the household, it was crucial for its prosperity. In 1870, James and Emily Gillespie sold \$551 in farm commodities, including wheat, corn, oats, butter, and cheese. That year corn brought in \$49 and butter \$77.70 (Strand 1942, cited in Nunnally 1989: 568). The cash value for butter in some years exceeded the cash value of corn.

While women's dairy work was an essential economic contribution to the household, their dairy work was soon devalued as a part of the industrialization of the dairy industry. The major transformation in the industrialization of dairying in the Midwest and almost uniformly throughout the United States and Atlantic world-economy (Shortall 2000) occurred in the development of butter factories (Shortall 2000). During the 1870s, commercial creameries began purchasing milk from farmers, cutting checks directly to farm men, not women. Creameries removed the actual production of butter

from the individual farm woman. The scale of production greatly increased with the industrialization of butter-making. While farm women might produce a couple hundred pounds of butter a year, creameries were producing well over 50,000 pounds (Nunnally 1989: 559-560). Eastern markets were willing to pay for uniform quality butter, that “country butter” often failed to deliver. The development of commercial creameries, increased regulations, professionalization of dairying, shifted dairy work from women to primarily men. Agro-industrialization of the dairy industry, then, increased the capitalization requirements of dairy farming while displacing women from that work. Commercialization, led-by experts and industry, emphasized that dairying should be scientific and rationalized. According to experts, the production of women’s “country butter” was “unscientific, inefficient, unprofitable, and of inferior quality” (Nunnally 1989: 561). Farm men in relation to the emerging dairy processing industry appropriated the traditional work of women.

The domestic ideology became an important force in making subjectivities. As part of the Mie’s second round housewifization in the *longue durée* of capitalism, the cult of domesticity imposed patriarchy and gender norms onto not only urban proletarian households but rural farm households as well. In a *Wallace’s Farmer* column written by Mrs. Wiscord of Tama County, Iowa on making the home more attractive, she wrote, “There are several things that are absolutely essential, namely an eye for harmony in arrangement, to know just what will harmonize to make a complete whole. The paper, paint, carpets and furniture must harmonize, so that the effect as you enter a room is restful and soothing.” As early as 1829, home manuals like *The American Frugal Housewife* cautioned women to be attentive to the problem of waste. In it, Lydia Child

wrote, “The true economy of housekeeping...is simply the art of gathering up all the fragments, so that nothing is lost. I mean the fragments of *time*, as well as materials” (Andrews and Andrews 1974: 317). Food waste, such as grease and fat was turned into raw materials for making soap. By emphasizing the home as women’s space, the domestic ideology made women’s productive work invisible, constructing women as symbolic housewives, even while in practice they carried the double burden.

Women shouldered nearly all the domestic labor of the household. Perhaps the most time consuming and life-making work was food processing and cooking. The production of use-values in the form of food derived from women’s work in gardens. In most cases, gardens were quite large on farms, feeding not only the immediate family but neighbors as well. Women grew vegetables, fruits, and herbs that improved the diet of families. Women and children gathered wild herbs and tree slips to plant in the garden and around the household. Maintaining a garden required constant effort in weeding and picking on the part of women and children (Riley 1981). In the nineteenth century, farm women’s relationship to food required processing, storing, and preparing, a process that would change as packaged meals and restaurants would lighten the work of feeding large families multiple meals a day.

The processing of food was a creative and time-consuming task of women. Processing raw materials into consumable goods was concentrated during the summer. Riley (1981: 60) details the myriad of raw materials women transformed into consumable goods: “Tomatoes were covered with red wax and placed in cans. Cucumbers were salted down in big crocks. Cabbaged was converted into sauerkraut in huge wooden barrels. Vegetables were cleaned and carefully deposited in the root cellar. Fruiters were stored in

crocks, were canned...Apples were wrapped in paper or hay, cut and dried, or cooked into apple butter.” In the fall, when men butchered a hog, women turned a single organism into multiple goods, including sausage, lard, bacon, ham, etc. (Schwieder and Fink 1999). Canning meat and rendering lard was a two-week long process in which the woman of the household along with women of the community participated. A butchered steer resulted in hundreds of jars of meat, while a hog entailed canning, curing, and handling (Fink 1986: 48). Canning meat was the most time-consuming of the food process chores. One farm woman commented on the process of canning meat: “We canned in a boiler...They will hold sixteen quart jars at a time, but you have to boil it three hours, and it takes an hour to come to boil. That’s four hours. It went that way for days. Then you made sausage. You had to grind all that” (Fink 1986: 49). By the end of the summer and into the fall women filled the root cellar with food that fed the family through the winter and spring. Women’s work in food processing was rather incredible considering the conditions of production under which they labored.

While food processing was primarily seasonal work, preparing meals was a year-round task. Women and their daughters regularly prepared three to four meals a day. For cooking meals women regularly hauled in wood and water. A constant supply of wood was needed to fuel stoves for cooking meals and then cleaning dishes. The workload intensified during the harvest season when women had the burden of cooking larger meals for a custom team. For farm women, threshing season brought excessive work. Threshing could take up to two to three weeks per farm, depending on the size of the farm and crop. Farm women were expected to keep clean house and sleeping quarters for men. Moreover, women had to clean their clothes and feed them. One farm woman

recalls baking ten loaves of bread every day during the threshing season (Fink 1986: 152). Farm women made, served, and cleaned up three to five meals a day were to the crew. In one case food preparation started as early as 3:30 a.m (Schwieder and Fink 1999: 194). Supper might begin at nine or ten o'clock at night. Women served a pre-lunch meal to men out in the field, allowing her to escape a hot kitchen, but requiring that she juggle a hectic schedule of domestic and field work. Farm women were judged by other women and men on the quality of their meals. While Post (2011) would consider the judgement of women's meal preparation a subjective force, as a relationship of the division of labor, it can hardly be ignored for reinforcing the gendered relations of social reproduction. While the mechanical reaper and thresher made have increased labor productivity in the fields, it also increased the unpaid work of women during threshing season.

In the early-pioneer era, store-bought clothes were limited to wealthier families. Seamstresses were often hired by wealthy farm families to lower women's labor time spent on making clothes (Strasser 1982). Most farm women made the clothes every member of the family wore. Starting with plants and animals, farm women appropriated flax and wool to turn into thread, a process that took hours of cleaning and "combing" the materials. After forming the flax and wool into thread, women had to weave the thread into cloth. "This cloth was then colored with dyes that women produced themselves from plants such as indigo...red sumac" (Riley 1981: 67). Afterwards, farm women sewed by hand every article of clothing. For several decades women handstitched clothes for their families. By the 1850s merchants and dry-good stores popped up around river towns and began supplying cheap yard goods and other materials for making clothes (Riley 1981).

Women were eager to purchase cloth-making materials as this reduced the necessary labor time for producing clothes for the family. But when cheap imports were available and household incomes increased due to women's productive labor, they purchased from town merchants, deepening market-dependent relations.

While the McCormick reaper was becoming more common on Midwestern farms in the 1850s, Singer's treadle sewing machine was replacing the iconic spinning wheel. Home cloth production was revolutionized by treadle sewing machines by drastically reducing the number of hours' women spent sewing clothes by hand (Riley 1981). By the second half of the nineteenth century men's clothes were produced by manufacturers who initially subcontracted to women in a "putting out" system that allowed cheap clothes to proliferate (Strasser 1982). This would allow women to dedicate more time to income producing activities like making butter and cheese or expanding the poultry operation, or produce clothing for neighbors. During the second half of the nineteenth century women supplemented household income with sewing work for local storekeepers (Nunnally (1989). The decision for a family to purchase either a sewing machine or a reaper is indicative of the interpenetration of patriarchy, work, and capitalism. A sewing machine at the time ranged from \$25 to a little over a \$100. A mechanical reaper and mower cost \$155 and usually more (Riley 1988: 59). Overwhelmingly, men choose to purchase the reaper, not the sewing machine. However, the popularity of the sewing machine in the nineteenth century suggests that it was not far behind in use in Midwestern households, again, deepening market-dependence.

The ability of the family to purchase a mechanical reaper and thresher or pay a threshing team was predicated on women's work. Boarding became an important source

of income for the family, a responsibility that fell to women. Emily Gillespie recorded in her diary that she boarded on average two or three lodgers a week. Emily usually charged a dollar per night per lodger that included meals and a place to sleep. One night Emily had eight lodgers stay over and the next morning they left and paid her husband James \$9 (Schwieder 1977: 162). Other women, like Sadie Stillson recorded in her diary that over a three month period in 1870 31 people lodged at her farm (Schwieder 1977). Beyond lodging travelers, women also lodged wage workers that were periodically used throughout the year. Farm men notoriously paid laborers low wages knowing that they would receive free meals and lodging. Those free meals and lodging added to women's unpaid work, suggesting that this work was not valuable or worth paying for.

Women's socio-ecological reproductive work in bearing and raising children was perhaps the most important labor process performed. Frontier families had ten percent more children under ten than eastern families and usually birthed between five and eight children (Wheeler et al. 1977: 26; Kulikoff 1992: 48). A social, and no less a biological relationship and process, large families were essential for encouraging population growth and as sources of farm labor. No rest for the weary, however. In a matter of weeks, and sometimes days, women were back performing domestic work, cleaning, cooking, and more. Older daughters and neighbors usually helped out with domestic work during short periods of rest. The relentless demands of patriarchy and capitalism necessitated women forgo rest.

Following the labor process of bearing children, women were the primary caregivers, socializing boys and girls into initially domestic work. Young boys and girls helped in the garden, milked cows, herded livestock, all at a very early age. Women's

care work socialized boys into farmers and girls into farmers and housemakers. While young children may have lightened the load of domestic work, women's primary role as caregiver required multitasking and supervision, a process that was difficult to manage given that were expected to also "help out" in the field. For pre-teenage boys and girls patterns of work were less structured by the gender division of labor that had characterized farm men and women, and more around domestic work.

As children became teenagers the gender division of labor became more clearly defined. Fathers further socialized boys into field work, whereby boys learned to operate farm equipment. Mothers socialized girls further into domestic work, such as canning and churning, gardening, and dairying. Older daughters, like their mothers, however, were frequently called upon to husk corn, cut thistles, and stack hay (Neth 1995: 21). Older sons were often contracted out to capitalist farmers for wages or petty commodity producers for work-exchange. During the 1840s corn planting season boys were paid twelve cents a day (Schob 1975: 189). Older girls served as domestic workers in wealthier and middle-income homes (Neth 1995). In the 1840s the weekly average wage for domestic work through various states was .96 cents in Ohio, \$1.14 in Illinois, and \$2.25 in Minnesota (Schob 1975: 207). By the 1850s wages continued to increase for domestic work, especially in the most remote frontiers in Minnesota where there was a shortage of farm girls. The scarcity of hired girls was an intractable problem on the frontiers, a problem that increased the burden of women's work and conditioned the purchasing of greater manufactured goods to ease that burden. As the life-cycle of the farm shifted from younger to older children the gender division of labor became more pronounced, while families could count on the wages of their teenage sons and daughters.

The “child crop” was the most important of the farm crops. Socio-ecological reproduction of the daily and intragenerational needs structured women’s roles and constituted their demands of productive and reproductive work.

However, farm families became smaller during the mid-nineteenth century. Under the cult of domesticity, child nurture, and declining prospects for sons to purchase cheap land, birth rates in the Midwest declined to three or four by 1860 (Kulikoff 1992: 51). Furthermore, schooling became an important dimension of farm children lives, an expensive imposition placed on farm families as they had to pay higher taxes. Smaller families resulted in farm women receiving less work from children, especially daughters from middling and capitalist farm families who were receiving higher education, performing domestic work, and other waged labor. It is no wonder, then, that women who faced the double burden and the loss of child labor were ready to purchase manufactured goods that may have lightened the physical burden of domestic work and household production.

While farm women performed nearly every task of farming, they were rarely considered farmers. The designation of farmer was primarily restricted to men. Censuses regularly counted farm women as unemployed, even while they joined men in the field. Women’s diaries in the nineteenth and twentieth centuries indicated that women themselves rarely thought of themselves as farmers, even though they spent significant time and energy raising and harvesting crops (Fink 1986; Neth 1995). Women were the “invisible farmers” (Sachs 1983), whose work was undervalued. As market-dependence deepened, the designation between men as farmers and farming and women as housewives and helping out only hardened. An important consequence of the

housewifization of farm women and their “invisible” productive labor was that it justified men’s “power to control the allocation labor” (Osterud 1993: 15) and resources over the household. In this way, gender inequity was structured into the patriarchal gendered division of labor.

The above suggests that women’s demands to ease their double burden entailed purchasing more commodities and hence deepening market-dependence. While independent farm families practiced “safety first” farming, this historical reconstruction suggests that the double burden placed on women and their demands to ease that double burden accelerated the transition to petty commodity production. It certainly wasn’t the case that women were against “safety first” farming, but that their socio-ecological conditions of production and reproduction when compared to men was on the whole harsher. While Kulikoff (1992: 47-51) makes a similar case with focusing mostly on northeastern agrarian households, he does not argue that women’s paid and unpaid work allowed the purchasing of the mechanical reaper that became the all-important moment in the transition to petty commodity production. However, as will be made clear later and in the following chapters, a class of “petit bourgeois yeoman household”, not capitalist households, emerged in the Corn Belt that were stable, flexible, and dynamic, a product of the socio-ecology of production, reproduction, and world accumulation.

The First American Agricultural Revolution (1840s-1900)

The first American agricultural revolution was a product and producer of industrialization in the Midwest and worldwide. We are concerned about these developments as it pertains to rising farm productivity, capital accumulation, and the process of proletarianization in the centers of accumulation. I focus on wheat as it was the

key commercial crop in the transition to petty commodity production and the foundation of the first American agricultural revolution. Northern Illinois and eastern Iowa were at the epicenter of the first American agricultural revolution that later blossomed in the Plains.

Recall, that in the introduction, following Conkin (2008: 97), I defined an agricultural revolution as at least a 50 percent increase in “full-sector productivity during a single generation”. Advancing productivity developed in fits and starts, an uneven development for sure. Between 1820 and 1850 total factor productivity in the Midwest “grew at annual rates of 2.1 percent”, and from 1850 to 1860 to 2.4 percent. Over those same periods “labor productivity grew at annual rates of 2.3 percent” and 3.2 percent respectively (Bauerly 2016: 59). The mechanical reaper and mechanical thresher, along with the seed drill, accounted for roughly 50 percent of labor productivity in the nineteenth century (Post 2011: 93). Advancing agricultural productivity was highly dependent on the importation of wheat varieties that could be adapted to emerging agricultural zones (Kloppenburg 2004; Olmstead and Rhodes 2008). Farm machinery increased labor productivity in wheat and other small grains by four to six times, and twice as much in corn between the 1830s and 1870s (Bogue 1963b: 21). Between 1840-1860 to 1900-1910 estimates for labor productivity increases are “2.6% per annum for wheat from 1.5% to 2.15% for corn” (Post 2011: 93; Parker and Klein 1966). “Productivity advances in wheat cultivation led all crops with a 94.6 per cent decrease in labor requirements, from 61 to 3.3 hours per acre between 1830 and 1896” (Pudup 1987: 205). Over the nineteenth century pre-harvest labor productivity in wheat increased by more than 50 percent, while harvest labor productivity also increased by more than 50

percent (Parker 1984). The great productivity gains in corn would occur until the second agricultural revolution.²⁴ While labor productivity advanced unevenly in the United States over the nineteenth century, the biggest advances occurred in the Midwest (Parker 1984) (see graphs 1 and 2).

Pre-Harvest Labor Productivity of Major Commodity Crops in the Northeast, South, and West

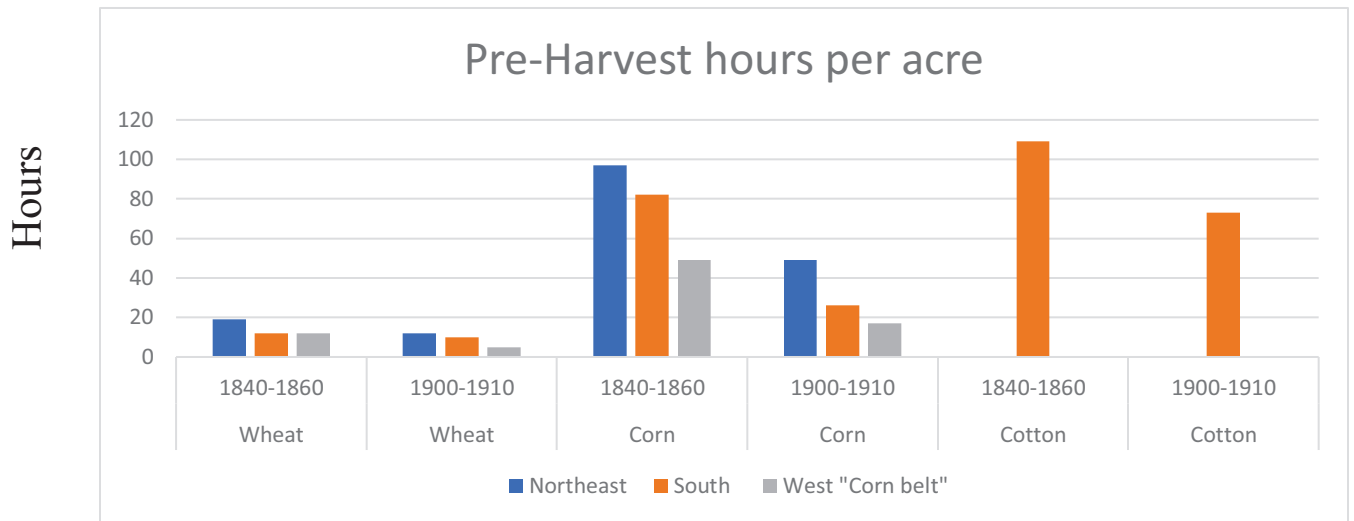


Table 1
Source: Parker 1984: 160

²⁴ During the nineteenth century, the Corn Belt “produced [corn] yields of forty to sixty bushels per acre” (Warman 2003: 180), with Illinois and Iowa on the high end of the range.

Harvest Labor Productivity of Major Commodity Crops in the Northeast, South, and West

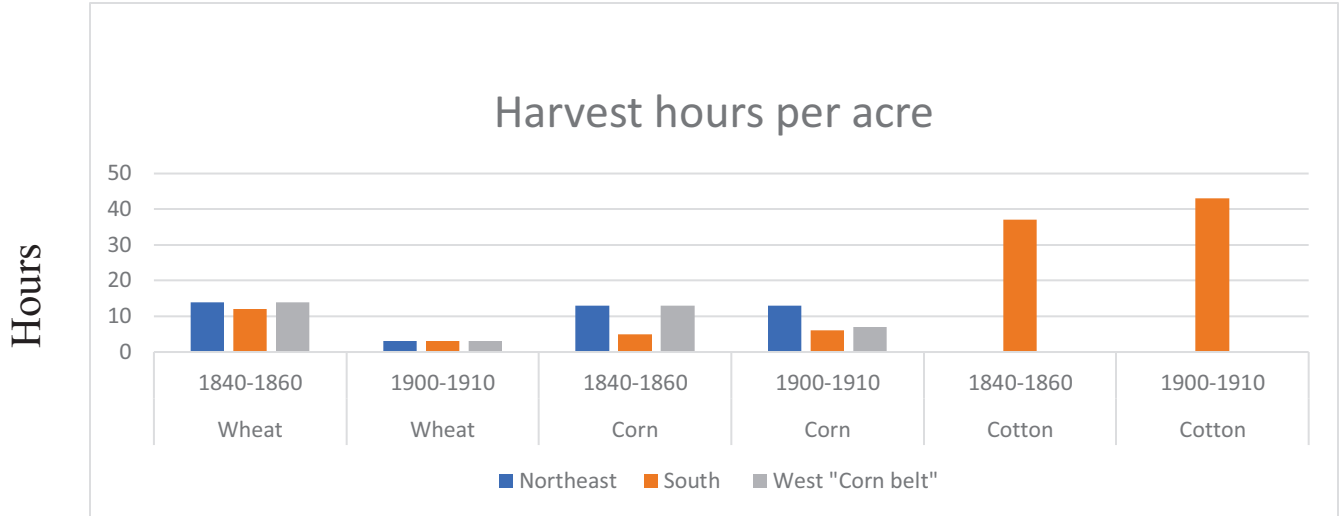


Table 2
Source: Parker 1984: 160

American farm commodity exports increased throughout the nineteenth century, with Britain serving as the most valuable market. From the birth of the nation, United States exports to Europe rose every year, making significant increases in 1835 and 1847 (Schlebecker 1975: 75). Between this period cotton, primarily from the American South, export earnings increased from \$30 million to over \$60 million before dipping in the 1840s (Nourse 1924: 13) (see table 1). Cotton continued to be a major export commodity, accelerating in the 1850s, but declining during the Civil War. During the Civil War period when Britain experienced several years of failed harvests, Midwestern grain exports increased. While Russia and Prussia maintained historical levels of grain and meat exports to Britain that when combined with harvest failures in France, allowed the United States to fill the gap. American grain and meat exports more than tripled during the Civil War years (Nourse 1924: 17). Between 1850 and 1899 American wheat exports

grew from 2.1 million of quarters to 22.4 million of quarters (Harley 1980: 227).²⁵

American meat exports were also significant for this period. By the end of the 1880s, the United States exported to Britain over 120,000 tons of beef, dwarfing New Zealand and Argentina's beef exports (Critchell and Raymond 1912: 13). By 1900 the value of total meats exported was \$114,000,000, only \$27,000,000 less than wheat and wheat flour exports. Pork products by far made up the largest amounts of meat exports (Whitaker 1975: 147-148) (see table 3). Agricultural exports helped finance American manufacturing (Schlebecker 1975).

Export Earnings of American Agricultural Commodities, 1805-1860

Year	Livestock and Animal Products	Non-meat Food	Cotton
1805	\$3,385,000	\$11,752,000	\$9,445,000
1815	1,332,000	11,234,000	17,529,000
1825	3,314,793	7,526,718	36,846,649
1835	2,901,896	8,250,577	64,961,302
1845	6,206,394	9,810,508	51,739,341
1855	17,178,080	23,651,362	88,143,844
1860	20,215,226	27,590,298	191,806,555

Table 3
Source: Nourse 1924: 15

American Exports of Major Agricultural Commodities, 1867-1896 (measured in millions)

Year	Wheat	Corn	Beef and Products	Pork and Products	Cotton
	<i>Bushels</i>	<i>Bushels</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1867-1876	101,069	48,485	169,353	696,278	436,602
1877-1886	254,938	138,182	444,336	1,815,249	3,707,070
1887-1896	286,153	118,586	918,975	1,988,382	5,176,305

Table 4
Source: Nourse 1924: 25

²⁵ Between the 1850s and the first world War world grew from five million quarters to 75 million quarters, a growth rate of four and a half percent annually. Between 1875 and the first world war world population grew at three-fourths a percent annually (Harley 1980: 226).

During the nineteenth century, agricultural revolution a pattern emerges in relation to exports. From the beginning, American cotton had been an export driven commodity, feeding Britain's textiles mills. Over the nineteenth century American cotton exports continued to rise, only dipping during world economic contraction. While cotton was the foundation of Britain's initial industrialization, recall that wheat and rye prices had skyrocketed during Britain's developmental crisis, 1825-1845, acting as a brake to industrialization. Also recall that Britain had an overabundance of cotton during the crisis. What Britain's working class needed more than cheap clothing was cheap food. Wheat, too, was primarily an export commodity crop. While exports increased throughout the nineteenth century, several dips occurred following the Civil War because of international competition. Unlike cotton and wheat, corn was a primarily domestic commodity crop. Measured in bushels, corn exports were almost always less than half of wheat exports. Corn exports declined in part due to its use as a feed for the increased production of hogs and cattle. Only during the last decade of the nineteenth century did corn begin to close the gap, which was a result of draining the Grand Prairie. Overall, farmer's producing corn were less dependent on export markets as they used corn as a feed for livestock. Beef and beef products and pork and pork products also increased throughout the nineteenth century, with pork (and pork products) always making up a greater portion of meat exports. Over the nineteenth century American exports left its mark on the world market.

The success of the nineteenth century agricultural revolution can also be measured by proletarianized labor.²⁶ From 1860 to 1900 18 million less people in the United States made their living in farming (Pudup 1987: 205). Between 1821 and 1932 over 34 million mostly European immigrants entered the United States, primarily as proletarians (Warman 2003: 178). The population of expanding industrialized cities “*tripled* between 1850 and 1910” (Moore 2002: 186, original italicized). Importantly, for Britain’s industrial revolution, a cheap grain invasion from the United States increased real wages (O’Rourke 1997: 775). Cheap food improved the standard of living of Britain’s proletarians, enabling them to spend a greater portion of their monthly household budget on housing (Secombe 1993). Between 1870 and 1900 the general United States population nearly doubled, with the industrial working-class expanded more than a third of the population (Agnew 1987: 56).

Cheap American wheat invaded European economies to such a great extent that Europe’s peasantry was in ruins. In the last quarter of the nineteenth century wheat prices fell by 27 percent in Germany and 30 percent in Sweden (Agnew 1987: 53). Eastern and Central European farmers, too, faced crisis conditions (Potts 1990). The productivity revolution that debt-laden Midwestern farmers generated had constituted a ready-made market in renewing Britain’s and America’s industrial revolution. The first American agricultural revolution, then, was no less a productivity revolution, but a world-ecological revolution, absorbing capital investments and appropriating cheap natures far and wide as it fundamentally transformed world accumulation and world nature.

²⁶ Moore (2010: 399) rightly points out that urbanization is “rough-and-ready index of proletarianization”.

In the first half of the nineteenth century eastern states led in the manufacturing of farm equipment. After 1850 Illinois became the leading state of farm machinery in shares of product value (Pudup 1987). The Midwest including the Plains manufactured nearly half of the total of farm implements and machinery in 1850 (Bauerly 2016: 57). The growing differentials in land-labor ratios of the Midwest and East undoubtedly was a factor in the growing demands for mechanization of the prairies and Plains. The mechanization of farming in the Midwest in the mid-nineteenth century generated forward and backward linkages. There was an increase demand in iron and steel for plows, hoes, and horseshoes, while there was also an increase demand in household products, like iron stoves, kettles, and skillets. The demands of farming and householding figured into the development of nineteenth century metallurgy and the expansion of iron foundries. By 1870, the manufacturing of agricultural machinery alone accounted for 25.5 percent of the value of all U.S. machine production” (Page and Walker 1991: 294). At the turn of the twentieth century the iron industry would be the United States “premier industrial sector” (Page and Walker 1991: 296), an industry with agrarian roots. While McCormick and other reaper manufacturers began selling reapers in the 1830s, the mass production of mechanical reapers did not occur until 1848 with the increasing demands of Midwestern farm families. Cyrus McCormick moved his Virginia operations to Chicago to serve a fast-expanding home market (Headlee 1991). Mass production combined with aggressive marketing and installment plans allowed the widespread adoption of mechanical reapers across the Midwest and Plains. By the early twentieth century

McCormick took his success internationally, selling reapers and threshers to Russian farmers.

The production and processing of wheat fed into industries like flour milling. During the last quarter of the nineteenth century Minneapolis became the flour mill center of the world.²⁷ New milling techniques derived from Hungarian grain mills had been adopted into the milling complex of the Midwest (Morgan 1979). Because wheat required processing before consumption, milling firms were integral to national and world markets. Between 1850-1860 flour milling ranked fourth nationally in value added by manufacture and was the leading industry in the United States, “in terms of the total value of products produced” (Bauerly 2016: 63) (Page and Walker 1991: 294). Grain elevators, concentrated in Chicago, fundamentally transformed the handling and marketing of wheat. Steam-powered grain elevators drastically increased the amounts of wheat moved and stored, a process that drastically reduced the need for labor (Cronon 1991). From 1850 to 1860 exports of wheat and wheat flour increased from 2 million bushels to 76 million bushels, with nearly half of it exported to Britain and Ireland (Gates 1968, cited in Bauerly 2016: 68).

Chicago became the epicenter in grain trading, enacting a revolution both in export processing and international financialization, a process that further alienated petty commodity producers from their crop. In 1848, the Chicago Board of Trade was founded which was to deal with the many wheat varieties headed to the Midwest grain elevators. The growth of wheat production enabled new opportunities for finance capital, in which

²⁷ Minneapolis milling firms dominated the flour industry in which a mere four firms controlled over 80 percent of the city’s milling in 1890, and easily becoming the leading flour producer in the United States (Page and Walker 1991: 297).

traders bet on futures contracts while shaping the organization of wheat exchange (Cronon 1991). The power of companies like Cargill and other “merchants of grain” benefited at the expense of farmers by creating a complex grading system that often undervalued farmers’ wheat (Morgan 1979). Complex financial markets simplified natures, forcing farmers to increase productivity as surplus-value was appropriated by traders.

While wheat was not the only major commodity crop of the nineteenth century, it was the important for feeding an expanding world proletarian class in Europe. Productivity advances certainly occurred in the cotton South with the introduction of the Petit Gulf hybrid cotton variety and the continuous frontier movement to fresh natures (Olmstead and Rhode 2008). However, the social conditions of reproduction and existence of the plantation slave labor regime blocked significant advances in productivity. Post (2017: 184-185) explains:

“the planters’ inability to easily replace slaves with improved tools and machinery meant that *geographic expansion* – the addition of more land and more slaves – was often the most rational and rapid way of increasing output in the face of rising prices. Plantation slavery thus entailed *accumulation without technical innovation*...the need to preserve slaves’ value as fixed capital required that they be maintained whether they labored or not, and this provided an incentive for planters to try and keep their slaves working *year-round*.”

In the Midwest, petty commodity production was the dominant social formation driving economic development. The growth of agrarian home markets and industrial manufacturing went hand-in-glove, blocking the frontier tendency of slavery and solidifying petty commodity production in the Midwest. World-ecological conditions and the material conditions and demands of wheat production in the Midwest engendered the first American agricultural revolution.

Making the Corn Belt and Petit Bourgeois Yeoman Farmer

The transition to petty commodity production unfolded in the Midwest prairies from roughly 1830s to the 1870s. In 1882, a periodical in *The Nation* was the first to use in print “corn belt” to signify the dominant corn growing region of the United States. Prior to the twentieth century popular magazines and geographers designated the Corn Belt as stretching from “northwestern Ohio, a considerable strip across northcentral Indiana, all of northern and central Illinois, the whole state of Iowa, northwestern Missouri, northeastern Kansas, and southeastern Nebraska” (Warntz 1957: 44). The heart of the Corn Belt that emerged in the 1870s was Illinois and Iowa.

The Corn Belt, like the Wheat Belt, shifted over the nineteenth century, culminating into its modern form in the 1880s. In 1839, total corn production in the United States was 337,531,875 with Tennessee and Kentucky the top producing states. In 1840 Tennessee was the top corn producing state, Ohio became number one in 1850, and by 1860 Illinois had reigned the king of corn. Following the Civil War the center of the Corn Belt had shifted from Terre Haute, Indiana to Springfield, Illinois (Warntz 1957: 42-43).

How do we explain the origins of the modern Corn Belt occurring in the 1870s and what was the outcome? The concluding section of this chapter explains the origins of the modern Corn Belt that gave rise to a class of petit bourgeois yeoman farmer that was relatively prosperous, dynamic, stable, and flexible. They were neither capitalist nor tenant farmers but were relatively better off petty commodity producers.

If we are to explain the shifting Corn Belt we must examine the geographical relations of civilizational crops, namely wheat and corn. Several forces explain the shifting Wheat Belt from the Midwestern prairies to the Great Plains. First, international competition was intense in wheat, owing to wheat frontiers in Argentina, Russia, Canada, and Australia. In the 1850s, crop-failures throughout Europe, the Crimean War, and expanding proletarianization of England, northwestern Europe, and the United States combined to increase wheat prices (Post 2011: 95). By the 1860s it was becoming increasingly clear that the world wheat market was highly competitive and unstable. Frequent price fluctuations exacerbated already existing uncertainties of farmers. Second, the price of land was substantially lower in the Plains than in states like Illinois and Iowa (Ankli 1974). In fact, many of families that failed at farming in the prairies moved westward to try their luck in cheaper, yet riskier farming conditions. Those that farmed in the Plains knew they could not compete with corn growers in prairies so they focused on wheat. Third, and related, harsher climates and socio-ecological conditions characterized the semi-arid Plains. Rainfall was irregular, soils were of lesser quality, extreme temperatures, and greater distances between community and markets all conspired to limit the expansion of commercial farming in the Plains. Fourth, under the guidance of agricultural presses, farmers shifted more land, energy, and capital to raising corn, oats, horses, and hogs. Finally, the drainage of major sections of the wetland prairies fundamentally transformed Indiana, Illinois, and Iowa into the feedlot empire, supplying cheap corn to hogs.

Although mechanical innovations were critical in the transition to petty commodity production and the first American agricultural revolution, biological

innovation, too, transformed American agricultural landscape. In the nineteenth century, biological innovations resolved two obstacles to shift the center of the Wheat Belt from the Prairies to the Plains. First, farmers needed wheat varieties that could withstand harsher climates while maintaining or increasing yields. Second, farmers attempted to fight “yield sapping insects and diseases,” a product of biological globalization (Olmstead and Rhode 2008: 17-18). The introduction of Red Fife, a hard spring wheat of international origins (Canada and Eastern Europe), became foundational to the emerging Wheat Belt in Wisconsin, Minnesota, and the Dakotas. In Kansas, Nebraska, and Oklahoma “Turkey”, a hard winter variety, was imported from southern Russia. Red Fife and Turkey could maintain yields despite recurrent drought conditions and winterkills (Olmstead and Rhode 2008).²⁸ In Nebraska, yields averaged 12.5 bushels per acre between 1870 and 1900. From 1900 to 1909 average yields increased to 17.5 bushels, a 40 percent increase (Olmstead and Rhode 2008: 36). Scientists attributed the increase to the substitution of Turkey Red for spring wheats (Olmstead and Rhode 2002: 945). By the early twentieth century most wheat planted was either durum or hard spring varieties. In turn, petty commodity production spread throughout the Wheat Belt.

²⁸ Winterkill rates in Kansas averaged around 20 percent (Olmstead and Rhode 2002: 944).

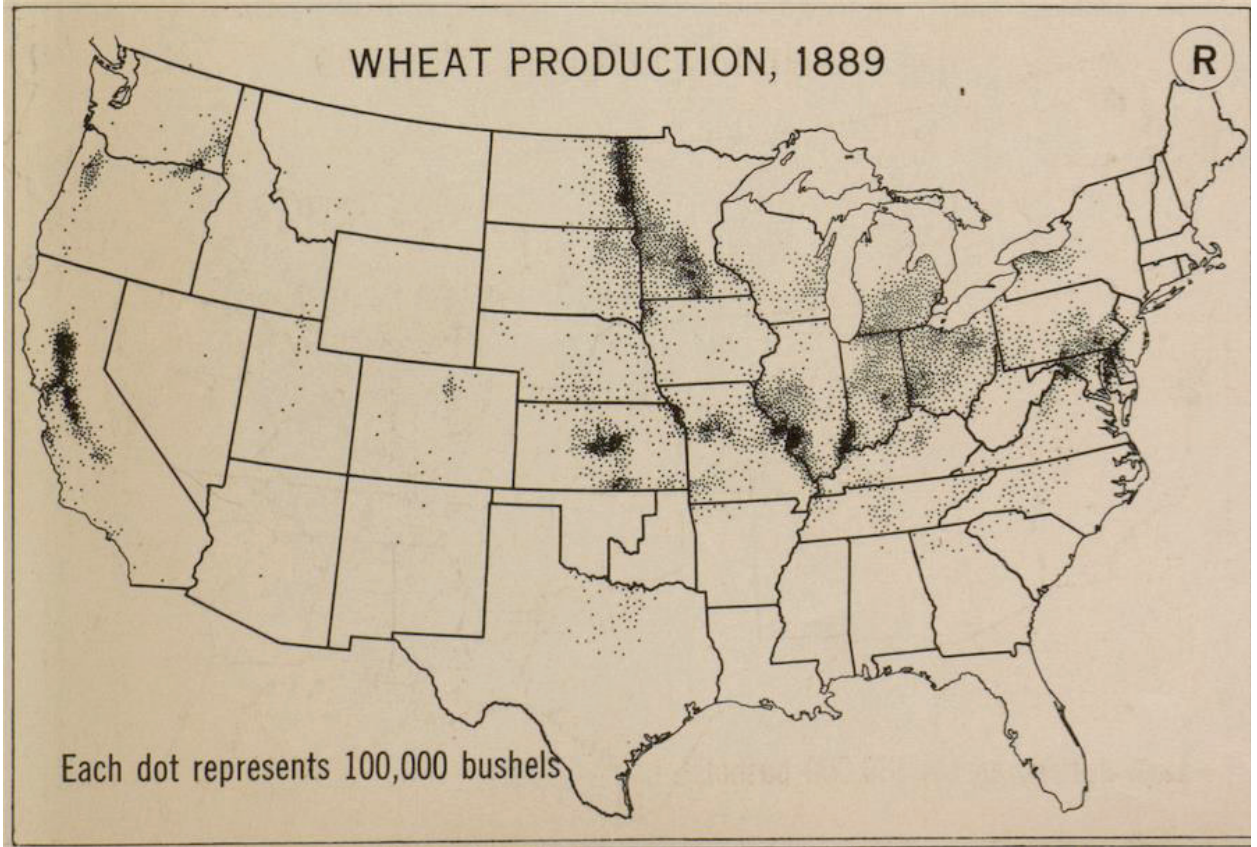


Figure 4
Digital Scholarship Lab, University of Richmond, *Atlas of the Historical Geography of the United States*.

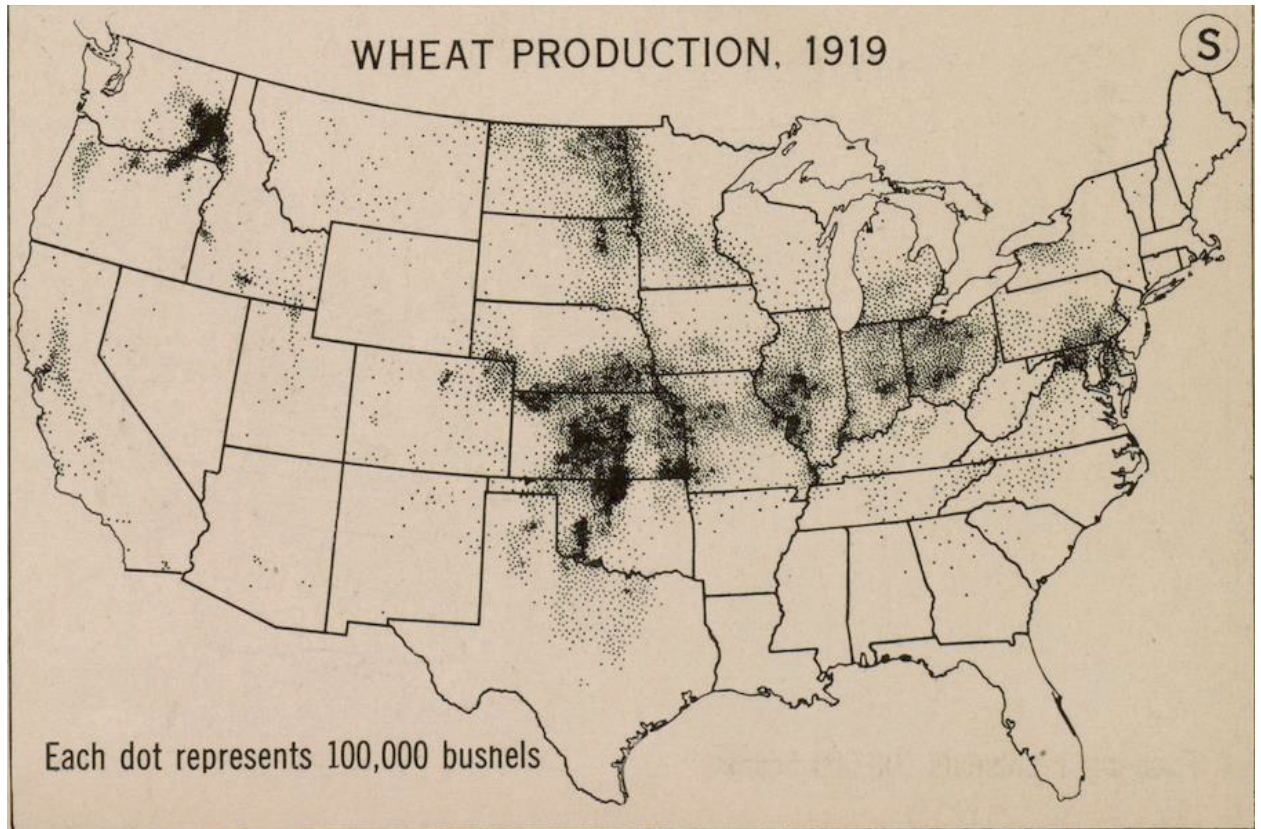


Figure 5
Digital Scholarship Lab, University of Richmond, *Atlas of the Historical Geography of the United States*.

Those harsher conditions that made it an obstacle for farmers to realize higher yields, that when combined with monoculture farming were also the same conditions that engendered the invasion of pests and pathogens. Rust has plagued wheat production for at least hundreds of years. In the mid-seventh century, English winter wheat were planted in Massachusetts black stem rust appeared, devastating the wheat crop. In the late nineteenth century stem rust destroyed large wheat sections of Iowa and Texas. Losses due to stem rust were estimated between five and ten percent in the late nineteenth century (Olmstead and Rhode 2002: 948). The rust problem was partially resolved through the introduction of improved rust-resistant early maturing spring varieties and better cultural methods. In terms of insects, the Hessian fly, which had entered in New

York through Hessian mercenaries and spread west, was by far the most destructive. Farmers realized to combat the fly that needed to plant winter wheat later and spring wheat earlier. This would reduce the likelihood of an invasion, but increase the probability of the rust, a problem that persisted. The answer to the Hessian fly problem was the introduction of a Mediterranean wheat from Europe. Chinch bugs and grasshoppers also plagued farmers wheat crop. These pests regularly whipped out half the farmers' wheat crop in a given year, and forced many to abandon their farms in the southern Plains. The same varieties that could withstand unfavorable weather conditions, Red Fife, Turkey, and new developed winter and spring varieties, were also able to withstand the onslaught of pests, diseases, and weeds. Olmstead and Rhode (2008: 32) state that by 1919...roughly 80 percent of U.S. wheat acreage consisted of varieties that had not existed in North America before 1873, and less than 8 percent was planted in varieties dating earlier than 1840”.

By the 1870s, the Wheat Belt was concentrated in the semi-arid Plains and tied to the world market (Friedmann 1978). Minnesota and the Dakotas were quickly turning into a wheat frontier as adaptable varieties could withstand unfavorable weather and pests, and both capitalist farmers and petty commodity producers settled the region. During the economic downturn of the last quarter of the nineteenth century capitalist bonanza farms folded, while family farms persisted, owing to the different logics of reproduction. While the mechanical revolution definitively founds its origins in the prairies, it blossomed in the Plains Wheat Belt. In the transition to petty commodity production Headlee (1991), Byers (1996), Post (2011), and Bauerly (2016) unduly focus

on mechanical innovations. Biological innovations occurring through the accumulation of world germplasm gave rise to petty commodity production in the Plains.

Agricultural presses encouraged prairie farmers to concentrate on producing a myriad of crops and reduce their acreage of wheat. In 1870, a letter to the *Iowa Homestead* read: “A farmer in Iowa can make more money on a dozen of eggs than he does on raising a bushel of wheat. A farmer in Iowa can make more money on one hog than he can on one acre of wheat” (Throne 1949: 127). During the 1870s corn and oats prices dropped significantly. Midwestern farm families had several options. A family could reduce the cost of hired labor, relying on a greater extent on the unpaid labor of family members. A family could increase overall production of crops and livestock to compensate for declining farm prices. Finally, they could curtail the production of one crop to increase production in another crop. Farmers utilized all three options. Farmers increased overall production through mechanization and the purchasing of more land. Average acreage per farm increased in the late quarter of the nineteenth century, the majority ranged from 100 to 160 acres (Bogue 1959: 150). By the 1870s, and no later than the 1880s for most farm families were shifting greater acreage from wheat to corn as feed for the rising prices per hundred weight for hogs and oats to feed horses as they became essential for pulling farm equipment. Farmers also increased the diversity in field crops and increased the value of livestock through improved breeding and feeding (Bogue 1959).

If wheat was foundational to the transition to petty commodity production, why did corn dominate the Midwest prairies? Corn was ubiquitous in the prairies web of life.

While we often think of corn as fungible commodity of the twentieth century, Warman (2003: 155) explains the fungible nature of corn in the nineteenth century:

“Settlers made use of every part of the corn plant. The leaves...became fodder for the livestock. Corn stubble left in the harvested fields became grazing fodder for the large livestock. Corn husks were used to stuff mattresses and to weave rugs and make twine. Corncob dolls clothed in corn husk dresses were ready playthings. Hulled corncobs were used as scrapers, pipes, or fuel. Fermented corn mash became beer and whiskey...Surplus corn was earmarked for animal feed, and eventually transformed into milk, eggs, and meat. Pork and whiskey both were considered to be forms of concentrated corn...Corn pervaded work, food, and relaxation, every conceivable aspect of day-to-day existence.”

Warman (2003: 155) continues:

“Corn was everywhere and became the organizing axis of pioneer agriculture and pioneer subsistence. Corn set the precedents for the sequence and style of work and serves as a bridge for the transformation of agriculture. Corn was the foundation of the household economy and allowed for the preservation of a high degree of self-sufficiency. Corn was also the basis for the realization of surplus and participation in a wider market. Corn was the means that permitted successive waves of pioneers to settle new territories. Once the settlers had fully grasped the secrets and potential of corn, they no longer needed the Native Americans. Indigenous peoples were wiped out, scattered, or relocated as settlers penetrated even further inland.”

During the early settlement of what became the modern Corn Belt, corn was the traditional American frontier crop. While originating in Mexico, corn, unlike wheat, required no worldwide search for compatible varieties. Women of the Mandan, Arikara and Hidasta tribes had been growing hardy varieties of Flint, flour, and sweet corns that were well adapted to the Midwest for many years (Olmstead and Rhode 2008). Just as European settlers had survived on “Indian corn” in the days of Jamestown, American settlers appropriated the Native Americans land, food, and farming techniques.

The great adaptability and biophysical advantages of corn enabled its great uneven expansion across larger and larger swaths of the world. The plant size can range

from three to thirteen feet in height, in some cases Native Americans corn grew up to sixteen feet tall (Warman 2003). Considered a short-day plant, corn flowers “after the number of hours of daylight falls below a certain maximum threshold,” usually nearing the end of summer (Olmstead and Rhode 2008: 69). From germination to pollination occurs from forty-five days to approximately one hundred fifty days (Warman 2003: 14). The length of an ear of corn ranges from four to twenty-four inches, and there are anywhere between five hundred to one thousand kernels on an ear of corn. Husks covering the ear shield kernels from adverse weather conditions and pests. These tightly ordered symmetrical kernels are able to concentrate energy because the ear is positioned near the center of the stalk. The large surface area of the plant’s foliage enabled it to absorb greater solar energy compared to other crops. “Corn transforms light, heat, and other inorganic elements into biomasses with the least amount of waste. The plant actively responds to the transformation of solar energy, the most abundant of the inorganic elements, and becomes a resource readily available to people” (Warman 2003: 16). Furthermore, its extensive root system enables the plant to draw in moisture and nutrients from a wide area. All these biophysical features combine to contribute to the high productivity of corn.

While most think of the genetic revolution in corn breeding occurring in the modern era of hybrid corn seed, much work was being done on corn varieties in the nineteenth century.²⁹ Farmers and breeders made much progress in improving corn varieties by adapting to geographical and ecological conditions to improve yields. A

²⁹ Prior to the biological revolution in the 1920s and 1930s, there existed roughly one-thousand varieties of corn (Olmstead and Rhode 2008: 64).

cross between Northern Flints and Southern Dents produced what became Corn Belt Dents (Olmstead and Rhode 2008). Northeastern farmers used Flint varieties because they were early maturing. In general, flint varieties produce slender-stalks that have ears with eight to ten rows of smooth, hard kernels. Southern farmers used a variety of Dents that were late maturing, heavier-stalked with many rowed ears with softer kernels. Northern Flints and Southern Dents were both adapted to the socio-ecological conditions of farming in their respective geographical locations. The migration of New Englanders and peoples from Virginia and Kentucky migrated with their respective corn seed varieties and in the process of settling the Midwest they crossed northern and southern varieties. Corn Belt Dents came to dominate the Midwest agriculture. Those varieties were highly productive and became the foundation seeds of the hybrid corn revolution, owing to the work of humans and the rest of nature.

From the beginning of settlement farmers planted more acreage and obtained more bushels of corn than any other crop. From 1840 to 1850 corn increased from 1,406,241 to 8,656,799 bushels (Ross 1951: 22). In Iowa, between 1840 and 1860 corn production increased over 400 percent, which became the fastest growing corn producing state (Throne 1949: 126). Throughout the second half of nineteenth century both Iowa and Illinois were the top corn producing states.

Iowa Corn Yields, Acreage, and Production (1866-1901)

Year	Yield (per acre)	Acreage	Production
1866	32.0	1,810,000	57,920,000
1871	43.5	3,060,000	133,110,000
1876	34.0	5,200,000	176,800,000
1881	30.0	6,530,000	195,900,000
1886	29.0	7,960,000	230,840,000
1891	40.5	9,040,000	366,120,000
1894	15.0	8,750,000	131,250,000
1896	43.0	9,160,000	393,880,000

1901	28.5	9,460,000	296,610,000
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Table 5

Source: USDA, cited in Hampton 1945: 24

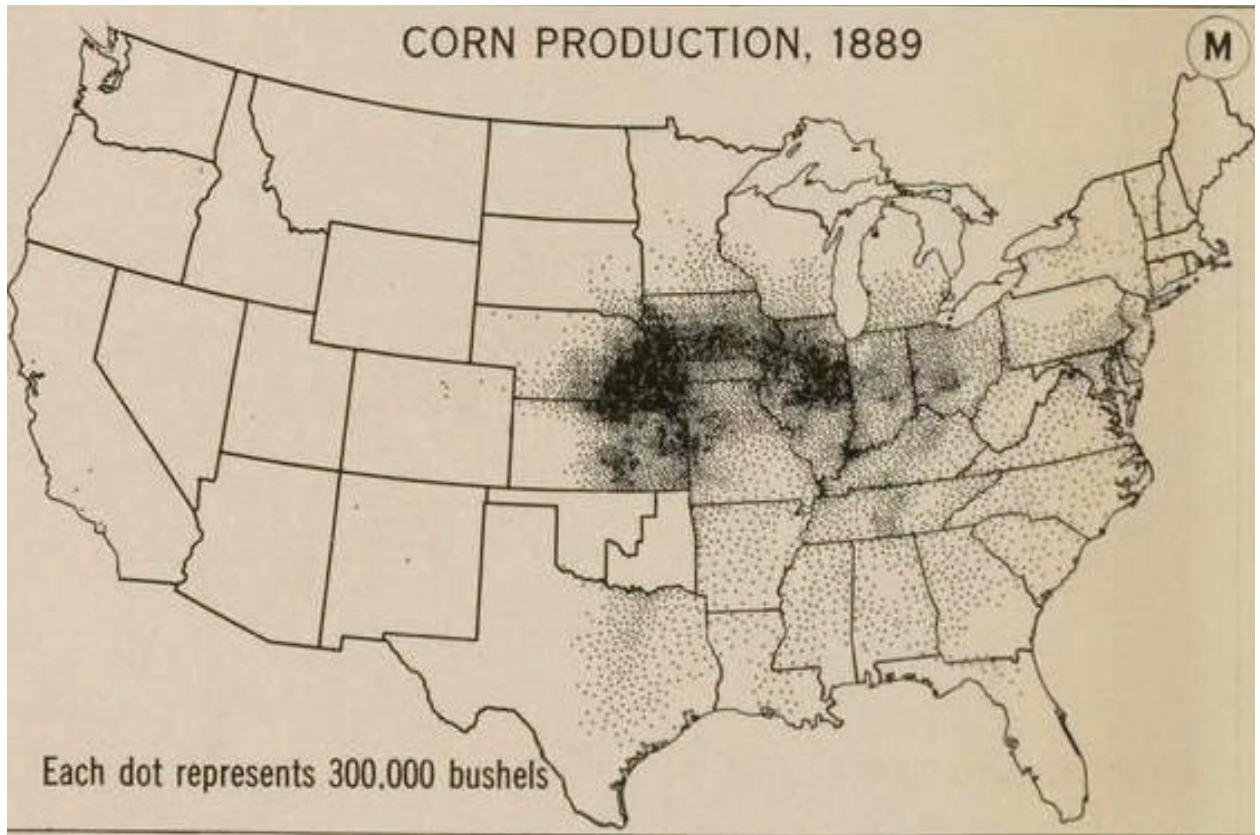


Figure 6

Digital Scholarship Lab, University of Richmond, *Atlas of the Historical Geography of the United States*.

Several developments can be discerned in relation to the production of corn and the transition to petty commodity production in the Midwest. First, unlike wheat, corn was not an internationally traded commodity. It would not be a major export until the last quarter of the twentieth century. In terms of price per bushel, corn was a bulkier product than wheat, making it costlier for farmers to transport corn long distances. Second, corn was not as susceptible to pests and diseases as wheat. Wheat fields regularly suffered from grasshoppers, Hessian fly, chinch bugs, and rust. Third, the demands of corn harvesting was not like that of wheat. Harvesting corn could occur slowly when time was

available, lasting sometimes into winter. Recall, wheat needed to be harvested in two weeks or face spoilage. As a result, technologies in corn harvesting had not developed to the extent that of wheat harvesting. Finally, the costs of farm equipment was much higher for wheat than corn. An Illinois agricultural editor compared the costs and returns: “Think, for instance, of buying a drill, price \$125, reaper, price \$125 and then a threshing machine, price \$175—total \$425, as a necessary preparation for wheat sowing; and then ten bushels per acre at 40 cents per bushel! Then think of corn, 60 bushels per acre at 30 cents per bushel, and no additional implement required but a sheller costing \$25, or so!” (Gates 1960: 288-289). The fungible nature and socio-ecology of corn when compared to wheat suggests that corn farmers were less market dependent than wheat farmers.

The prosperity of the heart of the Corn Belt in terms of major commodities derived not solely from corn, but also biological exchanges of hogs. Corn Belt farms always had an array animals including hogs, beef and dairy cattle, horses, poultry, and sheep as they served multiple purposes in providing motive power, economic returns, and manure for field crops. Hogs in particular were sometimes referred to as “mortgage burners” or “mortgage lifters” as they were the most consistent sources of profits (Fink 1986: 32). Importantly, they have the ability to thrive in many conditions and eating a variety of foods including corn, acorns, potatoes, soya beans, barley, clover, alfalfa, and numerous more (Shaw 1936). Hogs are quite fertile, having two litters a year with an average litter between six to nine piglets after only a four-month gestation period. Cattle, on the other hand, had a gestation period of nine months that resulted in a single calf (Cronon 1991: 226). Moreover, sows can farrow at a year old, whereas cows are at two to three years old, enabling farmers to produce as much or more meat from hogs than a steer

in half the time (Bogue 1963a: 104). After chickens, hogs are the most efficient livestock at fattening. One study stated that “it takes about 6 pounds of grain and 6 pounds of hay to produce a pound of lamb (live weight), 10 pounds of hay and 10 pounds of corn to make a pound of beef, and 5.6 pounds of corn for a pound of pork (USDA 1922, cited in Shaw 1936: 359). Furthermore, hogs cost the farmer little investment when compared to cattle, making raising hogs affordable to all farmers. Lastly, more of the carcass of the slaughtered hog could be used for food and non-food products. This was not the case for cattle, nor sheep. The carcass of a dressed hog weighs 65 to 80 percent of its live weight, while cattle dress out around 50 to 60 percent and sheep and lambs 45 to 55 percent (Bogue 1963a: 104). The biology of the swine was impressive, a product and producer of farming practices, historical natures, and an expanding packing industry.

Eastern settlers brought hogs with them as they settled the Midwest. Prior to breeding the unique Midwest hog, long-nosed, spindling legged hogs were numerous especially in the wooded regions of the Corn Belt where these characteristics were advantageous for foraging along the forest floor. These mast-fed wood hogs were sometimes referred to as “prairie sharks” that rarely reached 200 pounds (Bogue 1963a: 109). Hogs thrived in most environments, especially wooded regions that had mast of roots, acorns, and bechnuts. When allowed to roam free, which was the case prior to herd laws, hogs will become wild within a few generations (Hudson 1994). The confinement and feeding hogs a corn diet ensured they fattened at a quicker pace and also improved the quality of pork and lard. Hogs fattened on woodland mast often produced soft pork that was oily and hard to preserve, whereas hogs fattened on corn made the flesh solid and the lard white and firm (Hudson 1994). “Hogging down” was a common

practice for fattening hogs, which involved releasing hogs in a fenced in field to consume the unpicked corn from the harvest. “Corn provides an ideal food for hogs and swine enable the farmer to save transportation costs by “marketing corn on the hoof,” provide animal manures to replace lost soil fertility, and add economic and agricultural stability by creating more diversity to farm operations” (Shaw 1936: 372).

Since hogs often had the highest rates of return farmers focused on achieving the most efficient breed of swine. Efficiency meant the fastest weight gain on the least amount of corn. Imports from the eastern United States and Europe are well-documented. Each breed of hog had its advantages and disadvantages. For example, razorbacks were large animals with strong legs which helped on long distances to markets, but they were slow to fatten and produced little meat or lard. The Berkshire hog became trendy during the 1830s and 1840s because of its massive size. However, it often had poor feet and crooked legs and required great care in feeding, a bad combination for long distant marketing. “Lard hogs” fattened quickly and easily but were impractical to drive to market. Competition among hog breeders eventually produced a hog that would become the standard of the industry: the Poland-China. Poland-Chinas were a cross between the Berkshire and Irish Grazier, leading back to imports from Spanish and English settlers (Shaw 1936; Hudson 1994). The most important biological change hog breeders created was the lengthening of the intestines, which helped improve the ability of hogs to absorb food nutrients (Clemen 1923). Breeding pure-bred hogs was a competitive, and sometimes cutthroat, venture. Like in the canine world, breed associations and registers developed to construct the ideal breeds of hogs. Packers, beginning in the 1870s, would

influence breeding stocks by paying higher premiums for a younger and leaner hog that were in higher demand both domestically and internationally.

Cattle, Hogs, and Horses in Illinois and Iowa (1850-1900)

	Illinois				Iowa			
Year	Milk Cows	Other Cattle	Swine	Horses	Milk Cows	Other Cattle	Swine	Horses
1850	294,671	541,209	1,915,907	278,226	45,704	69,025	323,247	38,536
1860	522,634	970,799	2,502,308	563,736	189,802	293,322	934,820	175,088
1870	640,321	1,055,499	2,703,343	1,017,646	369,811	614,366	1,353,908	482,786
1880	865,913	1,515,063	5,170,266	1,023,082	854,187	1,755,343	6,034,316	792,322
1890	1,087,866	1,968,654	5,924,818	1,335,289	1,498,418	3,394,765	8,266,779	1,312,079
1900	1,007,664	1,373,024	5,915,468	1,350,219	1,423,648	2,653,703	9,723,791	1,392,573

Source: Bogue 1963a: 86 & 103

Table 6

The Civil War ignited a profitable expanding pork industry. Chicago succeeded Cincinnati as the “Hog Butcher of the World”, which during the Civil War, fed two million Union soldiers, particularly salted and smoked pork (Cumbler 2005). Of course, pork packers and meatpackers in general were dependent on the farmers’ supplies. The marketing of hogs required farmers were up to date on the latest prices for corn and hogs. In general, farmers aimed to sell hogs between 16 and 20 months at a weight of 200 pounds. After reading farm journals and local newspapers, along with the farmer’s personal experience, they had to decide which was more profitable in the fall to sell corn or corn on the hoof (Walsh 1982). If the price of corn was high, they sold the grain and kept hogs off the market, if economically possible. If the price of corn was low, as it was from the 1870s through 1890s, corn was fed to hogs to fatten as quickly as possible and to get as many hogs on the market. If farmers did not like market prices for hogs they sometimes hired someone to butcher on the farm or do the butchering themselves and make cure meat and sell “country bacon” to neighbors (Walsh 1982). Packers complained that farmers were careless with their cuts and cooling of carcasses. Early packers were so

dependent on the farmers' supplies that they sometimes took dressed pork, up to one-third in the early years.

In the mid-nineteenth century Midwestern packing companies served a variety of markets with different demands. In the South, merchant packers sent by boat hams, lard, and lard oil. In the Northeast a more varied market existed. Fancy hams were sold to wealthy families, while bacon, lard, and bulk pork, were sold to poorer families. By the 1830s, "the United States had replaced Ireland as the leading source of cheap provisions" (Walsh 1982: 36) to Britain. Packers served British tastes with dry salting bacon, mildly curing ham, and "mess pork was placed in a special pickle to preserve a better color" (Walsh 1982: 36). By the 1840s, United States packers had exported 166 million pounds of bacon and ham alone (Walsh 1982: 36). Packers also served the different demands of France and the West Indies. By 1880, meat and animals ranked second in United States exports, more than half were exported to Britain (O'Rourke and Williamson 1994: 901). Prairie farmers that concentrated on raising hogs in the post-Civil War era were likely to experience greater prosperity than those that relied on growing more wheat.

How did wheat and corn-hogs figure into the transition to petty commodity production in Illinois and Iowa? As farm-making proceeded farmers in the Midwest began to rely on wheat as the most important commodity crop. The two decades prior to the Civil war, farmers regularly switched between winter and spring wheat varieties were planted, depending on local ecological conditions as well as persistent periods of favorable and unfavorable seasons. Wheat prices increased nearly 60 percent between 1850 and 1854. Gates (1960: 289), states that high wheat prices in the 1850s allowed Illinois and Iowa farmers to enjoy real prosperity. Wheat acreage doubled over this

period, leading to increased land values, allowing for farmers to continue to borrow. Northern Illinois and eastern Iowa became major wheat producing centers in the mid-nineteenth century. Northern Illinois counties alone purchased one fourth of McCormick reapers sold between 1849 and 1857 (Gates 1960: 288). In 1854 three fourths of McCormick reapers were sold to Illinois, Iowa, Wisconsin, and Minnesota (Throne 1949: 124). In Iowa, wheat acreage continued to climb throughout the mid-nineteenth century but began leveling off in the last quarter century (see table 7).

Iowa's Three Leading Crops in Nineteenth Century in Acres

Year	Corn Acres	Wheat Acres	Oats Acres
1856	737,213	388,080	190,922
1863	1,733,505	1,149,836	336,137
1869	2,058,239	1,804,504	657,007
1875	4,019,738	3,244,954	956,687
1880	6,616,144	3,049,288	1,507,577

Source: Hampton 1945: 22
Table 7

Importantly, however, Midwestern producers could not afford threshers, thus were forced to pay threshing teams. The result was that many farm families in Illinois and Iowa that concentrated on corn and oats were less capitalized than wheat producers in the emerging Plains region. Farmers that concentrated more on raising corn and hog, and not wheat, were less likely to be in debt and had greater economic stability than farmers concentrating on wheat production. Recall, that corn planting and harvesting equipment had lagged behind wheat. While the origins of petty commodity production and a concomitant agricultural revolution centered in Illinois and Iowa, these producers were less mechanized than petty commodity producers and capitalist farmers in what would become the modern Wheat Belt.

The following table, compiled from multiple tables on Whitaker's (1975) study of livestock development in the Midwest provides a quick visual to understand the changes in the number of Illinois and Iowa from 1850 to 1900 in terms of farms, improved land in farms, crops produced, etc. as a percentage of the United States total. Whitaker's (1975) tables are derived from the twelve and thirteen censuses and reconstructed here.

Illinois Agricultural and National Position, Percent of Total

Item	1850	1870	1900
Number of farms	5.26	7.6	4.6
Improved land in farms	4.46	7.6	4.6
Corn	9.7	17.1	14.9
Wheat	9.4	10.5	3
Oats	6.9	15.2	19.1
Swine	6.3	—	9.4
“Other” cattle	5.4	—	3.8

Source: Whitaker (1975)

Table 8

Iowa Agriculture and National Position, Percent of Total

Item	1850	1870	1900
Number of farms	1.02	4.3	3.9
Improved land in farms	.73	4.9	7.2
Corn	1.5	9.1	14.4
Wheat	1.5	10.2	3.5
Oats	1.0	7.4	17.8
Swine	1.06	—	16.8
“Other” cattle	.78	—	7.5

Source: Whitaker (1975)

Table 9

Perhaps the most important development in the making of the Corn Belt was the draining of the wetland prairies. During the particular wet years of the 1870s areas known for flooding ruined many farmers crops. Such crop failures in conjunction with high land prices became the impetus for large-scale drainage projects. Like the Dutch in the long sixteenth century who managed to control water-logged fields, the Americans drained

more than 20 million acres in wetlands (Prince 1997). The principle force Those drained fields switched from pasturing to arable farming, growing more corn to feed hogs. The greatest benefit from draining the wetlands was aeration of the soil. Organic matter decomposed faster, roots penetrated more deeply, and growing seasons lengthened. The drained lands were relatively flat, ensuring the long-term maintenance of soil fertility compared to hillier prairies that had been settled earlier. The flatlands would be ideal for mechanization in the twentieth century.

While drainage began as early as the 1820s in southern Illinois, it was not until after federal legislation of the 1850 Swamp Act that gave millions of water-logged acres over to states and counties and following the Civil War when professional drainage teams could ditch and drain large fields. As early as 1853 legislation was passed in Iowa to begin dealing with the problems of flooding, levees, and straightening of streams (Hampton 1945: 24). In 1878, Illinois passed a constitutional amendment that allowed large landowners and small farmers to organize drainage districts, whereby they had “legal power to levy assessments for the construction of levees and ditches” (Bogue 1959: 146). Drainage did not begin in earnest until the 1870s in the Grand Prairie of Illinois and Indiana and a decade later in Iowa with the manufacture of drainage tile. Today, virtually no wetland prairies exist in Illinois or Iowa (Urban 2005;

Drainage work is hard and expensive, requiring substantial manual labor and machinery as well as skilled surveyors. Drainage on a larger farmer could cost up to \$750 (Schob 1975: 114). The Irish were the best skilled group at drainage, some of whom traveled the Midwest in teams performing drainage work, while others remained in the area as farmers (Schob 1975). “Draining land requires burying lines of tile, installing

surface drains, and digging ditches deep enough to receive the tile conduits that feed into them, arranging the whole system so as to remove excess water from the lowest portions of the fields, yet retaining a water level high enough to allow natural flow into a local stream” (Hudson 1994: 138). Further complicating the issue are property lines and how specific drainage projects could divert water from one farmer to another, thus being beneficial to one farmer and harmful to another (Bogue 1963). By 1882 Illinois had more than 100 firms manufacturing drainage tile, some even reported that were unable to meet demand (Hudson 1994: 139). One Irish farmer named Scully who farmed and rented out land in Illinois regularly had disappointing harvests. Scully began installing drainage all over his rental properties, a massive expense that was offset by raising rents on tenants. Tenants in turn had to increase production to advance the increased rent (Hudson 1994: 140). In this way, landlord-tenant relations were constituted through a set of socio-ecological relations and conditions. Fixing poorly drained fields and draining the wet prairies increased productivity as well as increased overall production as new lands were improved. Central Illinois transformed from disease-ridden swampland into fertile rich farmland soils, becoming one of the most productive farming regions in the world (Smith 1998; Urban 2005).

An agricultural depression swept across the United States from the 1870s to the late 1890s, sparing the Corn Belt (Bogue 1959; Bogue 1963; Hudson 1994). The price of farm commodities declined precipitously over two decades. Farm foreclosures were particularly high in the Plains, a product of increasing global competition of wheat producers, increasing dependence on wheat, unfavorable weather, and the dominance of monopoly capitalism. Not surprising, economic conditions were harsher in the Plains than

resulted in farmer-led populist movements who protested the monopoly of the railroads and grain operators. There was little protest from farmers in the richer farming region of central and northern Illinois and eastern Iowa. In the post-Civil War South, plantation slavery transformed into sharecropping, perhaps equally as harsh (Warman 2003). Black and white sharecroppers, alike, faced extended economic hardships. While corn prices remained low, hog prices increased over the two decades following the Civil War. Central Illinois and Iowa farmers specialized and intensified their corn-hog operations during this period. However, southern Illinois farm families remained relatively impoverished compared to their counterparts in central and northern Illinois (Adams 1994). As we will see in the next chapter, the standard of living for the petit bourgeois yeoman farm family in rich agricultural zones of central and northern Illinois and the eastern half of Iowa was better than most petty commodity producers in the United States. This prosperous region was not only home to the first agricultural revolution it would also be the home of the second agricultural revolution in the twentieth century.

In sum, I have explained the emergence of the Corn Belt following the Civil War and the attended outcome of the petit bourgeois yeoman farmer. A confluence of forces can explain the direction and pace of the transition to petty commodity production in Illinois and Iowa. During the mid-nineteenth century Illinois and Iowa quickly emerged as the 'feedlot empire' centered between the cattle frontier to the west and major markets to the east. Midwestern farmers received higher prices for livestock than wheat, and when livestock prices plummeted they could sell corn directly as is or in a host of other commodity forms. Petty commodity producers shift in the second half of the nineteenth century to increasing specialization in corn-hog farming was pivotal in

increasing prosperity, itself a product of a dynamic stability that was largely absent in the Plains and the South. As a whole the region was characteristically dynamic, stable, and flexible. The emergence of the dynamic, stable Corn Belt occurred in the context of world-historical transformations, from world accumulation to the frontiers to the household.

Conclusion

The transition to petty commodity production in the Midwest and subsequent agricultural revolution fundamentally transformed the capitalist world-economy. The first American agricultural revolution resolved the nineteenth century developmental crisis that had centered in Britain. Agro-industrialization had advanced productivity gains to such an extent that cheap grains led to the widespread dispossession of European farmers. In turn, those dispossessed farmers became part of the industrial reserve army of labor as part of the long-run process of proletarianization. In the nineteenth century world migration concentrated in the United States. In 1820, the United States population was 9.2 million and by the beginning of the twentieth century the population stood at 105.7 million (Potts 1990: 131). The greater majority of European immigrants sought work in American factories. In short, cheap food paved the road to proletarianization and industrialization for the United States and Europe.

The uneven development in transition to petty commodity production across the Midwest and Plains unfolded through differences in the socio-ecology of agrarian households. Land use patterns of commodity crops varied between specialization in wheat, dairy, and corn-hog production. On the whole, petty commodity producers in the Corn Belt experienced greater prosperity than their counterparts around the United States

throughout the nineteenth century. Corn Belt prosperity pivoted on high hog prices and the paid and unpaid work of women and the rest of nature. The dynamic stability that characterized Corn Belt agriculture operated through the diversity in both farming and householding in relation to agro-industrialization and the world market.

In Illinois and Iowa farmers experienced increasing prosperity during the thirty-year agricultural depression following the Civil War. Bucking the national trend, these farmers would once again become the epicenter of another agricultural revolution in the twentieth century. The second American agricultural revolution, like the first, emerged out of a developmental crisis in the capitalist world-economy. This time the crisis centered in the United States. The solutions, like the first, were twofold and mutually interpenetrating: increase agricultural productivity by incorporating unappropriated frontiers with complex of technics and advanced the process of proletarianization-housewifization. We now turn to the second agricultural revolution, or what might be called the American Green Revolution.

If Headlee, Byers, Post, and Bauerly missed the ecological question of the transition to petty commodity production, they also missed the gender question—these questions, as we will see, are dialectically bounded in the production of nature.

In summation, we have broadened our scope of the transition to petty commodity production in the Midwest through a world-ecological framework that incorporates the world-historical transformations into national shifts in geography, ecology, and gender. In doing so, I have provided a more precise explanation of the direction and pace of the transition to petty commodity production in the Corn Belt and beyond. The patterns of work, both in their productive and reproductive turns, formed the basis of the agrarian

household, a product and producer of agro-industrialization in the capitalist world-ecology.

Chapter 4: Agrarian Housewifization and the Remaking of Women and Household

While housewifization as a concept has generally been applied to urban classes, housewifization has certainly, historically, unfolded across the urban-rural geographical divide. Mies (1986) and others (Federici 1998; Fraser 2016) have argued that “colonization and housewifization” went hand-in-hand over the *longue durée* of historical capitalism, yet to what extent did housewifization occur in Midwestern agrarian household in the United States? What forces constituted that process? If one of the objectives of this research project is to explain the production of cheap food, then we need to explain the historical conditions of cheapening lives, particularly of agrarian women. While the antecedents of agrarian housewifization were emerging in the nineteenth century Midwest with a corresponding valuing of men’s labor over women’s, at the turn of the twentieth century the forces of capital, state, and nature would systematically remake agrarian households in the web of life.

But farm women were not simply bystanders in the process of housewifization. Women’s outrage and political unrest over the material conditions of re/production compared to farm men and urban women spurred housewifization. By the turn of the twentieth century it was becoming increasingly clear that the fate of petty commodity producers was not solely in the modernization of fields, but also in the modernization of the household, a process centering around women’s subjectivities and the rationalization of housework. Not all farm women needed to be saved. Women of capitalist farms were best able to uphold the separate spheres ideal, while most tenant farm families struggled

to survive. The target of modernization of the household, and thus, housewifization, was petty commodity producers who were able to purchase some household goods, but could not quite uphold the ideal farm enterprise and household. The agrarian web of life needed to be fundamentally restructured around separate spheres of production and reproduction.

While Corn Belt farm families increased their economic standing over the late nineteenth century, farm women's work lives remained difficult. The material conditions of women's production and social reproduction had largely remained as it had merely a decade or two after settlement. Farm women throughout the nation complained of their hardships and exhaustion. This was probably more so the case for the Corn Belt where economic progress was advancing in the face of women's economic status. During the golden age of American agriculture when farm families experienced their greatest economic prosperity in history, farm women were reaching their limits that culminated in the little known "farm woman problem".³⁰

In this chapter I explain the crisis of farm women and how the forces of capital, state, and nature acted to restructure agrarian women as modern housewives. The solution to the farm woman problem was to advance housewifization where the favorable conditions prevailed, namely in petit bourgeois yeoman households centered in the heart of the Corn Belt. Like any capitalist solution, housewifization of agrarian women was partial and incomplete. While women underwent the process of housewifization, farm men's subjectivities were being altered to the demands of capital accumulation and capital's cheap food strategy, a topic taken up in chapter five. To secure cheap food for a

³⁰ Jellison (1993) and Ramey (2014) historicizes the farm woman problem from a regional perspective. I interpret the farm woman problem as constituting long-run historical patterns of housewifization in the production of cheap food.

growing class of proletarians, farm men and women's subjectivities needed to be redefined around a capitalist world-ecology.

The Golden Age of American Agriculture

Recall from the previous chapter that aside from the Corn Belt most agricultural regions experienced a depression the two decades following the Civil War. By 1897 farm prices began to recover, giving rise to the greatest economic prosperity American farmers would ever experience. The first two decades of the twentieth century was the golden age of American agriculture. Prices for major farm commodities soared and land values appreciated, providing prosperity to many farm families. Agricultural prices generally increased faster than the costs of production, and during the period between 1909 and 1914 farmers had purchasing powers equal to or greater than non-farm workers (Hurt 1994). While general prosperity was experienced across most regions, it was the Corn Belt with its "unmatched resources of soil and climate, adaptability for the utilization of new methods and machines, and accessibility to primary markets" that would "set the pace" for the modernization of agrarian living in the twentieth century (Ross 1951: 118).

In 1900 agriculture remained the largest economic sector in the United States. Out of 76 million Americans 40 percent lived on farms and another ten percent were involved in agricultural services (Conkin 2008: 3).³¹ Agriculture's economic contribution to the United States economy remained strong throughout the first two decades. Between 1910 and 1920 agriculture's economic contribution to the United States economy more than doubled, in which cotton, wheat, corn, and hogs made up the greatest value (Alston and

³¹ However, after World War I the farming population would begin to decline until the present day, except a reversal for the years 1933 and 1934 when rural areas became a sponge absorbing the displaced urban industrial workers (Conkin 2008: 3).

Pardey 2006). Only second to cotton in value, wheat remained the main cash crop of the nineteenth century farmer, as wheat constituted a larger percentage of European and American diets (Ulrich 1989: 13). Production in all major crops continued to increase briefly following World War I, breaking records with each succeeding year. Winter wheat in particular was the most dependable of the wheat varieties as it could withstand most adverse weather conditions while also fetching high yields. In 1899, wheat acreage was 52.3 million acres, then jumped to 55.6 million acres in June 1914, and broke a record in 1915 at 60.3 million acres (Ulrich 1989: 13). The United States was one of the leading wheat producers in the world, but found formidable competitors in Argentina, Russia, Canada, and Australia. In 1913, the United States exported more than four million tons of wheat, just eight years later the United States exported nine million tons, earning more than \$1 billion in grain exports (see table 10) (Morgan 1979: 66).

World Production and United States Production of Wheat, 1909-1914

	World Production, Bushels	U.S. Production, Bushels
1909	3,582,000,000	683,000,000
1910	3,575,000,000	635,000,000
1911	3,552,000,000	621,000,000
1912	3,792,000,000	730,000,000
1913	4,127,000,000	763,000,000
1914	3,586,000,000	891,000,000

Table 10

Source: Hibbard 1919: 7

The years between 1909 and 1914 were a watershed moment in the trajectory of American agricultural policy. During this period, farmers in the United States experienced historic heights for their commodities relative to the goods and services they purchased. For example, in 1910 farmers paid an index price of 97 percent of production costs, which included taxes, interests, and wages (Hurt 1994: 12). Based on the principle of parity, the federal government would utilize the 1909-1914 period as a measurement

for paying farmers following the Great Depression (Hofstadter 1956). What would become known as price supports would act as a standard for agricultural policy over the next half-century, ensuring that the price farmers received for commodities they produced were equal or near equal to the cost of production. In this way, parity was used as a measurement to create equality between agricultural commodities and industrial prices farmers paid so as to offset the growing rift between rural and urban natures. This development will be explained in chapter five.

What were the reasons for the long-run prosperity for farmers? A central factor in the farmer's prosperity was gold. For thirty years after the Civil War a combination of constrained money supply with the first American agricultural productivity revolution led to depressed prices. It was groups like the Greenbacks and the Populists who in the late nineteenth century pushed for an increase in the volume of currency that would increase inflation, thereby lowering farmers' debt to asset ratio (Mooney and Majka 1995). By 1897, there was a greater flow in the global circulation of gold which eased credit, resulting in increased prices for food commodities (Prasad 2012). Between 1896 and 1909 a bushel of wheat increased from 72 cents to 98 cents, corn went from 21 cents to 57 cents, and cotton went from 6 cents to 14 cents a pound (Hofstadter 1956: 110). With the increase in the supply of gold, inflation was beneficial to farmers.

Another central factor in the American farmer's prosperity was the expanding urban markets. While exports markets stagnated, or declined in some years, throughout the late nineteenth and early twentieth centuries, American cities were growing at a rapid

rate.³² The period between 1890 and 1920 witnessed an increase in both rural and urban populations, with urban populations increasing faster. Immigrants represented a larger supply of cheap labor for urban industrial capitals. In 1890, over 5.7 million farms supplied a domestic urban population of 22.1 million people. By 1920, 6.4 million farms were supplying 54 million urban people (Hofstadter 1956: 110).

Rural banks were a key institution to farm families' prosperity. Credit has always been an essential element in farming, even for wealthy farmers. Rural credit reform had been debated for years, but by 1910 there were two major constituents fighting to shape the trajectory of finance in agriculture. The first group was the American Bankers' Association which sought to limit the government's capabilities in provisioning agricultural credit. The second group was farmers who demanded that the government intervene to provide longer loan periods and lower interest rates. In 1916, President Wilson under political pressure from Midwestern farmers, signed the Federal Farm Loan Act (Link 1964). The bill was a compromise to each group, in which banks profited from the increased business while wealthy farmers enjoyed better term loans, including "amortization, long terms, easy payments, profit sharing, limited liability, farmer control, tax-free mortgages" (Shulman 2003: 128).³³ During this period farmers were able to take low-interest rate loans from the newly established Federal Farm Loan System.³⁴ Rural banks popped up everywhere, often where there were already multiple banks serving an

³² There was a steady decline of exports of foodstuffs from \$545,473,695 in 1900 to \$369,087,974 in 1910. By 1910 the urban population made up almost half of the United States population (Saloutos and Hicks 1951: 27).

³³ Schulman (2003) argues that the Federal Farm Loan Act set a precedent for farm credit and was influential to New Deal policies.

³⁴ Under the Federal Farm Loan Act, 12 farm land banks were given \$500,000 each and 40 year loans at 6 percent interest (Bowers 1974: 76).

area. Between 1914 and 1920 more than 1,700 new banks began operating (Saloutos and Hicks 1951: 103). Life Insurance companies, too, had served farmers with mortgage loans with favorable conditions. In fact, life insurance companies became the biggest lender of mortgages to farmers (Clarke 1994).

Meanwhile, prior to the agricultural policies of the Great Depression, the government introduced guaranteed minimum prices for wheat, corn, and cotton, along with other farm commodities. Optimistic bankers urged farmers to purchase farm equipment and expand farming operations more loans with friendly credit. With prices as high as they were, \$3.00 per bushel of wheat and \$2.50 per bushel of corn, farmers could pay off debts within a few years (Sage 1974: 253). Rural banks, some who had no experience with farming as a business, lent out money to high risk customers. Giving greater credit and reasonable rates to farmers meant greater profits for banks, who at the time were flush with money. Banks and insurance companies were deeply implicated in the prosperity and later depression farmers experienced. In order for most farmers to modernize their operations required loans from banks. The federal funds funneled into rural banks, providing low interest loans to farmers. The problem, however, was that farmers were resistant to accruing debt to capitalize the farm (Clarke 1991). An advertisement from *Country Gentlemen* attacked the farmer's fear of debt, insinuating this fear was unreasonable (Neth 1995: 219). Bankers and reformers promoted the idea that debt was necessary, and even desirable, for making improvements to increase income. Many farmers and bankers enjoyed in the prosperity together.

Perhaps one of the most important factors constituting the prosperous times was the dramatic increase in land values. The land value of farms in the United States had

increased during this period. From 1900 to 1910 land value increased by 118.1 percent for the country (Saloutos and Hicks 1951: 22). From 1910 to 1920 the value of farm property increased from \$40,991,449,090 to \$78,924,100,338, a 90 percent increase (US Census 1920: 29). Between 1900 and 1910 the average price for an acre of Iowa land went from \$36.35 to \$82.58, an increase of 127.2 percent (Schwieder 1996: 146). “In the best farming areas, such as Iowa, the price of farmland more than doubled between 1914 and 1920” (Cochrane 1993: 100). Iowa lands that sold for \$3 to \$5 per acre in 1870s were selling for \$135 to \$155 an acre in 1910 (Saloutos and Hicks 1951: 23). Over this entire period, land values across the United States increased by 70 percent, with the highest land values in the Corn Belt (Fitzgerald 2003: 17). The cyclical nature of land values would have a profound impact on the historical trajectory of farming and its linkages with other industries. Importantly, it was not that farmers were becoming wealthy on the commodities they produced and sold, but made their money, at least on paper, through land appreciation (Saloutos and Hicks 1951). The cause of the appreciate in land values has been widely theorized, but the most convincing causes are the increasing investment in farm equipment and buildings, improved availability of markets, and improved roads and schools, combined with the world’s increasing supply of gold, “which had inflated all prices”, with food prices rising more rapidly (Saloutos and Hicks 1951: 24).³⁵

Land served two purposes for farmers. Purchasing more land would enable farmers to produce more commodities so as to increase profits. Greater overall

³⁵ Some claimed that the closing of the frontier that when combined with a great interest in land speculation, created land scarcity and concomitant rise in land values. In truth, there was still much land available in the first quarter of the twentieth century, especially in the west.

production would enable farmers to pay off their debts and make reasonable profits. Land was also source of wealth to acquire more wealth via speculation. Land speculation was particularly prominent in states like Iowa and Illinois, where land values were some of the highest in the nation. In 1910, the average price for an acre of in Iowa was \$82.58, and by 1920 it had jumped to \$199.52. For Illinois, during the same period, the increase was from \$95.02 to \$164.20 (Saloutos and Hicks 1951: 102). Speculation was not limited to eastern nor international capitalists, but farmers of modest means also engaged in speculation.

World War I was a catalyst for agricultural growth and farm prosperity, generating unprecedented demand for farm commodities. Under the Food Production and Food Control Acts of 1917, President Woodrow Wilson appointed ex-Iowan Herbert Hoover as the chair of the Food Administration. Hoover ordered massive increases in food production, especially in wheat and hogs, with a set minimum price of \$2 for wheat, which bold well for Wheat Belt farmers who experienced increased income as a result (Nordin and Scott 2005). Unfortunately, the price fix came too late for the 1917 wheat crop that was almost the same as the previous year due primarily to unfavorable weather. Corn Belt farmers had also experienced prosperity, although not to the degree of their Wheat Belt counterparts. Hog prices were not fixed like they had been for wheat, but the Food Administration worked with middle-men to assure a price of \$15.50 per hundredweight for hogs (Saloutos and Hicks 1951: 95). Under the national agricultural program farmers were urged to produce without limits and at whatever cost (Wallace 1924). Like many wars of the twentieth century, patriotic duty called for all citizens to sacrifice to win the war. One slogan stated, “Win the War—Damn the expense” (Wallace

1924: 1). Another said, “Plow to the Fence for National Defense!”, in which 40 million extra acres was brought under the plow for food production (Ramey 2014: 89).³⁶ The average annual value of American farms between 1910 to 1914 was six billion dollars. By 1917, it was \$13 billion and growing thereafter (Saloutos and Hicks 1951: 90). During and immediately after World War I, cotton rose from 7 cents per pound to 35 cents a pound, wheat went from 67 cents a bushel to \$2.16 a bushel, and corn increased from 67 cents to \$1.44 a bushel. Gross farm income more than doubled from \$7.6 million to \$17.7 million (Winders 2009: 33-4). Wheat Belt petty commodity producers have historically experienced greater highs and lows in income than the Corn Belt producers, who were more economically stable. World War I reinforced this pattern. The demands of World War I brought optimism and prosperity to the American farm, evidenced in higher farm prices and incomes.

Lastly, the prosperity of the American farm family pivoted on the unpaid work of women and children, whose labor conditions had not improved proportionally to men over a century. In fact, the unpaid work of women and children was roughly the same in most farming regions (Schwieder and Fink 1999). In the Corn Belt the soils, family farms, and community institutions remained rich throughout the nineteenth and early twentieth centuries. Without the farm- and community-based strategies of survival, family farming would have to ceased to exist by the turn of the twentieth century. Prosperity, then, was a product of unequal power relations constituted through gender and

³⁶ Saloutos and Hicks (1951: 90) estimated 45,000,000 extra acres were brought in under the plow.

class hierarchies that would continue to persist through the first half of the twentieth century and beyond.

How did the Corn Belt experience prosperity and how did the region contribute to the United States economy? In the early twentieth century, the United States was the leading corn producing country in the world. One gentleman at a corn carnival in 1899 stated that “from the beginning of Indiana to the end of Nebraska there is nothing but corn, cattle, and contentment” (Ross 1051: 118). States like Iowa and Illinois led in corn production, along with Minnesota and Wisconsin. During the mid-1920s the Midwest produced one-third of the total of American agricultural production, with Iowa and Illinois leading the way (Alston 2010: 10). Most of the corn produced on farms, nearly three-fourths, was used as feed for hogs and cattle (Warman 2003: 182). Again, Corn Belt farmers were less dependent on world markets compared to Wheat Belt and Cotton Belt farmers. While wheat dwarfed corn in terms of American exports, wheat acreage was about half that of corn acreage (Warman 2003: 183). Over the twentieth century corn would surpass wheat as the key crop in American agriculture.

Iowa, the premier agricultural state in the United States, led the nation in gross value of output with \$365,411,000 of the nation’s value in agricultural products in 1900 (Johnson 1978: 163). Once again environment-making in the form of drainage of Iowa’s northwest quarter would be crucial for increasing agricultural growth. In 1912, after drainage projects were completed all records in terms of acreage, yield, and production were broken (Hampton 1945). In 1916, Iowa alone had roughly 53 percent of the livestock receipts at the Chicago stockyards (Ross 1951: 121). In 1914, Iowa’s gross income from farming and agriculture grew to over half a billion, making nearly nine

percent of the total of the United States (Ross 1951: 121). Reflected in these transformations was an increase in land values and value per farm. During the period between 1900 and 1910 land values in Iowa went from \$36.35 per acre to \$82.58, “an increase of 127.2 per cent” (Ross 1951: 121-2). The average value per farm increased from \$8,023 to \$17,259 (Ross 1951: 122). These changes were unmatched across the nation, except in Illinois and Wisconsin. Many farmers used the wealth accrued from increased land values to obtain credit to purchase more land and machinery.

Illinois, followed by Iowa, had the greatest concentration of prosperous farmers in the United States. Cash-grain farms averaged \$2,781 annually (Nordin and Scott 2005: 104). The average annual income for a Corn Belt family farm was \$1,938 (Jellison 1993: 23). Per capita of the wealth of people was approximately \$2,584 (Iowa Census). The number of farms increased during this period. In 1915 there were 199,755 farms and by 1925 there were 208,780 farms (Iowa Census 1925: lxxiii). One of the major factors for the increase is tenant farmers buying their own farms. Iowa and Illinois had the most numerous farms that were well-off. In the Corn Belt tenant farmers were averaging around \$900 in income a year. In the South, tenants averaged around \$200 year (Hurt 1994: 42).

Aside from increased prices for farm commodities, Iowa farmers’ incomes were at an all-time high, according to Hampton (1945), as a result of three factors. First, Iowa’s productivity capacity held an unprecedented reserves of feed grains (table 2). Second, the record-breaking acreage and yield of corn, wheat, and oats during World War I ensured prosperity and development. Iowa farmers increased their basic food crops—corn, oats, wheat, barley, and rye—by 26 percent over the average yearly production for

that decade. And third, there was a great growth in the livestock and poultry industries, itself made possible by cheap feed. Furthermore, speculation was held to a minimum, while the “total farm mortgage indebtedness of the state was greatly curtailed” (Hampton 1945: 31).

Net Returns Per Labor Hour

	Iowa		North Central States	
	1917	1918	1917	1918
Corn	.98	.88	.92	.52
Wheat	1.26	1.08	.88	1.00
Oats	1.10	.58	.98	.68
Rye	.93	.77	.84	.40
Barley	1.63	.58	.72	.23
Potatoes	1.11	.44	.85	.65
Hay	.13	-.60	.77	-.05

Table 11

Sources: *Wallaces' Farmer* (1918); Saloutos and Hicks 1951: 99

By far the biggest contribution to the prosperity of the Corn Belt family farm was the war demand for pork and pork products, especially lard (Saloutos and Hicks 1951: 94). Hog production increased 15 percent between 1917 and 1918 (Schwieder 1996: 149). It must be kept in mind that these were well-established European markets, with roughly 12 percent of American pork and pork products had been shipped internationally prior to the war. This nearly doubled with the war. The average United States lard exports to Great Britain preceding the war was 450,000,000 pounds. By 1919 it was over a billion pounds (Saloutos and Hicks 1951: 94). Lard remained the largest pork product export. The exports of hams, shoulders, and bacon declined as competition from Danish producers provided higher quality pork products (Taylor 1932). Perhaps more injurious to American packers exporting pork products like hams and bacon was Britain's prohibition of boric acid in 1927. American packers had relied on boric acid as a key input for preserving meats, while packers from Europe because of their closer distance to Britain's

market did not require the use of boric acid (Taylor 1932). Banning the use of boric acid increased the cost of business for American packers. Nonetheless, pork and pork products, especially lard, remained a massive source of income for farmers and packers. Corn Belt farmers, recall, often assessed the prices received for corn and hog to determine whether they would sell the corn as is or on the hoof. Overall, corn production had stagnated for the years 1916 and 1918, leading to higher prices for corn. With hog prices at an average \$8 per hundredweight, farmers were incentivized to sell more corn. However, the Food Administration, with the assistance of the Chicago Board of Trade, artificially increased the price for hogs to roughly \$15 per hundredweight (Saloutos and Hicks 1951: 95). Exports of pork and pork products increased considerably during the war period, leading to greater prosperity for Corn Belt families.

Other indicators of the prosperity Iowa, Illinois and other Corn Belt states was the greater use of modern technologies and conveniences. Among Midwestern states, Iowa and Illinois had the highest rates of electricity in the home, as well as running water. By the early 1920s automobile ownership in these states were among the highest in the country (Schwieder 1996: 150). In fact, over the first quarter of the twentieth century rural people had a higher proportion of cars than urban people (Kline 1997). Telephones, dishwashers, and indoor bathrooms were more common in the Corn Belt compared to other agricultural regions. Finally, rural free mail delivery was being generalized throughout the Corn Belt, and by 1901 Iowa had nearly 300 routes (Schwieder 1996: 143). While communication and transportation technologies increased the standard of living for many Corn Belt farm families, farm women's experience did not evenly reflect these developments.

During the decade and a half before World War I, and shortly thereafter, optimism about the prosperity of agriculture was exceptional. Agricultural journals, businessmen, popular magazines, and elites boosted of the accomplishments of what we would become known as the “New Agriculture”, which expressed the changes from settler farming to modern farming. The good times brought increased investment in land, farm equipment, and modernized buildings. Most of these were purchased on credit or farmers took out mortgages, as limited available cash remained a problem. As long as prices remained higher for farm commodities, farmers were able to pay back their loans. By 1920, Corn Belt agriculture had developed the most productive, diverse, and dynamic farming system in the world (Hurt 1994).

The Farm Woman Problem: A Little Known Historical Development

Under the veil of prosperity women’s working conditions at the turn of the twentieth century were more like their mothers than husbands. While farming regions around the United States had experienced economic prosperity throughout the golden age, farm women had been largely absent from the benefits. The gendered socio-ecological relations of reproduction that maintained the farm through the first agricultural revolution were exhausted at the turn of the twentieth century. The drudgery of farm and household work for women led to a great migration for urban employment. Men’s patriarchal control over the means of production and resource allocation only heightened the contradictions between men and women. Although agrarianism obscured patriarchal control over the benefits and costs of petty commodity production, farm women in greater waves were entering wage work to increase their independence but also out of

necessity to save the family farm. The asymmetry of the agrarian web of life reached its apex during the golden age, giving impetus to the advancement of housewifization.

At the turn of twentieth century as the frontier had officially closed and the United States had entered a period of greater industrialization, there was a growing concern over the wave of rural to urban migration.³⁷ Specifically, it was women who were leaving the farm in greater droves, even while the farm sector experienced its greatest prosperity. Although women's work was not valued, at some point during the migration crisis, agricultural leaders admitted that to maintain the family farm would mean remaking the lives of farm women. "Uncle" Henry C. Wallace wrote in the *Wallace's Farmer*, "Until we make life on the farm satisfying to the farmer's wife, we will labor in vain to check the drift of rural population to the towns and cities" (Jellison 1993: 5). The solution according to the state, capital, and agricultural experts was to advance agrarian housewifization.

The state acted when President Theodore Roosevelt created the commission on country life, consisting of the leading agricultural experts, such as Henry C. Wallace, Liberty Hyde Bailey, and Kenyon Butterfield.³⁸ The commission conducted research on

³⁷ In 1900, the farm and urban populations in the United States were almost equal. By 1910 the urban population of the United States had clearly passed the farming population (Gardner 2002: 92-3).

³⁸ The Country Life Commission consisted of seven prominent men. The director of the commission was internationally known horticulturalist and director of the College of Agriculture at Cornell, Liberty Hyde Bailey. Henry Wallace, editor of the Midwestern journal, *Wallace's Farmer*, Kenyon Butterfield, the most prominent rural sociologist and president of the Massachusetts College of Agriculture, Walter Hines Page, editor of the *World's Work*, Gifford Pinchot, U.S. Forest Service, W.A. Beard, editor of the *Great Western Magazine* of California, and finally, C.S. Barret, president of the Farmer's Union in Georgia, who of all the men had most direct experience in farming (Larson and Jones 1976: 583-4). These prominent men were connected to well-respected mainstream institutions and were quite influential in their respected fields. The commission and its

rural wellbeing, providing questionnaires to farm families all over the United States. The questionnaire comprised of twelve questions, including “Are the farm homes in your neighborhood as good as they should be under existing conditions?”, “Do the farmers in your neighborhood get the returns they reasonably should from the sale of their products?”, and “Are the sanitary conditions of the farms in your neighborhood satisfactory?”.³⁹ The members of the Country Life Commission found that one of the most prominent major deficiencies was “the burdens and the narrow life of farm women” (Bailey 1908: 15). Based on 94,000 responses the results showed that farm women were overwhelmingly unsatisfied with farm life (Larson and Jones 1976). Perhaps not surprisingly, the most respondents came from the “North-Central” region (i.e. the Midwest), where there was a large farming population and a relatively larger population of better-off agrarian households. While farm women were universally unsatisfied with their working conditions and life on farms, the most promising population and that would become the target of housewifization were women from the Midwest.

In 1913, a few years after the initial Country Life Commission report, President Woodrow Wilson’s secretary of agriculture David Houston sent out letters to the wives of USDA volunteer crop correspondents so as to procure feedback how the USDA could help farm women. Of the 2,241 replies Houston received, the majority were white, middle-class, and native-born. The chief complaint from farm women was that their work was severely under mechanized compared to farm men (Jellison 1993: 10-11). Houston, echoing the ideas of the USDA and agricultural leaders, stated that “the woman on the

report became foundational to a larger Country Life Movement (Bowers 1974; Danbom 1979).

³⁹ For a full list of the questions see Larson and Jones (1976: 586-587).

farm is a most important economic factor in agriculture...On her rests largely the moral and mental development of the children, and on her attitude depends in great part the important question of whether the succeeding generation will continue to farm or will seek the allurements of life in the cities” (Jellison 1993: 15). In 1919 home demonstration agents conducted a survey of over 10,000 farm women in 33 northern and western states and found similar results to earlier studies regarding the condition of farm women in the United States (Ward 1920). One of the requirements of the study was to make sure all economic groups of farm women were represented. Ward (1920: 438), the head of the extension work for women in the USDA, acknowledges that it was more likely that “progressive” members of the community would participate in the survey. The middling farm families became the principal target for reformers because they were the ones that were more likely and capable of adapting the principles of the New Agriculture. That is, deepening capitalist relations of farming such that men were individualized capitalist farmers and women were individualized homemakers. The fragmentation and separation of the gendered division of labor became a principle organizing force in the nature of farming in the twentieth century.

Government and agricultural leaders were concerned about the growing resentment women were expressing. President Roosevelt was concerned about what he called “race suicide”, in which there was a marked decline in births for urban white women. Roosevelt hoped that white farm women would make up for the declining birth rate and supply the nation with abundant “child crops”.⁴⁰ To do this meant to make rural

⁴⁰ Hempstead (1992) and others have argued that the Country Life Movement contained within a thread of support for eugenics, sometimes explicitly.

life more hospitable. Herbert Quick, a journalist from Iowa and a prominent figure in the Country Life Movement, wrote in the popular national magazine, *Good Housekeeping*, that the rural to urban migration was primarily a movement of women. While men were more content on the farm, women's conditions were abysmal leading to migration. Quick emphasized that to keep women on the farm required modernizing the home with the latest appliances and conveniences (Ramey 2014).

The Care Crisis of Women's Double Burden

If a growing number of reports indicated the dissatisfaction of farm women's experiences and wellbeing, what exactly were those conditions and how did farm women express their dissatisfaction? Women's work was constant and increased during the late nineteenth century. This was the case for men as well (Craig and Weiss 2000). However, differences abound. First, while many farm families were cash strapped, even during this period of great prosperity, purchasing farm equipment was top priority, which lightened the physical burden of men's work. Women's combination of unpaid work that limited household expenditures and paid work that allowed the purchasing of household commodities, itself a form of work, along with cheap money enabled farm families to purchase farm equipment, improved livestock, and inputs. Although farm women worked in the field, barn, and household, women shouldered nearly all the burden of housework. The labor conditions of the household were often neglected in favor of improving conditions in the field and barn. Osterud (1993) argues that field work when compared to domestic work gained the greater attention because at certain stages field crops required immediate attention while some domestic chores were more flexible and could be completed later. What Osterud (1993) fails to mention, although she would likely agree,

is that it was capitalist markets that conditioned and structured “immediate attention” and “flexibility”. While both men and women had entered and participated in the modernizing project of the New Agriculture, women were working in similar conditions as their mothers, not comparable to their husbands. Work, patriarchy, and capitalism were interpenetrating forces structuring the social conditions of existence for men and women.

The spatiality of the agrarian web of life was asymmetrically gendered, placing a greater physical burden on women. Farm women most complained about lack of access to nearby water, lack of electricity, and outdated equipment (Jellison 1993). They often complained that wells were conveniently located near barns to water livestock, while they were some distance to the kitchen where she would perform much of her work. The average farm family was using around 175 gallons a day for just the household. This required farm women to fetch many pales of water from around 40 feet away. For Plains women, the distance was usually farther than for Midwestern women, owing to lack of available water sources (Schwieder and Fink 1999). Kansas women, and women of the arid Plains, also complained of the incessant cleaning due to the never-ending battle against dust. While ecological conditions were favorable for the humid Midwest families compared to the dry Plains, which lightened the burden of heavy lifting, many Midwestern farm women experienced unaccommodating working conditions. An Iowa farm woman stated: “In my opinion, the worse feature of the farm is too much work and too little pleasure. No wonder young folks leave the farm. The main cause of dissatisfaction of housewives is their isolation” (Schwieder 1986: 202). Another farm woman complained about how farm men invested all the income into the farm operations, while neglecting the household, stating:

“...I would work to have a law passed whereby no man should be allowed to own a farm unless he would provide for his wife as well as he did for his stock—plenty of water, and easy to get, good drainage, and other sanitary conditions about the farmhouse” (Fink 1986: 38).

One Kansas farm woman responded with wanting electricity in the home for a reasonable price:

“The thing [farm woman] needs in this day and time is electricity. Then when her house is lighted, her cream separated and churned, her washing, ironing, and sweeping, her sewing machine run by the same power, and she relieved from the drudgery of washing and filling lamps, lifting and washing jars, pans, and all these other hard old things, she can have some time for a social life and the improvement of her mind” (Jellison 1993: 13).

There were two extremes of rural farm women. First, those wealthy farm women that ordered paid housekeepers. Recall from chapter three, domestic hired girls were a scarcity throughout the Midwest, in which most were employed in wealthy, and some middling, households. Second, those women that farmed and performed waged work. In between these extremes was the more common, at least during the first quarter of the twentieth century, the farm wife who farmed, performed household labor, and exchanged non-commodity crops to local markets. Home economists did not target farm women working as waged labor. Rather, they focused on women who engaged in domestic work, household production, and some farming.

The crisis of care work and the production of cheap food are co-produced in the capitalist web of life. When we break down a typical week for farm women compared to urban women we can see the tremendous amount of work each were performing. A 1932 study indicated that farm women were averaging 62 hours a week with a quarter working over 70 hours, while urban women were averaging 52 hours a week (see table 12). Over a single year farm women were working more than 500 hours more than their urban

counterparts. The biggest difference was of course in farm work, which for farm women performed more than 450 hours more than their urban counterpart. On the whole, women and certainly farm women were working more hours a week than men working industrial jobs (Kneeland 1932: 564). Although an exaggeration, a common phrase at the time was that “man works in twentieth century while his wife keeps house in the sixteenth” (Kneeland 1929: 6). Overworked farm women and cheap food, then, advanced economic growth while undermining the conditions of social reproduction.

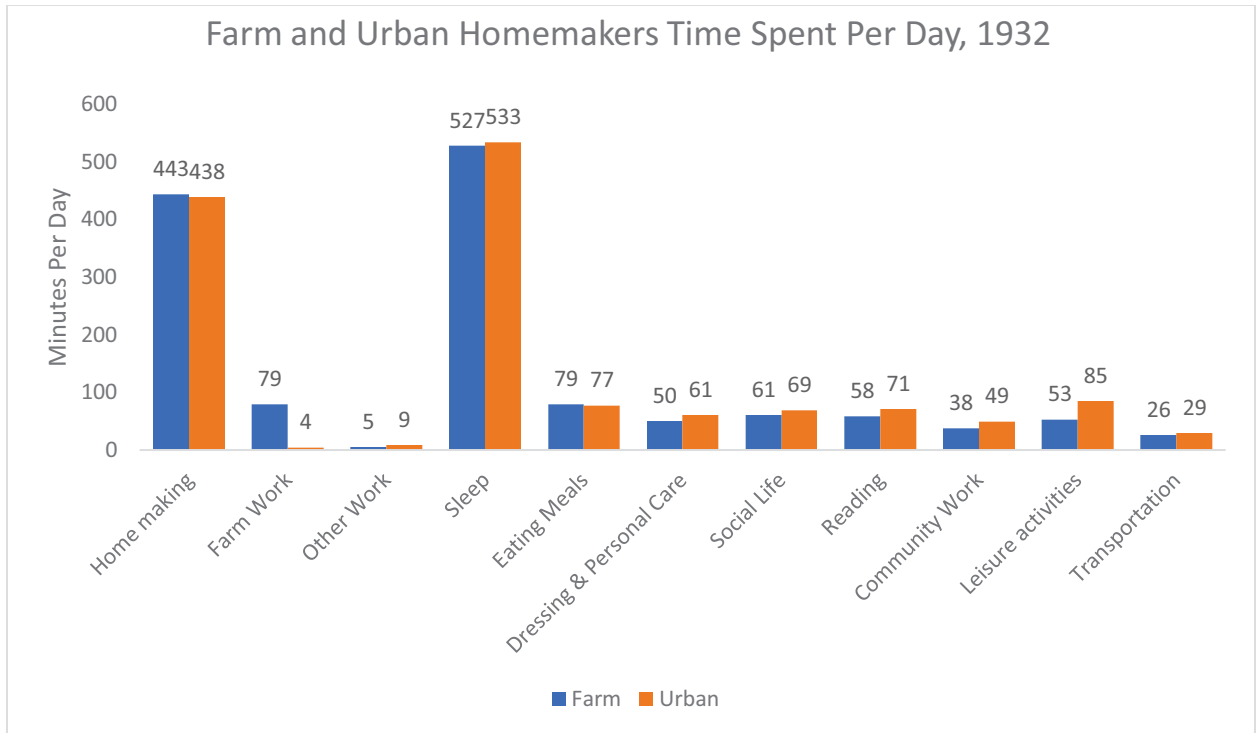


Table 12

Source: Kneeland, H. 1932. “Leisure of Home Makers Studied for Light on Standards of Living.” In *Yearbook of Agriculture* 1932, 562-564.

If we break down earnings from the unpaid and paid labor of women we can get a better sense of their contributions to the family farm and economic growth. One study asked farm women what their wages for housework should be: farm women stated \$2 an hour (Kneeland 1927: 387). If we average the 63 hours a week by \$2 you get \$126 a

week. Annual income in wages would amount to \$6,300. Recall from chapter three that Illinois and Iowa farmers were the most prosperous farm units. During the Great Depression, the average annual net income for Illinois farmers was roughly \$2,000 and in Iowa slightly less (Nordin and Scott 2005: 104). During the 1930s, women's home production was estimated at 40 to 50 percent of the total household budget (Schwieder 1996: 265). Farm women knew that by not hiring domestic servant she could stretch the household income. Given all this, it stands to reason that women's combination of waged and non-waged labor was substantial to household income.

In sum, the 'farm woman problem' is often absent from historical accounts of Midwestern agriculture. The prosperity of the golden age obscures the hardships women experienced, as well as their economic contribution. Farm prosperity, as I have indicated here, cannot be reduced to transformation in the productive forces of producing commodity crops, or even to the role of the state. Rather, this prosperity was a product of the cheapening of farm women. In this way, we can see the dialectical contradictory nature of production and social reproduction, its social crisis-tendencies, and the social conditions of agrarian existence. Capital and the state took note and acted on the growing plight of farm women by introducing new ways of organizing the agrarian web of life.

Science and Power: Remaking Farm Women as Housewives

Farm women were active participants in unveiling the paradoxical conditions of the golden age of farming and their lives. To be sure, farm presses and political leaders were writing of the "drudgery" of farm women in the nineteenth century, but the historical conditions of the twentieth century presented a stark contrast of modernization and underdevelopment within the agrarian household. But as detailed above, farm women

were active participants in struggling against the cheapening of their lives. According to the state and capital, the solution was housewifization for agrarian women, which became a key element a larger agrarian revolution unfolding throughout the United States.⁴¹ Furthermore, as chapter five will explain, while stagnating agricultural productivity and rising food prices boosted farmers' income, rising food prices posed an obstacle to capital accumulation, a growing concern for industrial capitalists and other elites in the first quarter of the twentieth century. Although the state and capital sought to modernize all agrarian institutions under the impetus of the Country Life Movement, women's political actions and demands for higher status via improved labor conditions impelled the state and capital to act. The state nor capital, however, were interested in dismantling patriarchy on the farm or in the city. Rather, they sought through different means and reasons, sometimes in contradictory ways, to restructure farm women as housewives.

The double burden of farm women had reached crisis proportions by the late nineteenth century. Many daughters left the farm for wage labor and educational opportunities, leaving farm women with a greater portion of reproductive work. The exhaustion of the social relations of reproduction conditioned the Smith-Lever Act of 1914, which "created a voluntary system through which the federal government provided matching funds on the basis of the rural population to states and counties that desired the services of country farm and home demonstration agents" (Jellison 1993: 16). A

⁴¹ Not to be confused with agricultural revolutions, which primarily focuses on advancing farm productivity, agrarian revolutions are fundamental transformations in the socio-ecological relations of reproduction and production. Clearly, this is not an easy separation given that agrarian social relations constitute agricultural revolutions and agricultural revolutions constitute agrarian social relations. In any case, when speaking of agrarian revolutions, we are focusing on farm peoples' subjectivities.

partnership between the USDA, agricultural colleges, and farm bureaus, would carry out the work of what became known as the “Agricultural and Home Economics Extension Service”, which divided the farm into two distinct spheres: farm work and housework. Farm work was linked to the man’s sphere, while housework was linked to the woman’s sphere, and never the two shall meet. Louise Stanley, the first chief of the Bureau of Home Economics, stated that “the contribution which home economics studies have to make to national economy has not yet been realized... The closer the adjustment between production and home demands the greater the economy to all, especially if the home demands are so directed as to promote health, efficiency, and well-being of the individuals” (Stanley 1924: 1). Echoing Stanley (1924), Florence Ward’s (1920: 7) survey “The Farm Woman’s Problems” stated “The entire purpose which animates the work of the cooperative extension service as it pertains to the home is to help the home maker to so arrange the various departments of her housekeeping that she may secure for herself, her family, and her community the highest possible degree of health, happiness, and efficiency”. Farm women would now experience a systemic round of housewifization, as science, capital, and nature sought to generalize the housewife of the bourgeois household.

The reality of farm men and women’s separate spheres was non-existent, at least for much of the farm population. As described in chapter three, farm women in the Corn Belt worked alongside their men in the barn and in the field. The diversified farm necessitated that farm women and their children participate in tending animals and maintaining and harvesting field crops. Not only did the diversified farm require all hands-on deck, especially during plowing, planting, and harvesting, but the lack of

money to pay farm workers necessitated the appropriation of women and children's unpaid work. Bourgeois farmers were more likely to construct a gender division of labor based on men working in the fields and women working in the household (Neth 1995). Bourgeois farmers were able to hire more field hands, allowing women to maintain the household and daughters to attend school. The bourgeois farmer, like his urban counterpart, actively constructed the ideal farm family to emulate. The extension service would impose the bourgeois farm model on petty commodity producers.

The extension service had long been in operation with the Morrill Land-Grant Act of 1862, primarily focusing on farm men, but resources were much more limited and based on state and local organizations, including private capital. Now, the federal government would pump money into extension services all around the country, and in 1915 created an Office of Home Economics to provide research support for the home agents (Kline 1997: 360). Importantly, though, farm communities were expected to raise funds for home agents to subsidize their salaries. It is no surprise then that the first home agent under the Smith-Lever Act began working in the Kankakee County, Illinois, a wealthy farming county in east-central Illinois. Fifteen-hundred women the Kankakee County pledged \$1 a year for three years to fund the work Eva Benefiel. Home economist Eva Benefiel completed her first home demonstration on July 1, 1915. began working in Kankae County, Illinois on July 1, 1915. Housewifization would then be enacted and financially supported by the federal government and its extension services. Scientific homemaking as environment-making became the order of the day.

During its first decade of work home economists sought to improve the lives of women through increasing social opportunities, improved food preparation techniques,

home sanitation, and household efficiency (Schwieder 1986). To do this, the extension service encouraged cooperation and social interaction centered on preexisting groups and organizations. Women had already been part of a wide range of community networks that exchanged food, household items, and labor. Community groups, both formal and informal, provided a social outlet for women as well as an economic safety net. Home economists realized the benefits of women's groups and sought to reinforce those connections. Women's relationship to one another not only increased social opportunities that would relieve the isolation of farm life, but these exchanges also entailed lowering the cost of reproducing the family (Neth 1995).

By all accounts abstract social nature through USDA home economists sought to maximize the unpaid work of women, concentrating their efforts on the management of the household. While farm women had complained about their status within the family farm unit evidenced in their labor conditions, home economists took the complaints as inefficiencies in the relations of reproduction in the household. The chief goal for home economists was to map out the household as a space for increasing the efficiency of women, solidifying their roles as housewives. Although generally coming from a farming background, the worldview of home economists was a gendered normative abstraction where the separate spheres of production and reproduction made up the family farm.

The deficits of the rural household needed to be modernized through rationalization and simplification of domestic work. The nature of the household could be reduced to "mathematical abstraction" (Moore 2017: 11) in the life-making capacities of women. The solution was a series of interventions via home demonstrations on how best to organize the household as abstracted from the agrarian web of life. Above all, the

drudgery of farm women could be eliminated through home economist's practices of abstract social nature which sought to restructure the spatio-temporalities of domestic work. For example, women wasted time and energy walking many miles in a given day in old-fashioned kitchens. Kitchen spaces of work were irrationally organized such that the stove, sink, and work table were too far apart. The kitchen was the workshop to the largest occupational group in the United States: housewives (Kneeland 1929). As such, the kitchen became the hidden abode of social reproduction, a vital space for the preconditions of cheap food.

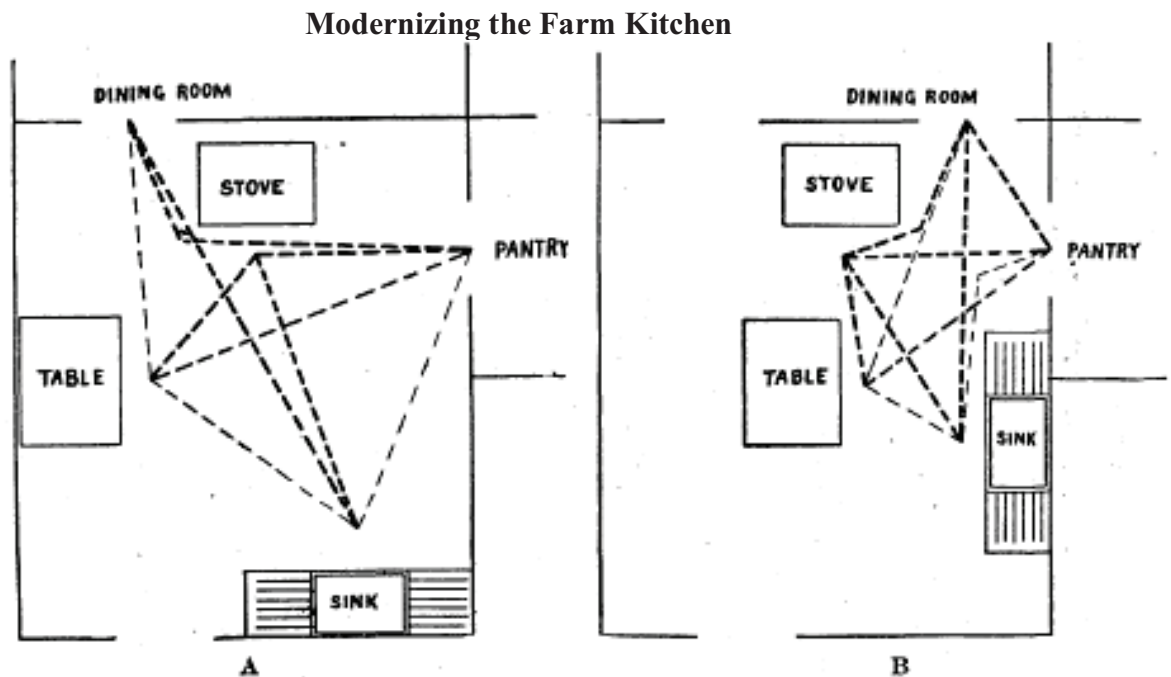


Figure 7

Source: USDA Archive: Apron Strings and Kitchen Sinks: The USDA Bureau of Home Economics, Barrows (1921).

Caption: Above are two kitchen plans. The kitchen "A" plan is wasteful in that it requires more steps between the stove, table, and sink. The kitchen "B" plan is more efficient in that the workshop is more condensed, limiting the necessary amounts of steps taken.

Not only were kitchens battlegrounds for housewifization, but women's bodies became a focal point as well. USDA bulletins like "Posture in Housework" explain how

“using your body correctly” can reduce the amount of energy required, thereby improving efficiency in housework. Proper posture and the use of correct tools when sweeping, washing dishes, and walking up and down stairs could reduce energy use (see below). The results of good posture in housework would help eliminate fatigue, improve looks, and get rid of nervous tensions and irritability (USDA). The household was treated as a factory, whereby women’s labor process could be rationalized. However, unlike the factory workers who fragmented into smaller and smaller components of a larger labor process, women still performed all the household chores.



Figure 8
Source: USDA Archive: Apron Strings and Kitchen Sinks: The USDA Bureau of Home Economics, Barrows (1921).



Figure 9

Source: USDA Archive: Apron Strings and Kitchen Sinks: The USDA Bureau of Home Economics, Barrows (1921).

The solution to the farm problem and the process constituting agrarian housewifization was deepening market-dependency. Besides encouraging already existing cooperation between women of the community, home economists concentrated their efforts on convincing women and families to modernize the household with electricity and running-water and to purchase appliances like washing machines and refrigerators. The idea was that modernization of domestic work would lighten the physical burden of women daily chores, freeing her from drudgery to pursuit leisure activities. The mass production of relatively cheap household commodities enabled farm families to consume new products. To be clear, the home economics extension service was not about teaching women to farm, nor about obtaining credit or labor if a single woman was to pursue farming, and finally, the service was not about challenging the

hierarchical gendered structure of the farm (Fink 1986). Women's rightful position, according to the extension service, was in the private sphere of the home. One of capital's tried and true method of stabilizing historical crises has been to increase market-dependency. In the first quarter of the twentieth century the solution to the farm women crisis was housewifization by way of consumerism.

In their pursuit to remake home environments, home agents were entering an established set of bundled relations with defined patterns of food-getting and family-making. Home agents, who were often single middle-class women, taught farm women how to modernize their home with laborsaving technologies. The principle target of home agents were white women from middling farm families. For those families that could not afford to purchase the modern conveniences, it was recommended that women use their "egg" money to make their purchases. Little did the home agent know that women's egg money had purchased the daily needs of the family, leaving no money left. While agricultural experts acknowledged women's role on the farm, they were acknowledging wealthy farm families who could afford to maintain traditional bourgeois gender roles and purchase the latest modern conveniences. Most home agents failed to realize the debts farm families had incurred over this period of economic growth and expansion. What disposable income was available it was often used to purchase farm equipment and livestock. As a result of patriarchal control over resources and capitalism unduly focus on advancing farm productivity, modernizing the home was of secondary concern for most farm families—developments most home agents failed to fully appreciate.

Homemaking was institutionalized early on for Iowa women. Iowa farm women had access to earlier forms of practical education through several mediums. In 1869,

Iowa State College, later turned university, established what would become a prominent Home Economics program in which women attended lectures and short courses (Schwieder 1986). As earlier as 1870 Iowa had created its first farmers' institute, which was funded by local farmers (Morgan 1934). State and county farm institutes catered to the needs of women. In 1901 the State Farmer's Institute in Des Moines held a conference where five papers were presented, three of which were farm women themselves, on "The Farmer's Garden", "Domestic Economy", "Culture and Social Life in a Farming Community", and "Poultry on the Farm" (Schwieder 1986: 203-4). Iowa women, more than many in the Midwest and Plains, were exposed to higher education.

By 1900 *Wallace's Farmer* carried a regularly column called, "Hearts and Homes", which provided the opportunity for farm women to write about their problems and concerns. In some cases, they wrote about practical matters of housework and gardens, and in other cases they discussed the deeper meanings around "their roles as wives, mothers, and community members" (Schwieder 1986: 204). While initially the column was open to Iowa farm women, over the coming decades home economists at Iowa State College and extension personnel increasingly wrote in the column after the 1920s. Experts paid less attention to deeper structural problems of patriarchal dominance, focusing greater attention on everyday tasks that farm women practiced. The changing direction from *Wallace's Farmer* from ordinary farm women to experts confirmed two ongoing developments. First, dialogue shifted from critical stances of patriarchal dominance towards improving the task-orientated day-to-day activities of women, as if these were not inextricably linked to patriarchy. Second, that the role of experts was gaining greater traction in society as part of the progressive era. As chapter five will

detail, the Wallace family was influential to the historical trajectory of farming in Iowa and the United States. In 1932, the journal's circulation reached 244,870 subscribers, many were Iowa farm families (Schwieder 1986: 206). Iowa farm women were certainly at advantage compared to other farm women around the country, at least in terms of opportunity to education.

To what extent did science, expertise, and power operate to improve the productivity, and thus well-being of farm women? One of the main ways home economists sought to measure women's work was through time-use surveys. Under the arm of the USDA Bureau of Home Economics and funded by the Purnell Act of 1925, home economists and social scientists, like Illena Bailey (1915) and Hildegard Kneeland (1929), began to study every task that farm women performed.⁴² Specifically, they categorized women's activities into four different categories: "homemaking" (household management, childcare, and housecleaning), "farm work" (garden work, poultry, dairy, and field), "leisure", and sleep (Kline 1997: 368).⁴³ Home economists provided women with forms where they were asked to fill in the time taken for daily activities for a week (see figure 2 and 3). Farm women were contacted through the American Farm Bureau Federation (AFBF), a national farm organization that represented wealthy commercial farmers, which had access to many farm families as it had become the largest farm

⁴² The Bureau of Economics and the *Journal of Home Economics* were central outlets for research on farm women during this era.

⁴³ There seems to be a parallel between time-use studies of rural farm women and Taylorism that had developed to study the labor process of industrial workers. While social scientists were preoccupied with creating "objective" surveys, they believed, like Taylor and industrialists, that by studying the actions of workers (and non-workers as well), one could point to inefficiencies and thereby seek to resolve that through technological or organizational techniques.

organization in the United States. Like most studies, non-English speaking women were excluded, while the women most likely to participate were “well-educated, middle- and upper-class, native-born, white women” (Kline 1997: 370). What these studies sought to accomplish was to measure quantitatively the labor process women performed daily so as to intervene with laborsaving household technologies to advance labor productivity and to increase leisure time. Greater leisure would result in greater happiness in the farm wife that would in turn creating a better life for farm families.

Daily Time Record of Homemaker

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF HOME ECONOMICS
WASHINGTON, D. C.

**DAILY TIME RECORD
OF HOMEMAKER**

Name

Address

Day of week

Date, 192

Each small space between the hours on the “clock” represents five minutes. Begin this day’s record by drawing a line on “A. M. clock” from outer to inner circles at time of arising. At end of time given to the next activity draw another line, and in space between lines describe this activity. Continue in this way changing to “P. M. clock” at noon and accounting for all of the 24 hours of the day.
Read separate “Instructions” carefully before beginning record.

A.M. CLOCK

P.M. CLOCK

	Lodging	At meals (includes lunches put up)		
		Breakfast	Dinner	Lunch or supper
Family				
Guests				
Boarders and roomers				
Household help				
Farm help				
TOTAL				

NOTES

(OVER)

Figure 10
Source: National Agricultural Library. U.S. Department of Agriculture, Bureau of Home Economics. 1925.

Daily Time Record of Homemaker

DAILY TIME RECORD OF HELP
IN HOUSEKEEPING AND CARE OF MEMBERS OF HOUSEHOLD

Head a column for each person helping the homemaker except when work is done by individuals for themselves. Indicate by whom done, such as husband, son, aunt, hired girl, hired man, neighbor's daughter. Give ages of children. In each column enter on proper line the total time spent by helper on each activity. If you have no help, indicate by drawing a line across columns.

ACTIVITIES												
	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.
FOOD.												
Breakfast:												
Preparing and serving												
Clearing table and washing dishes												
Dinner:												
Preparing and serving												
Clearing table and washing dishes												
Supper or lunch:												
Preparing and serving												
Clearing table and washing dishes												
Other preparing and clearing away:												
Additional meals and food eaten between meals												
Food not prepared for any particular meal (such as making bread)												
Refreshments for social affairs in the home												
Canning, preserving, pickling, drying												
HOUSE.												
Cleaning and straightening:												
Daily and weekly												
Extra (not as often as once a week)												
Making fires, emptying ashes, carrying fuel												
Pumping and carrying water (except for laundry)												
CLOTHING AND TEXTILES.												
Laundering:												
Washing (including getting and emptying water)												
Taking down, sprinkling, folding, putting away unironed clothes												
Ironing and putting away ironed clothes												
Laundry sent out (preparing and putting away)												
Cleaning and pressing												
Mending												
Sewing in the home (except by paid dressmaker)												
PURCHASING AND PAYING.												
Food												
Other purchasing for the home and members of household												
Going and returning when chiefly for purchasing and paying												
CARE OF MEMBERS OF HOUSEHOLD.												
Bathing, dressing, feeding, home nursing, and other physical care												
LIST ANY OTHER HELP IN HOUSEKEEPING.												
.....												
.....												
.....												
.....												
.....												
NOTES:												
.....												
.....												
.....												
.....												

(OVER)

Figure 11
Source: National Agricultural Library. U.S. Department of Agriculture, Bureau of Home Economics. 1925.

Time-use surveys spanned all the facets of farm women's lives. The research was conclusive. Farm women were spending nearly 12 hours a day working, equating to roughly 64 hours a week, which was substantially more than their urban counterparts (Ramey 2014: 34). During the busy summer months women were regularly working

more than 13 or 14 hours a day. Interestingly, studies suggest that parity in existed in farm women's average length of working-day across all geographical regions. However, differences in ecology, crops, and class shaped the qualitative dimensions of farm women. For example, Midwestern farm women spent more time raising larger poultry flocks compared to eastern and western farm women. Midwestern women had greater access to closer water sources than Plains women, resulting in less physical demands for Midwestern women. Midwestern women also had greater access to power machinery and engines that when not in use in field work could be hooked up to perform housework (Ward 1920). The biggest time-difference in women's work, however, was not between rural women, but between rural and urban women.

The USDA home agents were largely unsuccessful in their attempts to modernize large populations of farm women. Prior to World War I, had just begun performing home demonstrations and had not much success. During the war, the federal government infused more funding to the Bureau of Home Economics, dramatically increasing home agents. During the war, however, home agents focused less on convincing women to purchase home appliances and more conserving food for the war effort. Throughout the 1920s and 1930s home agents once again emphasized purchasing home appliances to resolve the farm woman problem. The families that purchased modern appliances were wealthier families affiliated with the AFBF, where the greatest concertation of members was in Illinois and Iowa (Jellison 1993). It was not until after World War II had many farmhouses were modernized when most families that were still farming were wealthier ones that could afford house appliances.

Home economics agents were not the only group to attempt the housewifization of farm women. The AFBF also became an important institution for relegating women's work. The AFBF formed in 1919 that derived from county and state farm bureaus around the United States. As a reaction to radical organizations like the Non-Partisan League, the Farm Bureau was a conservative farm organization that upheld the agrarianism and was financially linked to the USDA. The farm organization also held financial ties to "International Harvester, the Chicago Board of Trade, and Sears" (Neth 1995: 132). Its members were made up of larger commercial-orientated farmers, who were required to pay substantial dues, up to \$15 a year (McConnell 1953: 56).⁴⁴ The Farm Bureau was in charge of housing extension service county agents and promoting commercial farming. The county agent would be a servant, not a leader, to the local farm bureau (McConnell 1953). In 1921, Henry C. Wallace, the secretary of agriculture, was one of the biggest supporters of the Farm Bureau, and felt that as an organization it should be the most powerful business institution in the United States. The Farm Bureau was an external force structuring household social relations.

The first priority of the AFBF was upholding the goals of the agrarian bourgeoisie—wealthy farmers, agribusinesses, and large landowners. Their goals focused on improving production and marketing. Because of the goals focused primarily on commodity crops and cash-nexus relations, subsistence work and home production were secondary. The AFBF reinforced the nuclear bourgeois family in which worked was

⁴⁴ While there is widespread consensus that the Farm Bureau is composed of predominately wealthy farmers, McConnell (1951: 149-150) actually provides convincing evidence that the members of the Farm Bureau were overwhelmingly wealthy farmers.

differentiated by gender and alienated from the community. This negatively transformed women's activities as they were more likely to engage in community exchange than men. The AFBF with the help of home economists promoted the individualization and privatization of farm women and rural life. One study found that farm families in four Midwest states "extension agents most effectively reached families living on large farms and those who were members of the conservative Farm Bureau" (Wilson 1929, cited in Jellison 1993: 41). Throughout the 1920s county and state farm bureaus concentrated on integrating family-based activities that would seek to maintain the patriarchal form of the family farm (Berlage 2001).

Capital in the Production of Nature

Although the USDA's Home Economics agency and farm bureaus were important institutions, it was capital that was more effective in the housewifization of farm women. Unlike the extension agents, capital acknowledged the diversity of farm women's work and experiences (Jellison 1993). Capital, unlike extension agents, exploited the economic opportunities that were presented as tensions grew between men and women's work. Advertisers played on the inequalities and insecurities of men and women, suggesting to farm men that if they did not "bring the city to the farm" or purchase the latest conveniences that promised to improve the lives of farm women their wives would leave them to experience the modern urban world. In this way, housewifization and modernization went hand in hand with capital accumulation and restructuring the form of the family farm as a bourgeois family.

Women's housework preserved the value of commodities, and no other life-making activity was as consistently physical demanding as laundry. "Blue Monday" was

laundry day in which the better part of the day was dedicated to cleaning clothes of the entire family. Because many farm families did not have running water women had to fetch water from a well or nearby waterhole. One wash, one boiling, and one rinse used fifty gallons of water, equaling to 400 pounds. Women fetched water from the well, which on average was 30 feet from the Midwestern house, 60 feet in the Plains (Schwieder and Fink 1999). The water then had to be heated on the wood stove, itself requiring corn cobs or wood to heat.⁴⁵ After heating the water and adding lye, which softened the water, women agitated the clothes and linens with a hand crank (Fink 1986). After hanging up the clothes and linen to dry they were brought in to dry. The following day women ironed, sewed, and mended clothes and linens.

Since washing clothes constituted the greatest physical burden for women, there was a push from women to find alternatives to washing clothes. Commercial laundry services emerged in rural areas to serve farm families. Many women, even poor ones, were glad to bring their family's laundry to commercial laundromats. Roughly a third of families utilized commercial laundromats during the 1920s (Smith 1990: 135). Laundry cooperatives also formed to socialize housework throughout the community. Middling and wealthy households regularly paid professional laundress to clean the family's clothes, either there at their household or at her household. On the whole, farm women were pleased with the options of spending money to relinquish the burden of performing laundry.

⁴⁵ Corn cobs were often used to heat wood stoves as corn was always an abundant resource and required less energy hauling than wood. Using corn cobs ensured costs were kept minimal.

The laundry options provided to farm women in the early twentieth century was an obstacle to washing-machine manufacturers. Manufacturers like Iowa's Maytag Company and Voss Company were now mass-producing washing machines for the home. They advertised in farm journals like *Wallace's Farmer*, which often pictured a young white, middle-class woman smiling as she effortlessly washed clothes. Maytag advertisements read, ““All Work and No Play is Not for the Farm Woman of Today”, “Big Farm Washings Cost Less with Maytag”,” (Fink and Schwieder 1989: 587) and the “gasoline-powered Liberty motor” promised to “liberate” farm women from the drudgery of washing clothes (Jellison 1993: 45). Companies stressed the idea of modernity and progress with the purchase of the latest model washing machine, and emphasized that “women's” technology should reflect the latest “men's” technology. In this way, companies were capitalizing on the existing inequalities between farm men and women, but only in terms of farm and household equipment.

**BIG FARM WASHINGS
COST LESS with the MAYTAG**



The sturdy-built Maytag is particularly desirable for big farm washings. It gives you more washings per dollar—a lifetime of service. Scores of Maytag Automatic Washers in use in farm homes and large country institutions have each done an average of 3,000 to 4,000 washings and are still giving faithful service. This is equal to a hundred years of ordinary farm service.

The Maytag gives you greater speed, carefulness, convenience and washing ability. The rotary, one-piece, cast-aluminum tub, the rotary water container, and many other features originated by Maytag, have made it the choice of over half a million farm homes.

FOR HOMES WITHOUT ELECTRICITY
The Maytag is available with its built gasoline Multi-Motor, a simple, modern, in-built engine that a woman can operate. It has but four moving parts—interchangeable with an electric motor by removing only four bolts.

LET A TRIAL WASHING CONVINCE YOU
Write or phone the nearest Maytag dealer. Test the Maytag in your own home. If the Maytag doesn't suit you, don't keep it. Divided payments you'll never miss.

THE MAYTAG COMPANY
1897-1931
WASHERS, TABLE IRONERS, AND SEWING MACHINES
241 Washington, 4th, South, Des Moines, Iowa.

**MAYTAG NOW
MAKES A MULTI-
MOTOR WASHER
MODEL "G" (Gasoline)
THAT SELLS FOR
LESS THAN \$130**

THE Maytag WASHER • TABLE IRONER

Figure 12
Source: *Wallace's Farmer*, August 15, 1931, 937.

The development of laundry does not follow the typical transition from private housework to a marketed service, as was the case for clothing. Laundry work was exclusively performed by the unpaid labor of women and daughters in the household. When domestic servants, professional laundresses, and commercial laundromats emerged, women were content to spend the money to offset the time and energy required to wash clothes. However, manufactures mass production of washing machines intended for the private use of the household with the expectation that women would once again perform unpaid labor in washing clothes meant that once again women were offsetting

the cost of social reproduction. The purchase of household washing machines entailed the purchasing of a whole host of commodities, including “detergents...electric parts, plumbing supplies” and giving rise to a new branch in textiles, synthetic fabrics (Smith 1990: 136). Washing machine ownership was higher in the Corn Belt than most farming regions. The initial cost for many was out of the reach for poorer farm families (Jellison 1993).

Companies like Sears, Roebuck and Company and Montgomery Ward, both headquartered in Chicago, constructed a consumer market for rural populations (Worthy 1980). At the turn of the twentieth century, more than one of three people lived on farms, constituting a large consumer base for businesses (Lobao and Meyer 2001: 103). Sears, Roebuck Company provided a large selection of inexpensive goods that farm families could afford. They also had a selection of luxury goods that wealthier farmers purchased. In this way, the company was able to cater to a large swath of farmers while creating a desirability element for poorer farmers (Neth 1995). Mail-order houses became an important site for increasing the consumption habits of rural people. In part, there was a great increase in the use of mail-order houses because prices were cheaper than those charged by the local merchants (Saloutos and Hicks 1951). Most rural people were not loyal to the local town merchants, and as a result, companies like Sears, Roebuck and Company began to increase the distance between farmers and the commodities they purchased that in turn undermined local merchants and community networks.

Communication and transportation technologies became another solution for overcoming farm women’s hardships. By 1900, many farm families were gaining access to telephones with local rural-based companies. Over the next two decades major

companies like AT&T gained monopoly power over urban markets and later penetrated rural markets. Bell's telephone promised to remove the isolation farm women were experiencing. The telephone allowed women to market household commodities and socialize with their neighbors and kin without leaving the farm (Jellison 1993). The biggest obstacle to farm families purchasing telephones was the cost of infrastructure. The cost of setting up telecommunication infrastructure depended on the concentration of people within a given area. In the Corn Belt where telephone ownership was higher there was a greater concentration of people.⁴⁶ Whereas in the Wheat Belt telephone ownership was much lower for much longer because of the higher cost associated with a more dispersed population. During the Great Depression, however, telephones were often the first conveniences farms cut. Telephone ownership declined significantly for Wheat Belt families who suffered more from droughts, while telephone ownership fell less drastically in Corn and Dairy belts (Neth 1995: 201).

Radios were another modern convenience that changed the relationship between farm families, their communities and the rest of the world. During the 1920s, with the start of commercial broadcasting, thousands of farm families throughout the Midwest purchased radios. Broadcasting entailed advertising, education, and entertainment. In 1912 in the Midwest Illinois had the highest ownership of radios at 12 percent of farm homes. By 1940, Iowa had the highest ownership of radios at 85 percent (Neth 1995:

⁴⁶ Interestingly enough the 1920 United States Census revealed farm households owned more telephones and automobiles than nonfarm households (Kline 1997: 366). In 1920, Illinois, Indiana, and Iowa had the highest use of telephones throughout the Midwest (Jellison 1993: 54).

253). In 1933 the Collins Radio Company originated in Cedar Rapids, Iowa, became the leading radio manufacturer by the 1950s (Schwieder 1996: 272).

Although the automobile did not modernize the household directly, the use of automobiles on and off the farm changed the dynamics of the farm and household. While automobile companies advertised initially to men, farm women soon became an important demographic of advertisers. Like other capitalists, automobile manufacturers realized the demands of women's day to day life required improved transportation for marketing goods. Indeed, the automobile allowed women to accelerate the time for marketing goods and provided a sense of freedom from the farm. In many cases, farm men sent their wives with farm equipment parts to town to be fixed. The success of the automobile, however, could not be realized without the power of the state to impose taxes to modernize roads. During the prosperous years of the golden age and following World War I, the federal government spent roughly \$75 million a year building rural post roads, while "state and local governments were to match the federal funds so that the federal contribution was not to exceed 50 percent of the construction. In Iowa in 1925 23,909 farm families lived along improved roads" (Cochrane 1993: 223). By the end of the 1930s over 121,000 farm families lived along improved roads (Fink and Schwieder 1989: 580). Capital accumulation, state power, and the production of nature co-produced the housewife as a consumer.

Finally, electricity and running water brought the city to the country. The cost of electric power transmission to the countryside was a barrier to the widespread adoption of electricity in the household (Gardner 2009). It would not be until the Rural Electrification Act, "which provided low-interest rates loans for rural electrification projects", during the

Great Depression would significant changes occur (Fink 1986: 47). This was a mighty development project to remake the environments of six million farms (Kline 2002: 327). Rural electrification primarily benefited farmers in the Corn and Dairy belts. “In order to establish REA electricity in a neighborhood...residents had to guarantee that an average of three families per mile would use the REA lines” (Jellison 1993: 99). This meant that heavier populated farming regions like the Corn Belt could take advantage of loan interest loans, while many Wheat Belt farmers had to wait years for electricity. Prior to the Great Depression, Iowa, Illinois, and Indiana were the leading Midwest states that had electric lighting (Jellison 1993: 55). In 1920, 21 percent of Iowa’s farm homes had electricity, and by 1940, 45 percent had electricity (Fink 1986: 47). REA proponents suggested that the greater use of irons, refrigerators, and vacuum cleaners, and other appliances the greater use of electricity, which in turn, increases the housewife’s productivity at an overall lower cost (Jellison 1993: 99).

Recall, farm women were fetching many pails of water on average 40 feet away maintain the household. Having running water in the kitchen and bathroom would relieve the back-breaking work of walking, stooping, lifting, and fetching buckets of water. Electric water pumps were very much welcomed by farm women, as this would greatly reduce back-breaking work of procuring water for the household. In *Wallace’s Farmer* one farm woman wrote that electricity had given her a “houseful of servants—servants that carry water, sweep rugs, help with washing and ironing and preparing of meals”. While another farm woman held similar feelings about household electricity, “No water to be carried uphill; no waste water to be carried out; no kerosene lamps to be cleaned and filled; no hand scorching sadirons to be used; no fuel to clutter up my kitchen in pails

and boxes; no ashes to be swept up and carried out...It seems too good to be true” (Schwieder 1996: 273). Running-water and electricity were said to free the farm women from the drudgery of household work.

Electricity would also improve women’s productive work on the farm. Prior to the use of electricity for maintaining a poultry operation, raising chicks was no easy task as they could die from lack of heat. Even after the introduction of incubators with brooding boxes finicky thermostats did not maintain a constant temperature, a certain death sentence for chicks. On really cold days or when the incubator wasn’t working eggs and chicks were brought into the house and warmed around a stove or heater (Fink 1986). Electricity allowed farm women to expand their poultry operation to increase income. In the barn, electricity reduced labor involved in dairying in terms of milking machines, separators, and cooling tanks.

When farm women were able to afford the modern laborsaving technologies, researchers found that women’s leisure time had not increased (Vanek 1974, 1978, 1980; Cowan 1976; Walker 1976). When electricity and running water had freed up time and eased the physical burden for women, they generally focused on more time on household production or increased their standards of cleanliness (Jellison 1993). During the first quarter of the twentieth century capital and the state had laid the ground work for modernizing the agrarian household, a process that accelerated during the Great Depression and after World War II. Businesses were able to lower the costs of consumer goods, like washing machines, allowing households to purchase many household appliances. Without a doubt the physical labor of women’s work had reduced, but their time spent working had not.

Conclusion

In sum, the housewifization of farm women had mixed results. Capitalists farm families were not targeted by home economists as they upheld the Bureau of Home Economics prescription for separate spheres. Poorer farm families, many that were tenants, did not have the economic resources to purchase modern appliances. In some cases, even if they had money, they were less willing to improve the home as they were renters and could be displaced at-will by landlords. The generalization of the modernization of the farmhouse had not occurred until after World War II. By this time when farm women *seemed* to have the opportunity to be exclusively housewives, poorer farm families were displaced from farming. Those farm families that were well off, often members of the county farm bureau, and who already possessed some modern household commodities were the primary targets of home economists. These relatively prosperous families were concentrated in the heart of the Corn Belt, Illinois and Iowa. Housewifization found its fullest development in the petit bourgeois yeoman household of the Corn Belt.

While the process of agrarian housewifization had its antecedents in the mid-nineteenth transition to petty commodity production, it had become systemic in the twentieth century. The forces of capital, the state, and nature figured into that development like none before. Home economists identified, mapped, and simplified the world of farm women as a violent abstraction obscuring their life-making activities in the agrarian web of life.

Chapter 5: The Second Agricultural Revolution

As grasshopper invasions hastened the transition from wheat to corn-hog and diversified farming, Illinois and Iowa farmers bucked the agricultural depression of the two decades following the Civil War. Railroads accelerated the downward spiral of Northeastern wheat and sheep farmers who were displaced by larger producers in the West. On the Great Plains, as settlement accelerated following the Civil War, wheat farmers experienced plagues of grasshoppers, droughts, and eventually depressed wheat prices as competition in wheat production increased worldwide. The South experienced the greatest economic deprivation with the transition from plantation slavery to sharecropping. Freed slaves and poor whites were relegated to the worst farm lands. Sharecropping was nearly as brutal as slavery and economic conditions may have worsened with competing cotton producing countries worldwide (Warman 2003). Farmers producing cotton and wheat for their survival, rather than corn, were more dependent on world markets—a development that led to great fluctuations in prosperity and poverty. In the Midwest, Corn Belt agriculture bucked the trend. While pork and pork products were a major export sustaining the prosperity of Corn Belt families, hogs prices increased substantially over the post-antebellum period. Corn Belt farm families experienced greater economic prosperity as many farming regions suffered.

Following the golden age of American agriculture, an agricultural depression unfolded throughout 1920s and into the 1930s, only this time the Corn Belt was not spared. The demands of World War I increased agricultural production to such a high

level that farm commodity prices hit unsustainable levels. What became known as the “farm problem”—farmers faced a classic cost-price squeeze in which the costs of inputs, including land values, were on the rise while the price of their commodities was declining. Farm foreclosures were widespread across the nation. The farm crisis of the 1920s was unlike any other crisis prior, both in terms of its scope and severity.

The solution to the twin crisis of farming, the farm woman problem and the larger farm problem, was the second agricultural revolution. During the American century, petty commodity production fundamentally transformed from diversified farming units to large-scale monoculture units. Corn remained king in the Corn Belt, but the new miracle crop soybean greatly increased in acreage over the post-World War II era. Farm women’s role in the reproduction of the agrarian household shifted significantly in the twentieth century. As household production was gradually displaced by industrial capitals and rising farm debts choked household economies, women entered in greater force into wage work while also continuing to participate in farming.

A new complex of technics revolutionized productivity delivering cheap food to an expanding industrial working-class. Cheap food was crucial for advancing proletarianization and housewifization throughout the United States as food became less and less a major expense of the household budget. No longer were urban families as dependent on income from boarding. Advancing proletarianization expressed in the family wage enabled the Fordist housewife, whom enabled the development of the male-dominated proletarian household. The second agricultural revolution constituted the proletarian household, a process that unfolded through the reconfiguration of farm men and women’s work.

In this chapter I explain the origins and development of the second agricultural revolution. I focus on the changing nature of farm men and women's work. I argue that Illinois and Iowa agrarian households were at the epicenter of the second agricultural revolution because of their unique position in the development and exhaustion of the first agricultural revolution. Farm men's work became more rationalized and capitalized, while farm women formed a growing population of semi-proletarians. The twentieth century productivity revolution would have far-reaching consequences for American capitalism and the world-economy.

Political Economy of American Development, 1870S-1930s

Following the Civil War American capitalism took the road of core rather than peripheral development. Agricultural regional specialization was advancing throughout the nation. Beginning in the 1870s American firms were leading an organizational revolution in business (Arrighi 1994). Industrialization was entering a new stage, a shift from small- and medium-size firms to large-size corporations expressed in the era of monopoly capitalism. Economic concentration accelerated throughout the reconstructive and progressive eras. By 1901 United States Steel became the largest corporation in the world (Agnew 1987). This was the era of vertically integrated firms that owned mines, sold finished commodities, and everything in between. Vertically integration was complemented with scientific management in constructing mass production in manufacturing. The twin processes of vertical integration and scientific management "increased production per worker and per machine faster and to a greater extent than single-unit enterprises or less specialized multi-unit enterprises" (Arrighi et al. 1999: 129). American and German industrialization had succeeded British industrialization,

itself experiencing the rise of financialization as the dominate mode of accumulation. American ascent unfolded through “autocentric development”, the national integration of agriculture and industry (Friedmann and McMichael 1989)—a stark contrast to Britain’s free-trade led ascent.

American industrialization advanced as part of a long-run confluence of forces, including a shift from independent to petty commodity production, the increased material demands of British hegemony and American ascent, and the ability to undermined the control of skilled laborers (Agnew 1987; Moore 2002). American industrialization and proletarianization advanced during the conjuncture of the late nineteenth century.

Crucial to American ascent was its massive resource base. While Britain had an abundance of coal to fuel industrialization, America had greater quantities of coal, iron ore, copper, forests, and perhaps more importantly a seemingly endless supply of oil. High quality agricultural lands stretched far and wide that were overlaid with 200,000 miles of track—more than all of Europe combined (Agnew 1987: 49). The railroads and the telegraph had enabled capital to appropriate cheap natures within its own geographical boundaries. Technological innovations in steel-making enabled American steel firms to utilize poor quality ores that in turn increased ore and coal mining that in turn created the demand for larger mines (Bunker and Ciccantell 2005). The rise of American capitalism entailed the intensification and acceleration in producing and exchanging cheap natures as part of long-run trend in world accumulation. American ascent, then, was premised on material expansion and producing cheaper commodities than its competitors, namely Britain and Germany. The core of American capitalism was the appropriation of cheap nature.

Cheap nature in the form of labor formed the industrial base of American capitalism. The first American agricultural revolution, itself premised on the demands of British material expansion and international investments, led to rural expulsion across Europe, resulting in the vast expansion from 1.5 to 6 million America's industrial working-class, nearly doubling the rate of Germany (Moore 2002: 180). The patterns of emigration to the United States changed both in terms of composition and quantity. While northern and southern Europeans were the main population emigrating to the United States prior to the Civil War, between 1880 and 1920 most groups came from southern and eastern Europe. During those years, the number of immigrants climbed to 23.5 million (Agnew 1987: 51). Most fled depressive economic conditions knowing full well that they would receive wage work in the United States. America's ascent to economic dominance would not have likely occurred without a growing industrial army of labor.

Less than a century earlier Britain's working population had experienced a reduction in the standard of living with a mass migration from rural regions to industrial cities. However, by the 1870s, with the flows of worldwide cheap food, Britain's industrial working-class were able to spend less on food and more on better housing, thus, improving their standard of living (Secombe 1993). By the turn of the twentieth century the American industrial working-class were experiencing a similar decline in their standard of living with the transition from a rural to urban way of life. Farm houses offered greater space and comfort than crowded urban dwellings. The problem for industrial capitalism was that the America's working-class was spending too much of its household budget on essential commodities like food and housing as opposed to discretionary commodities. Between 1913 and 1924 food prices increased by more than

42 percent (Department of Labor 1924: 35). Throughout the late nineteenth century and well into the twentieth century food constituted the largest expense, making up nearly half the household budget (Gordon 2016: 4 and 65; Stanley and Smith 1992). Housing and clothing competed as the second and third largest expenses. Women often took in boarders, performed outwork for income, and engaging in part-time work to reproduce the household. Housewifization was unfolding throughout urban households in which the unpaid labor of middle-class women was estimated around \$700 a year (Boydston 1990: 134). With ever increasing flow of international cheap labor capitalists were reluctant to increase wages.

Recall, Britain's industrialization a century earlier had experienced similar limits to growth. The cost of food and housing was too steep for many proletarian households. The solution then, as would be the solution in the early twentieth century for American industrialization, was an agricultural revolution. While farm families were experiencing the greatest widespread prosperity in American history, the contradictions between capital and labor were becoming untenable—more so in heavy industries. In the early twentieth century labor strikes were significant in the auto, steel, and mining industries (Silver 2003; Podobnik 2006). The state and industrial capitalists claimed that farming was not delivering cheap food to the level necessary for industrialization. Thus, agriculture acted as an obstacle to economic growth (Danbom 1979). The solution was once again two-fold. First, modernize farming so as to increase productivity to lower the reproduction cost of working-class households. And second, American firms would assert economic dominance globally.

While European colonial empires were the old way of organizing the world-economy, American firms were reorganizing the world-economy for their needs. Throughout much of nineteenth century Americans firms grew nationally through domestic markets. The United States emerged economically more powerful in the aftermath of the 1896 depression. As early as the 1890s American firms were searching for international markets to absorb the “glut of goods pouring out of highly mechanized factories” (Agnew 1987: 60). Transnational American-based “firms held over \$1 billion in foreign assets by 1895, and \$2.5 billion by 1914”, second only to Britain (Moore 2002: 193; Agnew 1987: 62). American firms direct investment abroad amounted to 7 percent of GNP (Arrighi et al. 1999: 130). American ascendance, then, was in part a product of the growing dominance of its firms that were now operating globally.

Just as American firms were controlling the world-economy, the economy faced another depression, beginning in 1929. Between 1929 and 1934 GNP declined from \$104.4 billion to \$56 billion. Employment declined by 20 percent and unemployment increased from 1.5 million to 13 million (Agnew 1987: 65). Consumer debt skyrocketed during the 1920s as businesses provided installment plans for durable commodities, like cars and furniture. “By 1924, three out of every four automobiles were bought on credit” (Gordon 2016: 298). Even as consumer debt skyrocketed and international markets expanded, there was still not enough demand for the productive capacity of American firms (Agnew 1987; Arrighi et al. 1999). If the crises of early capitalism were generally expressed as not enough cheap natures, the crises of the long nineteenth and twentieth centuries were a product too much cheap natures.

While the New Deal and World War II are often credited as saving American capitalism, I suggest that cheap food was essential for advancing proletarianization and housewifization during the golden age of American capitalism. The challenge for meeting the demands of achieving American hegemony required access to cheap food.

Farm Crisis to a Generalized Crisis

The history of agriculture has been a history of recurring crises. While the farm crisis of the late nineteenth century was detrimental to farmers in the United States, the farm crisis of the 1920s spared no victims. The agricultural crisis hit in summer of 1920. Farm incomes held steady until 1920 when the government removed the price guarantee for wheat, lowering the price of wheat by 33 percent before the year was over (Fitzgerald 2003: 18). Over the 1920s prices for corn dropped by 78 percent, wheat declined 64 percent, and cotton dropped 57 percent (Hurt 1994: 43). Livestock prices declined as well. Economists estimated that the costs of corn production exceeded the price of corn by 50 percent (Hurt 1994: 43). With low returns from farm prices thousands of farmers were unable to pay off their mounting debt that had accrued during the prosperous years of expansion (Cochrane 1993: 101). Not only were farmers' incomes declining, but also consumers were paying higher prices for food, posing a formidable obstacle to capital accumulation. What was more problematic for farmers other than crop prices was the increase in non-farm goods. For example, in 1919 a farmer could purchase one gallon of gas with one-fifth a bushel of corn, whereas in 1921 a gallon of gas cost 2 bushels (Saloutos and Hicks 1951: 100). Land values, like farm commodity prices, declined, further contributing to the hardships of the farm family. The dynamism of the American

farm family had been so productive that it undermined the long-term viability of the enterprise.

During World War I European governments purchased food imports with United States lent money, which furthered ensured international markets for American farmers. After World War I, Europeans began building up their agriculture so as not to depend on imports from the United States and elsewhere. European countries became more self-sufficient in terms foodstuffs. Compounding the problem of food self-sufficiency in Europe, American Farmers began once again to experience competition from beef and wheat farmers in Argentina, Canada, and Australia, offering lower prices than American producers. United Kingdom's imports of American beef fell from 50 percent to 5 percent following the war (Saloutos and Hicks 1951: 105). Worldwide competition and international food self-sufficiency have always been obstacles to American farmers' prosperity.

While the farm crisis was particularly difficult on farmers, the agrarian web of life was interconnected well beyond the farm. The farm crisis or the 'farm problem' only became problematic for capitalism when food prices were high and capitalists whose profits were tied to agriculture were threatened.⁴⁷ Bankers, lenders, and business leaders

⁴⁷ Farmers and their organizations did not view the farm problem in the same light. They believed that banks, speculators, middlemen, railroads companies, and agribusiness were profiting from the hard-working farmers. Even the conservative AFBF believed that 'middlemen' were undermining the prosperity of the farmers everywhere. This was certainly the case in the last quarter of the nineteenth century with populists' movements across large farming regions. However, by the turn of the twentieth century most farm organizations were not concerned about class interests and contradictions, but narrowly on the prices of farm commodities (Bauerly 2016). Farmers urged government regulation. Government had price controls for wheat and hogs that lasted until 1919 when they were removed. The farm problem, according to farmers, was a result of capital and government seeking to profit and control farmers.

that encouraged farmers to purchase more land to increase production were at risk. During the 1920s, rural banks collapsed and lending contracted (Clarke 1994). Farm equipment manufacturers experienced sales losses due declining land values that farmers used as collateral. The costs of the crisis would be disastrous for many farm families and the agrarian web of life throughout the 1920s, a process that would continue into the 1930s. In this way, the farm problem cannot be isolated to farm management practices and family relations. Rather, they must be conceptualized historically through relations of power, wealth, and control outside of, but in relation to, farming.

As the farm crisis morphed into the global crisis of capitalism, the Great Depression exacted a greater toll on farmers across the United States. In 1932, wheat declined to 37 cents per bushel, 5 cents per pound of cotton, and corn fell to 32 cents per bushel (Winders 2009: 35). Farm incomes drop precipitously, resulting in a doubling of farm foreclosures in less than a two-year period (Winders 2009: 35). Part of the problem for cotton and wheat farmers was declining or stagnating exports. Wheat farmers from Canada, Argentina, Australia, and Russia increased production, creating a global glut for wheat. While cotton exports maintained stable through the crisis, overall cotton production increased significantly with its frontier expansion westward into Arkansas, Texas, and Oklahoma. During the 1920s corn exports dropped from 5.3 MMT to .3 MMT (Winders 2009: 38). Productivity gains were limited, but overall production had increased with the drainage of farmland in the Corn Belt. Overall, exports declined following World War I with the recovery of European agriculture. The value of the dollar

increased relative to other currencies making United States exports less competitive (Winders 2009).

The impact of the farm crisis and the subsequent Great Depression was uneven throughout the farm regions of the United States. In the South, where many sharecroppers lived in poverty and hardship, the economic crisis also intensified conditions, leading to the “Great Migration” of poor rural black farmers to industrial cities in the North, a process that accelerated following World War II. During the 1930s around a 1/3 of southern sharecroppers and 12 percent of the tenants throughout the thirteen cotton states fled to industrial cities (Hurt 1994: 297). In the South, cotton surpluses continued to mount through the 1920s and early 1930s, while cotton prices between 1927 and 1933 dropped from 20 cents a pound to 10 cents a pound. During the same period per farm income for cotton farmers fell from \$1,245 to \$397 (Winders 2006: 148). Pellagra, a disease of poverty and unduly narrow diet, became epidemic throughout the South. This deadly disease disproportionately impacted poor sharecroppers who did not have access to adequate land to grow their own food (Warman 2003). Under the Agricultural Adjustment Act (AAA) of 1933, the federal government provided payments to planters and tenants. Planters regularly stole tenants federal payouts, which they used to purchase farm equipment and wage labor, leading the expulsion of many sharecroppers.

On the Great Plains climate refugees were displaced by the black blizzards of the 1930s Global Dust Bowl (Holleman 2017). The Plains farmers mining of soils and long-term dependence on wheat as a monoculture undermined the health and vitality of the region. “In May 1934, a dust storm removed an estimated 300 million tons of soil from the Great Plains” (Hurt 1994: 300). Drought conditions through the 1930s when

combined with strong winds limited families' ability to survive the bad times, resulting in another "Great Migration" of 500,000 rural people (Hurt 1994: 303). This time it was to the fields of California. The 1930s great migrations of the Southern sharecropper and Plains farmer cyclically punctuated a long-term secular trend of rural displacement.

The Cotton and Wheat belts were the hardest hit farming regions during the two decades following World War I. Under Roosevelt's New Deal the Farm Mortgage Act and Farm Security Administration (FSA) provided loans for poverty-stricken farmers who hoped to stay on the farm, many that provided to the Cotton and Wheat belts. On his visit to the South, Secretary of Agriculture Henry A. Wallace observed the dire conditions of tenants and sharecroppers. Wallace suggested that the South's farm problem could be resolved by converting tenants into family-owned farms, like the prosperous farms of his home state Iowa (Bauerly 2016). While Secretary Wallace was one of the main architects of the Agricultural Adjustment Acts, the act only passed with the support of the Southern Democrats and the AFBF who favored production controls and price supports (Winders 2006). In this way, Southern Democrats and the plantation class were politically strong in shaping the trajectory of agricultural policy.

The Corn Belt while also faced hardships throughout the 1920s but began to recover during the mid-1930s. Aside from AAA payments families received for corn and hogs, what enabled the Corn Belt family to persist was its ability to carry out diversified farming. Home or subsistence production during the 1920s and 1930s actually increased as a strategy for making up the falling prices of corn and hogs which continuously fell below the cost of production. Farm women used strategies of "making do" with less, recycling clothes and materials, and reducing the family diet. Equally important, women

increased their production of chickens, eggs, and butter. From the turn of the twentieth century through World War II Iowa was the leading egg producer in the United States (Fink and Schwieder 1989). Women managed these small-scale, and sometimes large-scale, flocks. Farm income in the Corn Belt rose four points higher than other agricultural regions (Ross 1951: 175). In Iowa, farm women's "home production was typically 40 to 50 percent of the total household budget" (Fink and Schwieder 1989: 574). Corn Belt farmers were not as dependent on export markets as wheat or cotton belt farmer. Urbanization and the meatification of the American diet would only continue to grow throughout the twentieth century, an essential market for Corn Belt farmers.

While wheat and cotton farmers generally experienced slightly more prosperity than corn-hog farmers during the expansive war years, there was greater instability in the Great Plains and South during the crisis years. The Corn Belt was able to weather the storm of the unpredictable nature of markets and weather. The stability of the Corn Belt owes much of this to its specific historical, ecological, and geographical conditions, its farm commodities, and the unpaid work on women and the rest of nature.

Men Make Their Own History, Just Not as They Please

Agrarian change, like all historical change, unfolded through a complex configuration of humans and the rest of nature. The development of petty commodity producers across the heart of the Corn Belt was not simply a human affair, but one bound to the workings of extra-human natures. The transformation of the productive forces was a product of the paid and unpaid work of humans and the rest of nature. Pests, disease, and weather were all central to the reproduction of the form of petty commodity production and to the development of American capitalism. Prior to World War II, but

certainly after, the European Corn Borer, corn rootworm, and flies were pests that thwarted yields. Diseases, like hog cholera and other livestock diseases, continued to plague the Corn Belt. These extra-human natures were environment-making subjects that were constitutive of the web of life in the Corn Belt. This section explains the farm problem, the solutions to the farm problem, and the productivity revolution.

As much as farmers and agribusiness sought to control the unpredictability of nature and markets, at nearly every turn extra-human nature conspired to limit productivity gains. The European corn borer, *Pyrausta Nubilalis* (Hubner), was first discovered by an entomologist in corn fields outside of Boston in 1917. It was believed that an import of broom straw from Hungary had carried the Corn Borer to the United States (Dunlap 1980: 94). The corn borer quickly spread west across the United States over the coming decades, arriving in Illinois and Iowa in the 1930s causing significant crop losses. The corn borer feeds on the leaves and the larva tunnel through the stalks throughout the winter. By late spring the larva emerges as moths and reproduce throughout the summer, laying eggs on the corn leaves or on the ears, usually producing two to three generations of larva over the summer. The ear of the corn can be damaged by way of prematurely dropping from the stalk and/or “by feeding on the kernels” (Olmstead and Rhode 2008: 86). Many species of the corn borer still persist today.

There was a growing concern over the spread of pests as it decimated eastern fields and made its way to America’s heartland. Agrarian experts throughout the Midwest had been aware of inevitable reach of the corn borer and began making plans to stem the tide of destruction. Having been aware of the boll weevil epidemic that plagued cotton crops throughout the South, the USDA’s Bureau of Entomology (BOE) knew they had to

act quickly to contain the corn borer and maintain damage control. The BOE had been ineffective, partly because of lack of funding, in controlling the reproduction of the boll weevil, and had learned its lesson that required all hands on deck, including farmers, federal funding, scientists, county agents, farm organizations like the Farm Bureau, to ensure minimal losses to the most important crop (Dunlap 1980). Henry A. Wallace and E.N. Bressman, anticipating the loss due to the corn borer stated that “the European corn borer has possibilities of causing as much damage to the crop as the boll weevil has caused to the cotton crop. There is grave danger that it will reach the heart of the Corn Belt by 1930” (Wallace and Bressman 1923, cited in Olmstead and Rhode 2008: 87). In 1927, President Coolidge signed a bill to allocate \$10 million to control the corn borer, the largest insect-control project under taken in history (Olmstead and Rhode 2008: 87). The BOE enforced a domestic quarantine that forbid the shipment of corn out of the area to limit exposure, and eventually recommended that farmers practice sound culture techniques for controlling the corn borer (Dunlap 1980). Despite the large allocation given to farmers to plow up their fields to reduce the spread of the pest, it was more likely that weather reduced the overall population. In 1943 estimates of corn crop loss were around four percent from Indian to eastern Iowa (Anderson 2009: 17). Nationwide, the USDA estimated that the corn borer resulted in “an average loss of \$144 million per year over the period 1949-1953” (Olmstead and Rhode 2008: 91). While this did not spell disaster for highly productive Corn Belt farmers, there was the realization that cultural techniques of pest control were limited in successfully controlling corn borer populations.

Farm presses and the agricultural colleges believed cultural techniques were insufficient for pest control. The solution was chemical treatments. Although land-grant

scientists professed that farmers should engage in a balance between the cultural techniques and chemical treatments, the message was clear that the use of a man-made chlorinated hydrocarbon insecticide called dichlorodiphenyltrichloroethane or better known as DDT was the more appropriate option. Iowa State entomologist Harold Gunderson conducted joint studies with Wallace's Pioneer Hi-Bred Company, concluding that corn fields treated with DDT increased yields from twenty to twenty-eight bushels of corn per acre compared to untreated fields (Anderson 2009: 18). Gunderson detailed a four point program for farmers to control for corn borer that included early planting, clean plowing, purchasing pest-resistant hybrid varieties, and multiple applications of DDT. While the editors of *Wallace's Farmer* claimed farmers should practice an array of strategies for controlling pests, they showed the weaknesses of each technique and concluded that the best solution to farmers' pest problem was spraying DDT (Anderson 2009: 18). The state and capital's promotion of the use DDT as an effective technique for controlling pest resulted in its greater acceptance and practice.⁴⁸

While DDT was first manufactured in the nineteenth century and its use was primarily for war, its rise and fall on American farms was rapid, lasting roughly two decades. The most important decline of DDT in terms of treating crops, at least prior to an environmental backlash, was the development of hybrids that were resistant to them (Anderson 2009). In the 1950s, the major seed companies were breeding hybrids that were specifically designed to resist or tolerate the corn borer. Since the majority of Iowa

⁴⁸ Farmers had treated roughly 50,000 acres with DDT in 1947, several years later they had treated over 1.7 million acres (Anderson 2009: 19).

and Illinois farmers had already regularly purchased hybrid seed corn, it did not make sense to purchase insecticide for treating crop pests.

During the post-World War II period DDT was also used for eliminating flies around dairy cows. Agricultural leaders quickly realized that flies would reduce the productivity of dairy cows. Farmers would spray their livestock with DDT and have a barn free of flies, at least temporarily. Flies that survived the spraying reproduced offspring that were also resistant to the insecticide. Regulators soon realized that livestock sprayed with DDT entered the food chain that when consumed could be threatening to human health (Anderson 2009). After DDT was banned from applying to animals and barns, malathion and diazinon could be applied, but were significantly more expensive. These too were eventually banned. A series of highly toxic chemical treatments had been banned, yet many farmers continued to use DDT and other chlorinated hydrocarbons. By the late 1960s studies revealed that insecticides, along with commercial fertilizers, were not only in crops and livestock, but were poisoning ground- and surface-water like the Mississippi and Missouri rivers.

The biggest problem a farmer's corn crop faced was not insects, but weeds. Weeds continuously choked the lifeblood of the field by appropriating moisture, sunlight, and nutrients that would limit land productivity and reduce yields. Weeds, unlike the corn borer, were visible, and farmers had been managing weeds for generations. In the great demand of World War II, and the temporary elimination of production controls, farmers spent more time planting and harvesting corn and soybeans, and less time on cultivating weeds. In 1947 *Wallace's Farmer* said that "Weeds Won in War Years". Extension directors noted that weeds were becoming a greater problem than ever before.

Throughout the 1950s annual losses caused by weeds and the cost of their control was roughly \$5 billion (Peterson 1967: 253). Recall, farmers cultivated weeds at least twice during the growing season. For farm families managing weeds was a labor intensive and time-consuming process. Multi-billion dollar chemical companies, like Dow Chemical and American Chemical Paint Company, promised the farmer a ‘weed-free’ farm, with its 2,4-D, a growth regulator herbicide (Nordin and Scott 2005; Anderson 2009). 2,4-d “marked the beginning of the post-war chemical revolution in crop production and the birth of the agro-chemical industry” (Kirby 1980: 1, cited in Argue et al. 2003: 210). The growth of 2,4-D was impressive through the post-war period. In 1945, its first year of public testing, total production stood at 917,000 pounds. Five years later annual production was over 14,000,000 pounds, and in 1964 production increased to 53,000,000 pounds (Peterson 1967: 252). Herbicides, like 2,4-D, “reduced the requirement for tillage machinery” (Lewontin 1998: 74), thereby reducing soil erosion due to tillage. Sprayers subsequently increased around the Corn Belt. “One year after 2,4-D came on the market, 5,000 Iowa farmers owned sprayers” (Anderson 2009: 38). Farmers preferred to purchase sprayers over paying for custom work as sprayers were relatively cheap and they were already in use for insecticides. Some farmers applied herbicides prior to seeding, and in some cases farmers employed aerial spraying. The use of herbicides eventually ended the “cultivation of cornfields” (Nordin and Scott 2005: 139).

Herbicides were not the miracle chemical companies promised. Herbicides were not uniformly effective. Ecological conditions posed an obstacle to effectively treating weeds with herbicides. Too much rain, colder temperatures, and high wind patterns all conspired to lower the effectiveness of killing weeds. Strong winds could and did blow

the poison across unintended targets like gardens, vegetable fields, and orchards. In the 1960s commodity farmers began displacing beekeepers and grape growers as 2,4-D use increased with the expansion of commodity production (Fitzgerald 2005: 403). The greater use of 2,4-D for killing broadleafed weeds only reduced the competition for grassy weeds like the giant foxtail, which had spread across every county in Iowa in a matter of a few years (Anderson 2009). A whole array of expensive and more toxic herbicides, like Amiben and Atrazine, came on the market to reduce weeds. From the 1960s to the 1970s, the cost of herbicides increased, making up a larger proportion of the farmers operating costs (Anderson 2009). Many weeds existed throughout the Corn Belt, including cocklebur, Canada thistle, smartweed, foxtail, etc. Some of these still persist despite chemical companies continuous innovation of weed killers.

Finally, perhaps more important than insecticides and herbicides, was the greater use of commercial fertilizers on commodity crops. By the 1940s nearly every farmer in Illinois and Iowa were using hybrid seed corn in their fields. Hybrid varieties appropriated the nutrients of the soil much faster than open varieties, necessitating farmers utilize commercial fertilizers to restore nitrogen, phosphorous, and potassium levels. Under the AAA's production controls corn acres were reduced, giving farmers' greater incentive to increase the density of corn per acre, thereby increasing a greater need for the use of commercial fertilizer. Farmers used commercial fertilizers to boost yields and profits, a process that took place during planting season. Commercial fertilizers were made economically viable by the Haber-Bosch synthesis, which, according Vaclav Smil (2001), was one of the great agricultural inventions that

transformed farming. Above all else, farmers' use of fertilizers was to increase yields via fixing nutrient depleted soils.

Commercial fertilizers promoted by chemical companies quickly jump started yields that had been previously stagnate throughout the last two decades (Perelman 1977). The use of synthetic fertilizers in the early hybrid varieties of corn more than doubled the yield per acre, fetching returns of 300 percent or more (Cochrane 1993: 127). Nitrogen, phosphate, and potash, the three main nutrients in fertilizer, all increased in use for the period between 1940 to 1970.⁴⁹ Nitrogen increased from 419 million tons to 7,549 million tons; potash increased from 435 million tons to 4,035 tons; and phosphate increased from 794 million tons to 4,574 million tons (Cochrane 1993: 127-8; Nelson 1990: 470). In the 1930s synthetic fertilizer consumption was concentrated in the Atlantic states and the South. In 1934, the Corn and Wheat belts were slow to utilize fertilizer. However, by the 1960s the Corn and Wheat belts had become the two largest fertilizer-using regions in the United States (Nelson 1990). Fertilizers constituted one of the biggest energy expenses for farmers. However, a combination of government subsidies funneled into big developments projects like the Tennessee Valley Authority (TVA) was used to research, develop, and distribute fertilizers to soil-conservation associations. The highly-concentrated fertilizer industry was underwritten by cheap energy flowing from the oil- gas-fields of Texas and California.

⁴⁹ World consumption of commercial fertilizers grew more than 280 percent between 1946-1962 (Nelson 1965: 2). Over the twentieth century there has been a 125-fold increase in the global rate of inorganic nitrogen "per hectare of cropland" (Smil 2001: 141). While almost half of total amount of nitrogen fertilizer was consumed in the last two decades, its origins and significance began in the postwar era (Smil 2001: 141).

Industrialization of fertilizer industry advanced following World War II. Technological transformations in manufacturing ammonia cut production costs in half. A typical plant could produce 300 tons of ammonia a day at around \$40 a ton. With the introduction of the “Kellogg system” a plant could produce 1,000 tons per day at around \$20 a ton (Perelman 1977, 170). Now, fertilizer companies and the industry faced a double bind: the costs of modernizing plants was increasing while production greatly outstripped domestic consumption. The solution, under the aegis of the Green Revolution and government-supported subsidies for fertilizers, was developing fertilizer markets in the global South. In Japan, Philippines between 1965 and 1970 the amount of fertilizer doubled from 9.2 to 20.5 kg. per hectare (Griffin 1979, 58). The United States was the largest producer and exporter of commercial fertilizers. Companies like ESSO and IMC developed plants in India, the Philippines, and elsewhere (Perelman 1977). Under PL-480, Cooley Loans were given to US agribusinesses to use in the recipient nation in which over one-third of the loans were given to US fertilizer companies operating in the Near East and South Asia (Bauerly 2015: 315). In the postwar era America’s cheap food model went global.

Overall, the consumption of synthetic fertilizers grew throughout the United States and the world. From 1961 to 2010 worldwide consumption increased more than fivefold, from 31 to 178 million metric tonnes, with nitrogen fertilizer leading the way. Today, US farmers, which constitute .25 percent of the world’s farmers, consume more than one-tenth of the world’s annual fertilizer consumption (Weis 2013: 106). One study estimated that the increased yields of hybrid corn between the years of 1939-1961 showed that synthetic fertilizers accounted for 31.4 percent, 17.8 percent due to

geographic location, and 15.1 percent to other factors (Nelson 1990: 486). The increased yields of hybrid corn were achieved at the expense of protein quality (Perelman 1977: 45). This was not a problem for American capitalism given that quantitative accomplishments overrode qualitative ones.

Resolving the Farm Problem: Modernizing the Farmer and Fields

The farm woman problem and the farm problem of the first quarter of the twentieth century was an obstacle to capital accumulation. Recall from chapter four that home economists had made only partial progress in modernizing the farm wife and household. The farm crisis, extending from 1920s to 1930s, resulted in high prices for urban workers and generated financial crises beyond the farm. The solution to the twin crisis of the farm was the second American agricultural revolution. It was believed that productivity gains would increase income for farmers that would in turn allow them to purchase better farm and household equipment, and thus, improving their wellbeing. The reality was that the second agricultural revolution displaced many of the ‘uncompetitive’ farm families, allowing capitalist and petit bourgeois yeoman households to increase per capita incomes and enjoy prosperity while delivering cheap food.

The solution to the farm problem were the forces of science, capital, and technology. Under the banner of “education,” a combination of agricultural colleges, the USDA, extension agents, and farm organizations were there to educate and rationalize the subjectivity of the farmer. This entailed improving farming practices and adopting new technologies. According to the “New Agriculture” science and technology were the tools for the modernization of American agriculture. The task for reformers was to remove the physical labor of farming so as to elevate farming to the status of a middle-class

occupation that required more mental than physical skills (Neth 1995). In short, the idea and materiality of farming required a shift from farming as a way of life to farming as a business.

Abstract social nature not only transformed the household, but farming as well with the scientification and quantification of agriculture. In 1905, the USDA housed several bureaus and agencies, including the Office of Farm Management, the Bureau of Markets, and the Division of Statistics, which began to collect and analyze farm data. By 1922, these were consolidated into the what we become one of the most powerful agricultural agencies in the federal government, the Bureau of Agricultural Economics (BAE). The BAE encouraged each state to calculate the costs of production for grain crops. The federal government in conjunction with individual states began to coordinate in a more systematic and scientific manner with the intent that farming practices would become standardized. These agencies and bureaus, operating at the state and national level, collected quantitative data on farming across the United States. The diversity of farming in the United States posed a problem for the federal government and states because they believed diverse socio-ecological conditions would thwart standardization. Simplifying complex socio-ecologies meant standardizing and rationalizing agriculture to advance labor productivity. The federal government and capital could exercise greater control over farmers and their practices if farming could be restructured to reflect generalized standards. As Fitzgerald (2003: 34) explains, the rise of quantification and the rationalization of agriculture entailed states collecting “numbers—how many, how few, how big or small, how much, how old, what amount”. As a result, data collection

became more scientific and abstract. In short, it became less about people and their problems and more about rationalizing processes and products (Fitzgerald 2003).

Agrarian reformists allied with private capital to incorporate the productive capabilities of the modern science and farm management into raising crops and livestock. This not only entailed physical instruments of production but a new worldview of farming altogether. Fitzgerald (2003: 21) argues that there was an “overwhelming consensus...that farmers needed to become more businesslike, more like economists, in conducting their affairs”. The future of farming from the middle-class worldview abstracted the farm as a business from the community and family (Neth 1995). Even prior to the County Life Movement, agricultural economists and farm managers working with the land-grants colleges and the USDA stressed to farmers that in order to be successful at farming they must begin quantifying costs of investments, labor income, number of crops per acre, number of productive livestock, etc. (Fitzgerald 2003: 50). Agricultural economists and farm managers conducted surveys detailing the quantitative dimension of the farm, but they encouraged farmers to take responsibility in practicing the quantification of their own farms. The thought was that by farmers practicing accounting of their buying, selling, and investing, they would begin to internalize what it was like to be a businessman and be able to pinpoint losses and gains. Poorer farmers were less likely to engage in quantifying the farm because some felt embarrassed that neighbors would know their economic standing (Fitzgerald 2003). Middling Illinois farmers readily adopted such practices, and generated an overwhelming demand for extension agents and agricultural scientists. Illinois farmers paid \$17 a year and detailed their records of the farm operations. In return, they received advice from agricultural experts. At the end of

the year farmers received a report that detailed the most profitable farmers in their county, the least profitable, and the average, in terms of livestock, land investments, cropping, farm receipts, and labor and machinery expenses (Fitzgerald 2003: 51). The report ended with advice to farmers on how to improve the profitability of their farm. The farm problem could be resolved through the emulation of successful 'progressive' farmers.

There was a growing concern from farmers, the federal government, and consumers over livestock diseases. Hog cholera was especially virulent throughout the Midwest. In South Dakota between 1894 and 1896 cholera had decreased the hog population by more than half (Stalheim 1988: 116). Farmers and eventually packing plants began to suffer from the loss. Farmers used a variety of remedies and preventions, but to no avail. State colleges throughout the Midwest tested numerous cures and preventatives, but, again, to no avail. In 1884 Congress created the federal Bureau of Animal Industry (BAI), providing funds for veterinary research to control and eliminate animal diseases. Finally, between 1903 to 1908 Doctors Marion Dorset, Charles N. McBryde, and William B. Niles from the BAI discovered the infection traced to a filtrable virus. By 1907, the three scientists at the University of Iowa had developed an effective vaccine that was a serum collected from a pig that had recovered and the blood of an ill pig (Ross 1951: 132). The following year over 2,000 pigs in 47 herds in Iowa were vaccinated (Stalheim 1988: 118). It was estimated that by World War I the serum had reduced the deaths caused by cholera by 20 to 30 fold during the peak years (Ross 1951: 132). Hog farmers were optimistic that scientists had resolved the deadly disease, and lined up with pails outside the Hog Cholera Station. Shortly thereafter over 400 firms

began manufacturing the serum, but farmers realized that many firms sold a defective product. However, it would not be until 1951 when at the National Animal Disease Laboratory in Ames, Iowa would scientists discover a more effective live-virus serum (Skaggs 1986: 151). In any case, farmers realized that scientific agriculture could make progress on farmers most pressing issues.

Soil conservation was also an element on the production side of the New Agriculture. The Country Life Report stated that the conservation of soil and natural resources were essential for the long-term sustainability of farming and the prosperity of the nation (Bailey 1909). Loss of soil fertility would have economic, social, and political consequences. For Bailey and the commission (1909: 40), fixing the soil fertility entailed “a system of diversified and rotation farming, carefully adapted in every case to the particular region”. The Country Life Commission made direct links between the wellbeing of farmer is dependent on the wellbeing of the soil, and that this relationship between farmer and soil fertility was linked to question of power and wealth from different capitals. This was largely ignored in favor of technical fixes. In technical terms, the commission would leave it to experiment stations and land-grant colleges to remedy soil depletion. Head of the agronomy department at Iowa State and of the soil section of the Agricultural Experiment Station, William H. Stevenson, an influential soil scientist, supervised a series of county soil surveys, and led the push for drainage, liming, and crop rotation. By 1904, Stevenson and the Experiment Station declared over four million acres in the north-central counties of Iowa were in need of drainage (Ross 1951: 123-4). Stevenson along with engineers at the experiment station formed the State Drainage

Association, which helped push legislation to eventually open highly productive farming regions. The last bit of the frontier was now in full utilization.

Hybrid Corn Revolution

While wheat cultivation and harvesting was foundational to the first American agricultural revolution, hybrid corn was foundational to the second American agricultural revolution. The watershed moment of the second agriculture revolution was the invention of the hybrid corn seed in 1933. A combination of science, publically funded agricultural research, and profitable opportunities resulted in the invention of the hybrid corn seed (Kloppenburg 2004). Importantly, the seed, the biological basis of farming, was commoditized, forcing farmers to pay for an input that was historically free. Illinois- and Iowa-based the Funk Brothers Seed Company, Pioneer Hi-Bred, and DeKalb were the leading private companies selling hybrid seeds who had appropriated the dead labor of land-grant universities turning a public good into private profit. By 1942 nearly of Iowa's corn fields were planted with hybrid seeds. In 1965 over 95 percent of the United States corn acreage was planted with hybrid seed (Kloppenburg 2004). Hybrid corn became the model for other major cash crops, including wheat and cotton. By 1985, farmers were achieving yields well over 125 bushels an acre (Hurt 1986: 53). Corn more than other crops reacted better to the introduction of commercial inputs, so much so that fertilizer and pesticide manufactures became profitable businesses following World War II. Corn was also input for livestock and commercial processed food. Hybrid corn farming was at once an impetus for off-farm industries to profit from and for corn to be an important input for postwar "durable food complex" (Friedmann 1993). These economic and no less ecological linkages figured significantly in the making of the rise and development of the second agricultural revolution.

Postwar American agriculture was in all senses of the word revolutionary. In the first three decades of the twentieth century total factor productivity in farming increased at a .5 percent annual rate.⁵⁰ However, from 1935 to 1975 total factor productivity increased at a 3 percent annual rate. Labor productivity were equally significant. Prior to 1930 labor productivity was less than 1 percent annual rate of growth, while after 1935 labor productivity advanced more than 4 percent annually (Clarke 1991: 101-102). Labor productivity in agriculture outpaced all major economic sectors and continued throughout the second agricultural revolution. During this period labor productivity in non-farm sectors increased 2.5-fold. Labor productivity in agriculture increased 7-fold (Conkin 2008: 98). Labor hours to grow a bushel of wheat, corn, and cotton decreased precipitously throughout the twentieth century (see table 3).

Labor Hours to Grow 100 Bushels of Wheat and Corn and 100 Bales of Cotton, 1900-1990

	Wheat	Corn	Cotton
1900	147	147	248
1950	14	16	100
1990	6	3	5

Table 13

Source: Conkin 2008: 98

Between 1945 and 1970 the area dedicated to corn cultivation dropped from 80 million acres to 55 million acres. Even with less land under cultivation corn production surpassed 84 million tons in 1956, and reached 112 million tons in 1964. In the mid 1970s corn production increased to 154 million tons (Warman 2003: 187). Between 1930 and 1965 the volume of production increased by 2.3 billion bushels (Kloppenburger 2004: 91). In the United States in 1945 corn yields averaged 35 bushels an acre—corn yields increased to

⁵⁰ The century before 1935 the annual growth in full-factor productivity in agriculture rose about 1 percent a year (Conkin 2008: 97).

87 bushels in 1970 (Pimentel et al. 1973: 444; Nordin and Scott 2005). “By 1970, in the heart of the Corn Belt, it was common for the average to exceed 100 bushels an acre (Nordin and Scott 2005: 161). Between 1945 and 1970 corn yields increased 240 percent, while the labor input decreased by more than 60 percent (Pimentel et al. 1973: 445). Output per worker on farms grew 68 percent in the 1950s and 82 percent in the 1960s. Between 1935 to 1997 output per farm increased ten-fold for field crops, and even faster for poultry and hogs (Conkin 2008: 98). In Marxist terms, there was a rising organic composition of capital in farming as productivity advanced and machines replaced human labor.

It is no surprise that the hybrid corn revolution centered in the same geographical region where the mechanical reaper had emerged—the northern half of Illinois and east to central Iowa. Funk Brothers Seed Company, Pfister Hybrid Corn Company, DeKalb Agricultural Association, and Pioneer Hi-Bred were the leading private companies selling hybrid seeds. The first three companies were located in Illinois and the last, Henry Wallace’s seed company, was in Iowa. In the emergence and development of hybrid seed corn, geography and ecology mattered. The ecology of the seed was based on its specific location, primarily in central Illinois and Iowa, which posed a problem of adaption to different ecological conditions. In any case, the success of these companies was premised on the appropriation of the dead labour of land-grant universities.⁵¹ Private seed companies, like all agribusinesses, are profit-driven. The drive for profitability required

⁵¹ The Funk Brothers Seed Company had a close relationship with the Illinois research experiment station, in which the experiment station regularly provided valuable information to the private seed company (Fitzgerald 1990).

gaining control of the market through coercion in agricultural research, policy, and initial consent from farmers.

In Illinois, the top seed companies in the nation were focusing on developing hybrid seed corn to increase yield and increase disease- and insect-resistance of the state's number one crop. Eugene Funk had noticed that part of the reason for declining yields was an increase of corn disease. For example, in Illinois corn disease "decreased yields by 12-15 bushels per acre" (Fitzgerald 1993, 334). The Funk Brothers Seed Company working in conjunction with the USDA, became a leading seed company developing hybrid seed corn. While agricultural scientists at the experiment stations at the University of Illinois were constrained by the demands of farmers' needs, the politics of college administration, and its attention on other facets of agriculture besides improving corn, the Funk Brothers Seed Company focused primarily on corn improvement. The top seed companies, therefore, were not constrained by the demands of farmers and could draw on resources from other agribusinesses.

The Funk Brothers Seed Company were the forerunners of private seed companies. Recall, Cattle King Isaac Funk had moved his family to central Illinois by the mid-nineteenth century had developed a large-scale livestock feeding operation. The family accumulated more than 27,000 acres of land in McLean County, Illinois (Prince 1997, 133). The Funk Brothers stood out from most seed companies in that they promoted a scientific image in which they sought to unify science and business. Unlike most private seed companies of the time, and even experiment stations, the Funk Brothers had access to large quantity of land and were engaging in the latest scientific research, employing the top researchers in the world, like J.R. Holbert (Fitzgerald 1990). Holbert

had been involved scientific research at Purdue before being hired by Eugene Funk. The USDA set up a federal field station at the Funk farm in 1918, collaborating with the seed company and employing Holbert. Private and public research were indeed mixed and cooperative. The scale of operations that the Funk Brothers Seed Company was unmatched both in business and public research. This allowed a great deal of flexibility but also allowed the company to generalize results. The twenty-year relationship between the USDA and the Funk Brothers Seed Company signified the close connections between capital and the state (Fitzgerald 1990).

Illinois University scientists, on the other hand, had to rely on farmers to perform field trials and report the results. During the first two decades of the twentieth century experiment station scientists, who were beginning to focus on “pure” planting research, focused primarily on theory. These scientists, in part, were influenced by a number of theoretically orientated scientists in Germany, who saw value beyond everyday practical matters (Rosenberg 1976). This shift from focusing on farmers’ practical concerns to theoretical research was made possible by the Adams Act of 1906, which provided greater funds for “original research” (Rosenberg 1976). By the 1920s, land-grant scientists and the Funk Seed Company were collaborating in joint research, primarily through Holbert, focusing on corn disease and improved yields. Average farmers were being replaced by wealthy farmers, changing the collaborative relationship between farmers and scientists. Results were publicized to farmers in the form of bulletins and demonstrations.

In Iowa, at the turn of the twentieth century the Wallaces had become an influential agrarian dynasty. The farming dynasty began in Iowa in the 1870s with Corn

Belt farmer Henry Wallace, who owned three farms in Adair County and started the famous *Wallace's Farmer* magazine in 1890s (Rogers 1974). In 1908, President Theodore Roosevelt requested that Henry Wallace form and serve on *The Country Life Commission* that would detail rural conditions and propose solutions to agrarian social problems. Henry's son, Henry C. Wallace, served as secretary of agriculture in 1921 under President Harding. Henry C. took over *Wallace's Farmer* for over 26 years. Henry C.'s son, Henry A. Wallace, also became secretary of agriculture in 1933 under President Franklin Roosevelt, and was one of the most influential individuals in the "agrarian New Deal" (Gilbert 2015). Needless to say, the Wallace family had not only influenced national politics, but also influenced farmers regionally and beyond with one of the longest running farming magazine.

Henry A. Wallace had formed his own private seed company called Pioneer in Des Moines, Iowa. Initially Wallace believed that farmers were in the best position for breeding improvements of seed corn in terms of an open-pollinated method because they had the greatest knowledge of the ecological conditions. Wallace soon realized, however, that Donald Jones work at the Connecticut experiment station on the "double cross" hybrid, which is "the product of crossing two single crosses," held great potential for improving yields (Kloppenburg 2004: 99). Wallace acknowledged that the future of corn breeding should be in the hands of scientists, not farmers. Henry A. Wallace encouraged his father Henry C. Wallace, then Secretary of Agriculture, to increase funds for research solely focused on hybrid breeding techniques. Funds for research on hybrid breeding techniques "increased tenfold" (Berlan and Lewontin 1986). Wallace published the potential revolutionary nature of the hybrid breeding techniques in *Wallace's Farmer*. In

1926, Wallace's company Pioneer became the first company to produce commercial hybrid corn (Hurt 1994: 51).

For Wallace, farming, and thus the production of nature, took a particular form. It was the family farm that informed his worldview, a family farm that was on the cutting edge of an emerging revolution. With one foot in family farming and another foot in agricultural science and economics, Wallace, an "agrarian intellectual," was on the frontline of a revolution (Gilbert 2016). "In less than thirty years, from the 1920s to the 1950s, Wallace fulfilled the manifest destiny of American farmers by "industrializing" corn breeding and thus laying the foundations of modern American agribusiness" (Fussell 1992: 67). Today, Pioneer Hi-Bred International still operates in Des Moines as a powerful force in the seed market.

Success was not immediate, however. Perry Greeley Holden, an enthusiastic leader with popular appeal, led the extension service in Iowa which had turned into the pioneering institution throughout the United States (Ross 1951). Holden was hired as the head of the Agronomy Department at Iowa State College traveled rural Iowa presenting on corn-seed selection and cultivation.⁵² Holden, with the support of the Rock Island Railroad, *Wallace's Farmer*, and other state organizations, began performing his demonstrations on rail cars over thousands of miles in 97 of Iowa's 99 counties. College officials estimated that 145,700 people heard his presentation (Schweider 1996, 148). Demonstration trains were initiated and carried out by "Uncle" Henry Wallace, but it was Holden that gave the practice national publicity (Ross 1951). In effect, Holden was laying

⁵² Holden previously worked at the University of Illinois and later for the Funk Brothers Seed Corn Company.

the groundwork for the widespread adoption of hybrid corn seed in the post-war era.⁵³ Taking hybrid seed corn as foundational for the second agricultural revolution, we can confidently state that serious corn breeding took around thirty or more years before the transition to generalized hybrid varieties took hold across the Midwest and beyond.

Like most technical innovations in agriculture there were significant problems associated with early hybrid varieties. The first problem was one of adaptability. Jones' early double-cross hybrids created at the Connecticut experiment station performed poorly in the Corn Belt (Berlan and Lewontin 1986). Most of the private seed companies had originated in central and northern Illinois and Iowa where favorable ecological conditions prevailed. Corn seed were bred for those conditions, and as a result, were not productive outside of those areas. Southern Illinois farmers who had purchased hybrid seed corn from breeders in central Illinois experienced no increase in yields. In fact, open-pollinated varieties that had been adapted and adjusted to the local ecological conditions performed better than hybrid varieties (Fitzgerald 1990). For private seed companies producing hybrid varieties the question of adaptability to specific ecologies posed an obstacle to its future profitability. Nonetheless, the hybrid seed revolution would take hold over the 1930s and accelerate after the war.

The widespread adoption of hybrid corn ultimately turned on two major developments in the 1930s (Fitzgerald 1990: 220). First, successive droughts in the middle of the 1930s resulted in a scarce supply of seeds. Second, the AAA acreage reduction program paid farmers to reduce their improved acreage for government

⁵³ The “Young” Henry A. Wallace believed that Holden was more influential to Iowa farm boys prior to World War I than anyone he knew. Holden later moved on to work for a harvester manufacturing company in Chicago (Ross 1951).

payments. The revolutionary nature of hybrid corn was twofold: drought-resistant and increased land (and labor) productivity. Farmers seeking to service debts and maintain their enterprise on fewer acres adopted hybrid corn as a strategy for squeezing more work out of extra-human nature.

The Golden Bean

The other miracle crop that came onto the scene at the start of the second agricultural revolution was soybean, *Glycine max*. Soybeans provided at least three benefits to the farmer. As a legume the crop has the ability to appropriate nitrogen from the atmosphere to be processed as a nutrient and taken up by plants. Corn, a nitrogen-intensive crop, when rotated with soybeans increased next year's corn yield. Finally, soybean has a high protein content making for an excellent feed for livestock (Hudson 1994: 158-159). Soybeans 40 percent protein content, which is twice that of beef, sped up the weight-gaining process of hogs, poultry, and cattle that many feeders were looking for (Morgan 1979: 99). More to the point, soybeans "fixes nitrogen in the soil, is easily mechanized and, when processes into oil and meal, brings in cash" (Berlan 1991: 123). Soybeans, like hybrid corn, would revolutionize farming initially in the Corn Belt and later the South.

Soybean enthusiasts, like J.C. Hackleman, an extension agronomist at the University of Illinois, and the American Soybean Association were crucial for spreading the high returns from farmers producing soybeans (Hudson 1994). Hackleman attempted to convince Illinois farmers that soybeans were like 'green manure' in its ability to fix nitrogen in the soil. He then convinced four processing companies to contract to soybean growers around Illinois and purchase 250,000 tons of soybeans (Fitzgerald 1990: 116-

117). Early on, most of the leaders of the American Soybean Association were academics, but two decades since its inception in 1919 industries and corporations became influential members. Railroads “ran exhibition trains throughout the Midwest to familiarize farmers with” the potential of the ‘golden bean’ (Berlan 1991: 125), a process that had occurred with corn earlier.

Part of the initial challenge aside from publicizing the promise of producing soybeans was having mills to process the product. Processors were only willing to construct mills if there was high enough production of soybeans, while farmers sought to achieve high prices by withholding their soybeans from the market. This did not last long. In 1943 Cargill set up two mills in Iowa and one in Illinois processing soybeans (Kneen 2002). Archer-Daniels-Midland and General Mills also set up mills around the Midwest (Hudson 1994). The state sought to protect the nascent industry with the Hawley-Smoot Tariff that placed high tariffs on major imports like coffee, bananas, and soybeans. With protection from global competitors, mills were able to produce an array of oil-based products that eventually, with the help of tax loopholes, eased United States processors dependence on international tropical oils (Friedmann 1991).

During the 1930s the corn acreage reduction program gave greater impetus for planting more soybean. By the late 1940s soybean production was concentrated on the best farmlands in the Corn Belt where fields were well-drained, flat, and could be effectively harvested with machines. These lands resided in central Illinois in the Grand Prairies as well as the Des Moines lobe in Iowa (Hudson 1994). The geographical spread of soybean, like corn, was like a “Y” cutting across the heart of the Corn Belt. Soybean and its by-products would be integrated into human and livestock diets and as inputs for

industrial manufacturers. As farmers received regular payments for reducing their corn acreage, they were able to invest in producing soybean, an industry that was not nearly as developed as other major commodity crops. The state's payments reduced the risk in farmers' investments, allowing for a great expansion in soybean production. Soy oil flowed eastward as processing plants soon thereafter followed, and soy based feed flowed throughout the feedlots that were emerging as concentrated operations.

Until World War II China was the largest producer of soybeans, with Manchuria as the leading exporter. Manchuria's climate was similar to the United States Corn Belt, making it an ideal crop to integrate into farming. World War II had stimulated demand for greater production of soybean and soybean by-products to "replace other oil and feed supplies which might be cut off by the war" (Fornari 1979: 246). Prior to the war the United States had imported roughly 40 percent of its fats and oils. After the war, the United States became the largest exporter of oils and protein meals. In Illinois, the leader in soybean production, farmers produced over 7,760,000 bushels from 760,000 acres in 1932 and at the end of the war produced 74,258,000 bushels from 3,957,000 acres (Nordin and Scott 2005: 102). Fear of overproduction of soybeans, the federal government encouraged the greater consumption of meat as citizens' patriotic duty (Friedmann 1991). In the United States, between 1941 and 1977 soybean acreage increased from 5.8 million to 58 million, and in those same years there was a corresponding increase in bushels produced, from 108 million to 1.7 billion bushels (Fornari 1979: 248).

The rise of soybean as the other miracle crop was due its use as an industrial oil for manufacturers. Initially used for paints and varnishes, a breakthrough in processing

allowing the hydrogenation of soybean oil became affordable on a large scale, allowing for the production of margarine (Berlan 1991). During the 1930s margarine manufacturers contracted with Corn Belt farmers to supply soybean (Friedmann 1991: 78).⁵⁴ The promise of soybeans rejuvenating the exhausted soils while generating new markets through margarine and other processed foods was enticing for Midwestern farmers, many whom experienced significant losses during the extended farm crisis.

Perhaps, even more enticing for Corn Belt farmers was that soybean was a protein rich feed for livestock. Recall, that by the late nineteenth century central Illinois and north-central Iowa were specializing in cash-grain farming. Cash-grain farming entailed a removal of livestock from farming operations and corresponding acreage dedicated to corn and soybean. During the second agricultural revolution soybean acreage displaced other forage crops like oats and hay as higher returns could be realized with soybean. For example, in Ford County, Illinois between 1949 and 1982 acreage for oats decreased from 68,000 to 2,000. In those same years, soybean increased from 27,000 to 123,000 acres (Hart 1991: 133). Throughout much of the Corn Belt there was a general shift from three-crop rotation to two-crop rotation that centered on corn and soybean.

To be quite revolutionary these miracle crops necessitated a transformation in harvesting. During the inter-war years Corn Belt farmer Carl Hamilton claimed that hand-picking corn was the worst drudgery on the farm (Anderson 2009).⁵⁵ Prior to the

⁵⁴ In fact, it is possible that soybean marketing were the origins on contract farming (Berlan 1991).

⁵⁵ Prior to mechanical corn pickers, corn was harvested by hand using three different methods. The first involved cutting and bounding stalks and then removing the ears for use and the stalks were fed to livestock. The second method involved cutting ears from the stalk and chopping the stalk for silage. And third, which was the most common method in Iowa, was hand picking from stalks left in the field (Colbert 2000: 531). The

mechanical corn picker harvesting could take up to weeks and even months. More troubling was that when the cold weather hit farmers could be ankle deep in snow handpicking corn with torn up bloody hands (Bogue 1983). When wind had blown down the stalks farmers had to bend down and pick up the corn. Hand-picking corn, then, was a labor-intensive process that was often completed over several months. Farm women welcomed the end of the hand corn-picking era as this drastically reduced their work of cleaning and caring for hired hands.⁵⁶ Hybrid corn and soybean went hand in hand with mechanization. The success high yielding crops was a cause and consequence of the 'tractor' revolution that was unfolding. The increasing standardization of corn plants through hybridization, with stiff stocks and strong roots, facilitated the expansion of mechanical corn pickers. Between 1930 and 1950 the mechanical picking of corn increased nine-fold (Kloppenburg 2004: 117). In part, this was due to the changes in the plant architecture that made it difficult and thereby costly for hand pickers.

During the first two decades of the twentieth century land values increased dramatically for the best farmland. Recall, land served two main purposes for farmers.

process required that harvesters wear a husking pin, which was a metal hook strapped to the hand that enabled both the opening of husks and holding the ear as it was broken from the stalk and thrown into the wagon. The wagon was driven by the eldest son and pulled by a team of horses. An excellent hand husker could harvest and unload 100 bushels of ear corn a day (Colbert 2000: 531).

⁵⁶ Farm women were expected to keep a clean house and sleeping quarters for men. Moreover, women had to clean their clothes and feed them. One farm woman recalls baking 10 loaves of bread every day during the harvest season (Fink 1986: 152). Farm women made, served, and cleaned up three to five meals a day. In one case food preparation started as early as 3:30 a.m (Schwieder and Fink 1999: 194). Supper might begin at nine or ten o'clock at night. Women served a pre-lunch meal to men out in the field, allowing her to escape a hot kitchen, but requiring that she juggle a hectic schedule of domestic and field work. The non-stop cooking and cleaning during the harvest season tested women's skills on a number of fronts, something that many home economists ignored.

Purchasing more land would allow farmers the opportunity to increase overall profits. Greater overall production would enable farmers to pay off their debts and make reasonable profits. Land was also source of wealth to acquire more wealth i.e. through speculation. Some of the best lands in the heartland were worth \$400, allowing farmers to accrue greater wealth (Prince 1997: 229). Land speculation was particularly prominent in states like Iowa and Illinois, where land values were some of the highest in the nation. In this context, farmers were able to obtain low-interest loans to purchase tractors to make up for the scarce labor force. The combination of labor scarcity from each of the world wars and inflated land values conditioned and enabled the mechanization of farming in the Corn Belt.⁵⁷

Mechanization was quite limited in the Midwest prior to World War II, although tractor sales increased ironically during the agricultural crisis of the 1920s and the Great Depression of the 1930s (Nordin and Scott 2005). Between 1920 and 1930 the percent of farms with tractors in Illinois and Iowa went from nine to 30 percent (Ankli 1980: 134). By 1929 Iowa had 60,000 tractors in use, second only to Illinois. Fourteen years later Iowa had over 160,000 tractors working its fields (Ross 1951: 154). While the Great Plains and western agricultural regions were the early adopters of tractors, the greatest profitability for tractor manufacturers lay in the Corn Belt where there was a greater concentration of prosperous farmers.

⁵⁷ The total value of all farm property in Iowa between 1910 and 1920 increased markedly. The largest percentage of this increase was in machinery, which grew over 223.8 percent (Ross 1951: 145). Land values as a percentage of total assets increased from over 60 percent in 1950 to over 70 percent in 1990 (Cochrane 1979: 203).

Farm equipment manufacturers rushed to market their latest tractors during the boom of World War I without sufficiently testing the durability and efficiency (Fitzgerald 2003). The adoption of expensive farm equipment had always been a highly uneven process in which wealthy farmers are usually the first to purchase and poorer farmers wait until the ‘kinks’ are worked out (Hurt 1994).⁵⁸ Tractor manufacturers were attracted to the diverse Corn Belt because the region was highly productive without being heavily capitalized. If manufacturers could overcome the obstacles that row-crop farming presented to using tractors a massive market would be made available. Henry Ford’s “Fordson” was affordable at \$750 and small enough to handle smaller farms, yet did not possess the power most larger farms required (Fitzgerald 2003). Further, the Fordson could not be driven down the characteristic row-cropped fields of the Corn Belt without damaging crops (Hurt 1994). While there were significant problems with the Fordson, Ford introduced mass production to tractor manufacturing which in turn eliminated many competitors.

The tractor that revolutionized the Corn Belt was International Harvester’s McCormick-Deering Farmall tractor. Introduced in 1924, a Farmall tractor was built for the row-crops of the Corn Belt. Its tricycle design allowed for the two closely spaced front wheels to travel between the crop rows, while its high axle in the rear allowed to “straddle the growing crop during cultivation” (Hurt 1994: 248). The Farmall, unlike earlier tractors, was able make sharp turns in the fields. Two years later, International Harvester introduced a power-take-off (PTO) shaft to its tractors that allowed it to run tractor-powered machinery. At the turn of the twentieth century there were a few hundred

⁵⁸ In 1920 less than four percent of farmers owned tractors (Hurt 1994: 244).

tractor manufacturers. Just two decades later there were only a handful of companies with International Harvester leading the pack.⁵⁹ Productivity gains were evident with the purchase of tractors. A typical Corn Belt farmer was likely to work a team of horses for nearly every task in the field. A team of horses could plow 6 acres in a 10 hour day. Whereas a tractor could plow 10 acres in the same time. Ankli (1980) estimated that for all the different tasks of producing corn a tractor saved roughly seven hours per acre compared to a team of horses. Gains were even greater on larger farms as the average unit costs continued to decline. Farm size mattered, then. Tractors were said to be cost effective on farms of at least 100 acres (Clark 2002: 93). During the 1930s the majority of farms in Iowa and Illinois averaged slightly over 130 acres.

Promotion of tractors and other farm equipment was widespread across Iowa and Illinois. Henry A. Wallace promoted state hand husking contests, in which the best farmers competed with one another to see who could husk corn the fastest by hand. In 1924, during one of the hand-husking competitions, a parallel performance in which one man operated a single-row mechanical picker powered by a tractor. “The machine proved to be three times faster than the fastest hand husker” (Colbert 2000: 534). The mechanical corn picker, said to be the most important corn harvesting equipment of the first half of the twentieth century (Roe 1988), was a major labor-saving device. This reduced the number of hired hands to harvest corn by hand, lowered the time required to harvest, and reduced the physical hardships of picking corn during harsh winters (Colbert 2000). Importantly, nobody missed the hand corn-picking era, especially farm women who had

⁵⁹ There were 47 kinds of wheel-plows before World War I. After the war there was 15. The 788 corn and cotton planters were reduced to 31 (Fitzgerald 2003: 90).

to care and clean after hired hands. Tractors and their implement attachments gained greater attention at the Iowa state fairs with each passing year. At one point there were so many tractors and farm trucks at the fair that it posed a logistical problem for parking (Ross 1951).

A generation of agricultural engineers came of age during the first decade of the twentieth century. Agricultural engineers partnered with agribusiness to transform farming from “unorganized” and animal-powered to rationalized and machine-powered. In 1907, Iowa State University was the only higher education institution to offer a four-year degree in agricultural engineering (Fitzgerald 2003: 86). Over the next decade several colleges began offering agricultural engineering degrees. Soon thereafter, a partnership between agricultural engineers and farm equipment manufacturers (i.e. agribusiness) developed to increase efficiency and standardization. To overcome stagnate productivity, agricultural engineers and farm equipment manufacturers sought to improve on the tractor and combine. Companies, like International Harvester Company, boosted how tractors were the wave of the future of modern farming. Not only would tractors increase productivity, eliminate the need for labor, and increase overall profitability, they would eliminate the drudgery of fieldwork. The tractor was claimed to be the “Great Emancipator” (Ramey 2014). Manufacturers also emphasized that tractors were predictable unlike horses and mules who required feed, a personal relationship, and care. However, tractors were susceptible to breakdowns that were time-consuming and costly. Tractors compacted soil that resulted in poor drainage and limited root penetration (Hurt 1994). They also compacted the soil to a greater extent than horses and mules. In any

case, boosters and advertisements sought to highlight benefits while neglecting the problems associated with tractor farming.

The productivity capacity of corn pickers and combines in combination with artificial fertilizers necessitated a corresponding transformation in the modernization of storage. Farmers realized quickly that a disproportionality emerged between the advancing productivity capacity of harvesting equipment and primitive corn cribs. Not only did farmers not have enough physical space for storing all the corn, but the accelerated temporality of harvesting corn by machine rather than by hand created problems in adequate drying. When corn was picked by hand over a period of weeks, even months, corn had plenty of time to dry. With modern harvesting equipment tons of the corn were stored without time to dry, resulting in mold. Farmers either constructed seasonal make-shift corn cribs or purchased expensive state of the art storing and drying equipment (Anderson 2009). In this way, the revolutionary nature of hybrid corn was generative, necessitating more capital investment and more unpaid work of soil and off-farm inputs.

Farm mechanization symbolized the successful progressive farmer. No other farm technology more epitomized the successful farmer than the tractor. Tractors during the first two decades were prohibitively expensive, and only the wealthiest farmers could afford one. For those that could afford to purchase and equally important to repair a tractor symbolized a successful farmer, whom as a result would not force his wife to work in the fields or to hire workers. The reality was that the tractor took decades to become more efficient than horses and mules before its widespread adoption. However, capital and agrarian reformers were changing the expectations of a successful farmer. It

did not matter so much that the reality did not match the emerging model, but what was crucial was that enough farmers were able to purchase farm machinery to increase productivity and intensify the competitive nature of farming.

Likewise, farmers who resisted purchasing machinery were characterized as stubborn, uneducated, and backwards. An advertisement in the *Country Gentlemen* asked farmers, “Are you a stick in the mud? One who doesn’t believe in such “pesky” contraptions as tractors? Who won’t rotate crops or feed stock? Who bars all conveniences from his home?” (Neth 1995: 218). Capital had sought to capitalize on the insecurities of farmers based on their use or lack thereof the latest farming and home technologies. In large part, the middle-class urban ideal required that farm men should purchase productive technologies so that their wives would no longer have to labor in the fields and barns and concentrate of housekeeping and leisure activities. The reality was that many farm women during World War II and afterwards frequently ran tractors (Jellison 1993). The point, however, is that capital and the state had constructed an ideal farmer that could be taken advantage of by playing on the insecurities of masculinity.

The generalization of the farm tractor was a class project. Regarding the tractorization of farming in the United States, Secretary Henry A. Wallace in a speech asked, “Shall American agriculture let an uncontrolled technology wipe out the independent family-sized farm, or shall American agriculture turn its back on technology, in order to preserve the family-sized farm?” (Ramey 2014: 94). Some groups that opposed the purchasing of tractors like the Horse Association of America argued that the adoption of tractors was to blame for overproduction, falling farm prices, and bankruptcies that occurred during the farm crisis of the 1920s and 1930s. However, banks

that believed the end of the horse era began changing their loan policies. No longer were horses accepted as collateral, but banks and agribusiness “would carry notes for the purchase of a tractor” (Ramey 2014: 94). In short, banks made it easier for farmers to purchase a new tractor, while discouraging the use of horses.

The long-lasting debate between horse power versus mechanical power came to an end during the 1930s with two developments. First, scorching heat during the early 1930s slowed productivity of horses with some even dying from heat exhaustion. On extremely hot days Iowa farmer Elmer Powers had two separate teams of horses that he used daily, working one team while the other team rested from the heat. Powers noted in his diary on June 6, 1933 that horses appreciated cooler temperatures, which showed in their behavior and productivity. The second development was two federal farm programs: the Commodity Credit Corporation (CCC), an agency of the USDA, and the Farm Credit Administration. Farmers that signed up with CCC were guaranteed a place to store their crops while also providing loans to purchase farm equipment and storage facilities. “If prices advanced above the loan rate, farmers could sell their crop and keep the difference between the two prices. If prices failed to rise above the loan rate, farmers forfeited their crop to the U.S. government and kept their loan payment” Anderson 2009: 187). The Farm Credit Association provided the credit to do so.

While class and capital underlie the widespread adoption of tractors, the question of work/energy must be explicated. In order to reorganize the farm around the general tractor has required cheap energy in the form of fossil fuels, resulting in greater market-dependency. The shift from renewable energy like plants, animals, and humans to non-renewable energy sources further alienated the farmer from the means of production.

During the second agricultural revolution corn yields more than tripled yet energy use increased faster. “Corn production per unit of energy declined 24 percent between 1954 and 1970. Between 1940 and 1982, tractor horsepower increased sixfold and the quantity of fuel fivefold. Since yields rose far less dramatically, energy efficiency fell” (Perelman 1977: 14). The productivity revolution not only displaced uncompetitive farmers who lacked the resources to increase their organic composition of their farm. As part of the productivity revolution farmers in the United States were appropriating an ever-increasing portion of cheap natures forming a distinctly new capital-intensive food-energy complex. Energy use in the Corn Belt skyrocketed with the use of fossil-fuel powered tractors and combines that when combined with hybrid corn and the necessity to use pesticides and fertilizers was disastrous. “For each calorie of food produced...more than six calories of fossil fuel are consumed” (Perelman 1977: 12). Between 1954 and 1970 corn production per unit of energy declined by nearly a quarter (Perelman 1977: 15). The second agricultural revolution, then, has been a source of cheap food enabled through fossil fuel-based energy.

Farming during the second agricultural revolution restructured farm work and agricultural markets. “By 1950, more than 3 million tractors had freed an estimated 70 million acres for the production of food and fiber” (Hurt 1994: 317). The displacement of horses and oats as their feed, initiated the increasing specialization of Corn Belt farming. A two-crop rotation of hybrid corn and soybean that when combined with tractors fundamentally transformed the Corn Belt. “These crops produced the greatest volume, thereby reduced unit costs, and provided the highest returns on their investments” (Hurt 1994: 357). Productivity gains lowered the socially necessary labor time for producing

corn, which in part, determined the market exchange value. For those able to maintain or advance labor productivity were able to realize greater overall profits. For those unable to meet the socially necessary labor time fell further behind. In effect, progressive farmers with the support of agricultural experts and the state were increasing the organic composition of capital that led to the displacement of uncompetitive farmers.

The simplification of crop production corresponded with the intensification of livestock production. During the 1950s agricultural scientists made significant advances in animal sciences that allowed a reorganization of livestock raising. Raising hogs became spatially concentrated on the farm, allowing for larger herds to be managed on less land. This was made possible through the “life sector” primarily led by pharmaceuticals (Friedmann 2016). A study by the Iowa Extension Service found that farmers that mixed stilbestrol, an antibiotic, with feed “could reduce feed costs by 10-20 percent” (Anderson 2009: 96). The intensive livestock complex turned on a new way of organizing farm relations, evidenced in farmers purchasing synthetic hormones and antibiotics, commercial feed, specialized outbuildings, waste removal, etc. (Van Arsdell and Nelson 1984). The effect of the development of the intensive livestock complex was a reduction in labor requirements and advancing of labor productivity (Page 1997). In 1940 Illinois produced nearly three million hogs. By 1974, Illinois was producing nine million hogs. In those same years, Iowa’s hog production increased from five million to 11 million (US Census 1940, 1974). In short, large-scale confinement operations that raised and housed livestock accelerated the livestock commodity chain, reducing “the biological time required to bring a pig [livestock] from birth to slaughter” (Page 1997: 138). The second agricultural revolution forced many farmers to substitute farm machinery and chemicals

for human labor, thereby reducing the unit costs of production, a process that worked through both crops and livestock.

Trends and Outcomes of the Second Agricultural Revolution

Similar to the first agricultural revolution that displaced a significant number of European farmers, the second agricultural revolution displaced a significant number of American farmers. Between 1940 and 1980 the farm population declined tenfold and the number of farms declined by more than half. Competitive, and heavily subsidized, farms were buying out their neighbors and increasing in size. Average acreage for this period more than doubled (Lobao and Meyer 2001: 107-109). Similar trends are evident in Illinois and Iowa. Table 4 depicts the changing number of farms in Illinois and Iowa and a corresponding increase in the average acreage per farm for the period of 1945 to 1969. Tenants rates decreased in every Midwest state over this same period, with Illinois and Iowa decreasing from 29.6 percent to 25 percent and 32.9 percent to 24 percent respectively (Nordin and Scott 2005: 173).

Change in Number of Farms and Average Acreage in Illinois and Iowa, 1945-1969

	Number of Farms in 1945 ⁶⁰	Average Acres per Farm in 1945	Number of Farms in 1969 ⁶¹	Average Acres per Farm in 1969	Percent Increase of Average Acres
Illinois	204	155	126	234	51.1
Iowa	209	163	141	244	49.7

Table 14

Source: Nordin and Scott 2005: 172

Those displaced farm families migrated to urban industries including manufacturing and service. Urbanization, and thus proletarianization, accelerated over

⁶⁰ Measured in thousands.

⁶¹ Measured in thousands.

this period. Between 1930 and 1970 the United States urban population went from 51.4 to 67.7 percent, while the farming population declined to 4.8 percent of the population (Gordon 2016: 98). In Illinois, the rural population dropped to 35 percent, while Iowa's rural population dropped to 42.8 percent (US Census 1995, 2008). Proletarian households were spending less on food—dropping from 24 percent to 14 percent (Moore 2015: 251). Aided by cheap food, growth in real wages occurred throughout the 1950s and 1960s, enabling an increase in middle-class consumption. Productivity gains outside of farming and world economic growth led by the United States was unprecedented in world history (McNally 2011: 27). Yet, during this period productivity gains in farming were still higher than in industry (Conkin 2008). Like the first American agricultural revolution that consolidated British hegemony, the second agricultural revolution enabled American hegemony.

How did farm women figure into the second agricultural revolution? The transformation of the farm's chicken enterprise is illuminating in the status of women. All Corn Belt families during the first half of the twentieth century had poultry operations, ranging from a few dozen to hundreds of chickens per farm. Raising, caring, tending, processing, and marketing of chicken and eggs was women's work. For men, chickens were lesser of an animal than cattle, hogs, and horses, and were associated with the daily housework chores. As such, women were responsible for the daily chores and seasonal tasks of the poultry operation, a year-round job. Daily chicken chores included feeding, watering, and gathering eggs. Chores also included hatching the eggs and brooding the baby chicks (Wright 1995). Chicken houses were cleaned once or twice a year, sometimes by the husband or a son (Vanek 1980). In the spring farm women hatched

eggs or raised chicks. Raising chicks was no easy task as they could die from lack of heat. Even after the introduction of incubators with brooding boxes finicky thermostats did not maintain a constant temperature, a certain death sentence for chicks. On really cold days or when the incubator wasn't working eggs and chicks were brought into the house and warmed around a stove or heater. Some farm women with larger poultry operations began feeding "special feed" that provided better nutrition. In this way, care work for poultry was productive work in which women were the main producers.

Poultry, like most farm animals, had their own demands and challenges. The temperamental nature of chickens and other poultry was unbecoming, and most did not desire to form human-animal bonds. This was more so the case with large flocks where farm women rarely had close relations with an individual chicken or duck. As the poultry operation on farms began to grow they required more work and resources. Bigger and better coops were required as well as better and specialized feed. Farm women became experts in raising and selling poultry meat and eggs by everyday experience, reading journals, and attending husbandry meetings. Improved breeding and improved living conditions equated to better products in the form of more eggs, more meat, and more stock (Pooley 2012: 49).

The size and contribution of poultry operations varied across farms. In Iowa, the leading egg producing state during the first half of the twentieth century, farm flocks ran from small to large. One study (Stewart 1946, cited in Fink 1986: 141-2) attempted to classify and distribute the size and contribution of flocks of poultry in Iowa. They are as follows:

1. *Backyard flocks* ranged from ten to 50 hens that produced eggs and meat strictly for the farm. This was subsistence poultry farming.
2. *Pin-Money flocks* ranged from 50 to 100 hens provided additional money to the family beyond supplying eggs and meat
3. *Grocery-bill flocks* ranged from 100 to 200 hens provided enough income or trade to cover the grocery bills
4. *Semi-commercial flocks* ranged from 200 or more hens provided a fairly large total of the farm income and was on par with the cattle and hog operations

A 1940 study by the USDA found that the majority of farm operations in northwestern Iowa had poultry operations that were grocery-bill flocks (Fink 1986: 142). The second largest group was the semi-commercial flocks. This indicates that the poultry operation was crucial to the family farm. By 1939, 70 percent of poultry farming was done by women, even while a process of modernization was unfolding (Kleinegger 1987: 166).

Not only did women produce eggs and meat for the family, they marketed surpluses to pay for household goods. Marketing entailed women transporting eggs to the local retailer who would ship the eggs eastward. Women often traded eggs for groceries and other household items (Fink 1986). Egg money allowed women to receive money if needed, or more often than not to trade for flour, shoes, or clothes. Local merchants would keep an account for each farm woman. Record keeping, like work-exchanges, from merchants and farm women were casual and not precise. Such flexibility allowed farm women to meet the different demands of reproducing the household. What became known as “egg money” was the product of women’s work. Egg money was the

equivalent to the grocery bill, but in some cases more than that (Neth 1995). In the late nineteenth century farmer Thomas Terril had absolutely no money to his name. His wife thankfully had sold eggs for 8¢ per dozen and butter for 13¢ per pound, ensuring daily expenses were met (Pooley 2012: 46). During the 1920s and 1930s, when farm prices for hogs and corn collapsed egg money had saved the family farm. Women's egg money paid for veterinary bills, farm machinery, and land purchases beyond the grocery bill (Fink 1986; Pooley 2012). Farm women's participation and work in the development of the poultry operation ensured the survival of the family farm. However, one study concluded that 89 percent of farm women cared for poultry, and of that only 25 percent had poultry money, while 16 percent of women had egg money for their own use (Ramey 2014: 39). This suggests two things. First, money was not a generalized form of exchange between women and merchants. And second, men still controlled the purse strings.

In the same year that hybrid corn was introduced the National Poultry Improvement Plan was created as a strategy for greater federal involvement in the poultry industry, especially regarding breeding, animal husbandry, and disease control (Boyd and Watts 1996). Promotion of the consumption of chicken, along with other meat commodities, continued throughout the twentieth century, a growing reflection of the changing diets of Americans, who were now eating less bread and wheat-based products and more meat and corn-based products (Ulrich 1989). In 1929, US per capita consumption of wheat was 177 pounds, which by 1975 had fallen to 107 pounds (Warman 2003: 189). Corn-fed meat and dairy products like eggs, milk, and cheese made up for the calories over this period. The livestock and meatpacking industries with the help of the USDA promoted animal protein as superior to plant protein in which high

meat consumption became associated with a healthy diet (Weis 2013). In 1948, led by the poultry industry and the USDA, the A&P retailer created a national contest called the “Chicken of Tomorrow” to encourage and award the best produced “meat-type” chickens. The winner was California-based Vantress Hatchery who was able to grow a “heavier, meatier chicken faster than any other entrant”, receiving a \$5,000 cash prize, along with voluminous orders from farmers around the United States (Horowitz 2006: 103). Prior to World War II, chicken consumption was the lowest among the big three (beef, pork, chicken). By 1990, for the first time Americans consumed more chicken than beef (Boyd and Watts 1996: 192). This transformation in the poultry affirmed President Hoover’s promise of a ‘chicken in every pot’. What explains the transformation of the American diet?

State practices initiated changes in the poultry and egg businesses. In 1924, Iowa legislature passed a law requiring that all farmers marketing eggs must have a license. In 1933, a new hatchery code required that hatcheries upgrade their operations and maintain more formal accounting that had been lax because of traditional market exchanges. Hatcheries were barred from selling chicks below the cost of production. These developments, Fink (1986) argues, increased standardization in chicken and egg operations, but more importantly, increased the costs of production for Midwestern farm women. In short, the state was creating the conditions for turning poultry operations from women’s work into a fully capitalized industry.

Iowa’s egg production, however, would continue to expand under the impetus of World War II. In 1940, Iowa produced 214 million dozen eggs and five years later produced 370 million dozen eggs. This was primarily the work of farm women and their

modest operations. While most farm women did not have the capital to invest in “egg factories”, farm men were not willing to make the investments as they believed that investments should be made in primary commodity production, like in hogs, corn, and soybeans. To be sure, chicken and egg operations did increase throughout the postwar era, while the number of operations declined. Despite the lack of capitalization in women’s chicken and egg business, Iowa remained the leading egg producing state in the United States until 1959 (Fink 1987).

While the seeds of the modern poultry and egg industries were planted in the 1930s it was in the 1960s when vertical integration revolutionized the industry. Central to the development of the restructuring of the chicken industry was privatization of genetic chicken breeding. Similar to hybrid corn, breeders constructed a “biological lock” of the hybridization of chickens, in which private companies would soon profit from owning the rights to genetic strands (Boyd and Watts 1996: 198). This was complemented with government investment in disease control and confinement technology. In particular, vitamin B-12 and a collection of antibiotics in the feed served two purposes. First, antibiotics were used to stave off disease that was connected to the confined spatial relations of chicken raising. Mortality rates from diseases declined 30 percent at the closing of the 1930s (Boyd and Watts 1996). By 1950, growers were “cramming” three birds in a space intended for one (Weis 2013: 96). And second, the use of pharmaceuticals was to encourage the rapid growth of chickens—classic time-space compression at work. Antibiotics, especially penicillin, enabled the continuation of 20,000 birds and 4,000 hogs to be spatially concentrated (Conkin 2008: 116). With the aid of electrification labor productivity grew substantially. In 1940, it required 250 hours

to raise 1,000 birds, by 1955 the time to raise to maturity dropped to 48 hours (Boyd and Watts 1996: 199). At least temporarily, the work of capital, science, and the state outpaced the contradictions issuing from what Moore (2014, 1) calls “negative value”—forms of nature that are hostile to capital accumulation. Hybrid corn had met its livestock counterpart, the hybrid chicken, and with it, the basis of the postwar productivity revolution.

Postwar development of now what would be considered confined animal feed operations (CAFOs) resulted in the consolidation of largely small independent breeders, feed companies, hatcheries, processing and distributing firms into large agribusinesses that controlled the entire commodity chain, from credit and loans to marketing. Companies like Perdue and Tyson, now two of the world’s largest agribusinesses, were operating on the Delmarva Peninsula and the Deep South respectively (Horowitz 2006). Processing plants initially employed primarily rural white women. Increased capitalization of the poultry industry resulted in larger plants and required more employees. Plant managers quickly shifted to hiring African-American women at lower wages (Horowitz 2006). Wages remained among the lowest across all industries, even as working and safety conditions are abysmal. Leading up to World War II and thereafter, the “broiler” industry had transformed into a tightly vertical-integrated global industry that sought to control the world chicken market while offsetting the risks through growing contracts with farmers. Low profit margins necessitated the poultry industry to increase productivity and protect against market risks.

Corn became the cheap food that sustained both humans and the meat-derived livestock. The productivity revolution in grain production reproduced the intractable

overproduction problem, which was partially resolved through the grain-oilseed-livestock complex. Unlike wheat, it was more cost-effective to feed cattle, pork, and chickens corn which has historically had a much lower price per bushel (Ulrich 1989). Compared to cattle and hog, chickens were the most energy efficient in conversion of feed to body weight. Beef had a conversion index of fifteen to one; pork ten to one; and chicken was approximately six to one (Warman 2003: 189). Birds are the smallest and most industrialized of the Big Three, and as such, have the fastest turnover time. Monocultures and CAFOs, while energy and capital intensive, created path dependencies and increased specialization that reduced the ability of farm women to reproduction the conditions of production. They were mutually reinforcing systems that necessitated greater productivity gains, increases in circulating capital, and faster turnover time.

The transformation of the poultry industry in the postwar era resulted in a loss of women's productive work on the farm. The proportion of women's productive work on the farm was thus shrinking in relation to the growing penetration of agro-industrialization and, importantly, to the expansion of farm men's sphere of commodity production that gained a growing share of capital investments and energy. In this way, we can see the dialectical contradictions between the emergence of agro-industrialization and the changing proportions of paid and unpaid work of farm women and men.

What were the consequences of reducing women's paid work on the farm? Women entered the non-farm workforce in greater droves than the past and in nearly all fields. Meatpacking in Iowa and throughout the rural Midwest expanded during and following World War II, allowing greater opportunities for rural women to work in packing plants. Meatpacking firms created gendered segregated jobs that paid women

less than men. Farm women worked as teachers as well as in retailing. Overall, Fink (1987) suggests that women’s acceptance of lower wages paid by employers ensured higher profits while women’s wages ensured the reproduction of the farm and household.

During the 1950s, low farm prices combined with rising farm debts necessitated a transition in the economics of survival. The appropriation of women’s work, including dairy and poultry, and the loss that income that when combined with the increased capitalization of farming forced women into wage work in the postwar era. Farm women joined the swelling ranks of a semi-proletarian class. Their wages were among the lowest of any demographic (see table). Between 1950 and 1975 the female workforce increased from 29 percent to 40 percent (Derifield 2014: 30). In Iowa, a similar trend persisted. The female paid workforce in 1940 was 170,350. Twenty years later there was an 80 percent increase in women’s participation in the paid workforce (Derifield 2014: 30).

Average Annual Income of Iowans, 1979

Residence	Men	Women	Women % of Men’s Income
Urban	\$13,104	\$5,089	39
Rural	\$12,055	\$4,336	36
Farm	\$11,494	\$3,926	34

Table 15

Source: U.S. Census

Iowa Women in the Labor Force, 1950 and 1960

	Women Working (1950)	Women Working (1960)	Women Not Working (1950)	Women Not Working (1960)
State	249,524	318,117	735,645	680,478
Urban	165,003	208,842	339,083	344,244
Rural Non-Farm	51,192	68,327	177,642	165,029
Farm	32,929	40,928	218,920	171,205

Table 16

Source: Derifield 2014: 36

Capital's appropriation of women's work did not simply occur through technological innovation in producing dairy and poultry products. Rather, women worked to build up production and marketing of these enterprises that were undervalued compared to commodity crops and livestock. As women's dead labor had clearly developed to a certain level agro-industrial capitals appropriated these activities as a capital-intensive production and marketing processes. As women's undervalued enterprises became more capital-intensive and more valued, farm men spent more energy engaged in these activities. In many cases, those enterprises left the farm, turning into CAFOs.

To be clear, the technological innovations brought in with the winds of the second agricultural revolution did not displace women from farming. Farm wage-laborers had been displaced. Women became "tractorettes" during World War II when men left the farm to serve (Jellison 1993). After the war, women continued to perform farm work, including driving tractors, bookkeeping, marketing, etc. Many women preferred farm work over house work as they enjoyed being outside and the work for some was more meaningful (Jellison 1993).

Farm women's double burden of working for a wage and on the farm suggests the failure of agrarian housewifization. But what of other women? The so-called family-wage of the post-World War II era created a new social-reproduction/economic production regime. The state would once again play an important role in organizing this regime. Higher corporate taxes and greater public investment in education and healthcare improved the standard of living for the Fordist family. The Fordist housewife for her part became the symbol of attaining the ideal, a full-time unpaid care worker. The Fordist

family, however, was reserved for white families, forcing women of color to continue performing low-wage work (Fraser 2016; Cooper 2017). State-managed capitalism in the postwar era hardened the gendered division of labor for non-farm families, obscuring women's contribution to the household.

The Fordist family and its housewife, however, needed more than entitlements from the state. It required cheap food and surplus nature from the periphery. Underwritten by cheap energy, the second agricultural revolution by all accounts delivered cheap food (Gordon 2016). While the world market was essential for American farmers, the boom in cheap food in the postwar era was unprecedented to such a degree that “food dumping” in the form of the PL-480 policy that constituted a geopolitical strategy to limit the expansion of socialism in the periphery (Patel 2013). Regimes of forced underconsumption throughout the periphery were also fundamental to the reproduction of the Fordist family (Araghi 2009).

Conclusion

This chapter has explained the historical conditions that generated the second American agricultural revolution that originated in the 1930s. The coupling of the farm woman problem and farm problem with the demands of American ascent required a revolution in agrarian relations and a revolution in farm productivity. The twin crisis of the farm were only partially resolved through the second agricultural revolution. The wealthy and capable farm families that increased the organic composition of the farm increased the cost of business for farmers everywhere, a cost that was too heavy for many. Those that were able to survive the second agricultural revolution, certainly fewer than the first, increased their wealth, income, and standard of living. The agrarian

household and the farm enterprise, even for many petit bourgeois families, rarely upheld the ideal of separate spheres as farm women continued their double burden with the displacement of farm wage-labor.

The prosperity of farm families in the Corn Belt would advance in the context of the 1970s food-energy crisis. However, as the concluding chapter examines, the 1980s farm crisis would spell disaster for many farm families in the Corn Belt. How would families in the Corn Belt recover from this crisis and what would that mean for American development in the world-system?

Chapter 6: Crisis, Renewal, and the Family Farm in the American Corn Belt

The maturation of the second agricultural revolution occurred in the context of the 1970s world food crisis. During the 1970s Midwestern farmers experienced prosperity as they filled the gaps resulting from widespread droughts in Russia and Africa.

Historically, major droughts acted as a boon to farmers as it often resulted in rising prices for their commodities. The 1970s farm boom brought with it a great expansion of capitalization of farming in the Corn Belt. Investments in land, machinery, and other inputs increased the cost of production. However, as had been the case during the golden age of agriculture, farmers used rising land values as collateral on loans. Also, like the golden age, lenders were enthusiastic to lend to farmers. By the 1980s, like the 1920s, another crisis plagued farming, leading to another round of expansion and displacement.

Unlike the crisis of the 1920s, which eliminated many poorer farmers, the 1980s farm crisis eliminated many highly capitalized farms. Those farm families that were conservative in their investments during the 1970s booms, and were more diverse increased their probability of survival. Other changes were also occurring to undermine farmers in the Corn Belt, including legislation that prevented corporate hog farming in Iowa, engendering competition with North Carolina who was now emerging as the prominent hog producer. More recently, legislation passed to increase the use of corn, soybean, and other commodity crops as a source of ethanol. The rise of agrofuels was posed a solution to energy security, mitigating global warming, and creating sustainable development.

Prosperity in Crisis

The second agricultural revolution had supplied an abundant supply of cheap food so much so that following World War II another great wave of world proletarianization occurred. Cheap energy underwrote America's cheap food model, resulting in a farm model that was heavily dependent on fossil fuel energy sources. Waves of cheap food during the golden-age of American capitalism was utilized as a geopolitical strategy under PL-480 as aid to the Global South, while attempting to manage food/feed surplus (Patel 2013). By 1973, the world experienced a converging and unprecedented food-energy crisis. Two decades or more of food abundance turned to scarcity. Neither food nor oil were in absolute scarcity, but were expressions of the declining world ecological surplus constituting the signal crisis of American hegemony and global capitalism. In this sense, the prosperity and subsequent farm crisis were a product of long waves of expansion and contraction (Buttel 1989).

Declining world ecological-surplus was a result of several interrelated developments during 1970s conjuncture. For the first time since World War II world food production declined in 1972 (FAO 1973: xii). Food prices were rising across the world due to droughts and floods. In Russia droughts severely damaged its wheat supplies. In parts of Asia a rice crisis ensued, leading to widespread rice shortages. In Peru floods damaged land crops, and its fisheries were in decline for the second year in a row. Recall, severe changes in climate can become an important force structuring the conjuncture and its solution. During the climatic crisis conditions of the early 1970s, American farmers prospered on exports. "From 1872 to 1981...agricultural exports increased in value from \$8 billion to over \$44 billion (Strange 2008: 18). Japan's economic growth, especially in

automobile manufacturing was impressive, and by 1981 had become the top importer of corn, three-fourths came from the United States (Strange 2008: 18). President Nixon's 1972 visit to China resulted in new geopolitical relations, opening up the world's largest market for American farmers (Barnett 2003). Proletarianization of the Global South did not depend on its own national agricultures, but on American grains (Friedmann and McMichael 1989). Prices for wheat increased 132 percent, corn 92 percent, and soybean 52 percent (Strange 2008: 18). Farmers' net incomes doubled between 1970 and 1973 (Barnett 2003: 164). Declining world-ecological surplus registering in rising consumer food prices and the prospects of insatiable export market initiated another boom for American farmers.

The American state's empire projects in Vietnam and elsewhere had initiated a period of inflation. American money was overvalued, making it exports expensive and imports cheap. President Nixon removed the gold standard, leaving currencies and interest rates to fluctuate. Inflation advanced making the dollar worth less, incentivizing countries to purchase more American goods. Oil-rich OPEC countries, like Mexico, Venezuela, and much of the Middle East traded oil for American grains, constituting a massive market for American farmers (Strange 2008). While food prices continued to rise for consumers, interest rates were the low, and sometimes negative, aiding the farmer's lot. "Global inflation, the general slump or slowdown in the world economy, and dollar gluts associated with the surplus of 'petrodollars' caused these low real interest rates" (Buttel 1989: 54).

Historically inflation has been positive for farmers. Inflation had generated another land boom, making farmers millionaires overnight, at least on paper. Federal tax

provisions on capital-gains had incentivized non-farming investors to purchase more land. The value of land increased substantially, with the greatest increases in the Corn Belt (Buttel 1989). From 1970 to 1981 land value of American farms increased from \$176 billion to over \$700 billion (Strange 2008: 22). Lenders encouraged farmers to purchase new farm equipment, modernize outbuildings, and purchase more land. In fact, many farmers who sought modest loans were discouraged by lenders, who suggested they borrow several hundred thousands of dollars (Friedberger 1989). Inflated land values were a source farmers leveraged to increase farm assets. Under expanding export markets and rising crop prices, inflation and low interest rates were the mechanisms of capitalization of American farms.

During the 1970s farmers of all kinds expanded their operations. It was a period of massive expansion in farming operations. Under the rhetoric of Nixon's secretary of agriculture Earl Butz, whom stated 'get big or get out,' encouraging farmers to plant fencerow to fencerow. The 1973 Farm Bill dismantled the twin pillars of the agrarian New Deal: price-supports and production-controls (Baines 2015). As long as export markets remained healthy, crop prices remained high, and high inflation coupled with low interest rates, farmers would continue to prosper in crisis. This combination emerged from a structural crisis of capitalism. By the early 1980s cheap food and cheap energy had increased the world-ecological surplus. Renewal of world accumulation in the 1980s transformed the short-lived prosperous combination, imposing hardships on agriculturalists. For farmers, the good times of the 1970s had sowed the seed of its own destruction.

The Farm Crisis, 1980s

The perfect storm of the 1970s conjuncture gave way to deregulation and the financialization of the global economy. Under the so-called Volcker shock, a period of deflation and high interest rates ensued. Farmers who had borrowed heavily to expand their farming operations under the prosperous boom when interest rates were low were now servicing debts with high interest rates (Friedberger 1989). Throughout the 1980s interest rates regularly surpassed 10 percent. Farmers were struggling to just pay down the interest accrued on loans, forcing many to continue to borrow more loans in order to meet daily expenses. Part of the problem rested in the loan agreements of the boom. Bankers and lending agencies did not base the farmers' credit worthiness on cash flow or income, but on the rising value of farm assets, especially land. From 1981 to 1983, before the federal government provided some relief to farmers, bankers were unforgiving to farmers who could not meet the terms of agreement.

Beyond rising interest rates, which were used to fight rising inflation, export markets began to dry up. High interest rates meant that the dollar was worth more and it was costlier for importing nations to purchase American goods. As American farmers piled on debt during the boom at the same time Latin American countries had become debt-ridden, giving rise to the 1980s-debt crisis. Inflation was not only a problem for American farmers but a dire problem for countries of the Global South. IMF structural adjustment loans meant that countries like Mexico would have to eliminate government subsidies and social safety nets and were encouraged the liberalization of agriculture, forcing farmers to produce for the world market. As Europe, Japan, and Green Revolution countries' agriculture developed they became less dependent on American grain imports and the world market tightened. From 1977 to 1992 European grain exports

increased from seven million metric tons to 23 million metric tons (Winders 2017: 64). While world imports stayed relatively stable throughout the 1980s, the share of American exports has declined precipitously, increasing its carry-over stocks from 70 million metric tons in 1983 to 150 million metric tons in 1986 (Buttel 1989: 57). Despite Reagan's attempts to cut farm subsidies, federal commodity programs continued to rise to over \$30 billion annually (Friedberger 1989; Buttel 1989; Strange 2008).

Like all farm crises the consequences are uneven. While the Corn Belt had often been spared the worst of recurrent farm crises, they bore the brunt of the 1980s farm crisis. Farmers of the Great Plains and the South did not experience the crisis to the extent of the Corn Belt. The explanation in the differences lies in the devalorization of land. While the Corn Belt experienced the greatest increase in land values during the boom, the fall was that much further. Before the fall, however, they had capitalized the farm to such an extent that when a reversal of fortunes occurred, differentiation soon followed. The farm crisis was not exclusive to farmers. Like the 1920s farm crisis, the crisis became more real when banks began closing. This was also the case for banks and lending agencies in the 1980s. Furthermore, farm equipment manufactures also experienced depressed markets as fewer farmers were able to purchase tractors, combines, and other farm machinery.

The continuities and discontinuities of the twentieth century farm crisis must be acknowledged. The farm crisis that followed World War I continued through the 1920s and into a generalized crisis of capitalism in the Great Depression. Whereas the 1980s farm crisis had followed on the heels of a structural crisis of capitalism and corresponding prosperity of American farmers. The earlier twentieth century crisis

stemmed largely from low crop prices, while the later farm crisis stemmed from low crop prices and insurmountable debt. Debt seemed to be a larger factor than low prices during the 1980s farm crisis (Barnett 2003; Strange 2008). This exiting of farming was not exclusive to small farm families. In fact, if the 1980s farm crisis suggest anything, it is that it was the larger overcapitalized and less flexible farms that were more susceptible to changing world markets (Strange 2008). Small and some medium sized farms remained diversified and were conservative with expansion and investments during the boom so that when the crisis emerged they were able to weather the storm (Friedberger 1989).

The Industrial Hog and Competing Hog Frontiers

While Chicago revolutionized hog marketing, which in turn handsomely rewarded Corn Belt farmers, “truck marketing” from the Great Depression had eliminated nearly half the hog farmers in the Corn Belt by the 1970s (Rhodes 1995: 107). However, the 1970s constituted a new phase in the industrial hog, one that would bring prosperity to those remaining hog farmers. As late as the 1960s many hog farms were still relatively small, with a greatest number of herd sizes under 100 hogs, with only 6,000 hog farms having more than 1,000 or more hogs. “The typical Midwest hog farm was 320 acres, with 75% of hog rations grown on the farm. The farm operator provided most of the labor...[and] animal waste was contained on-site and...was spread...on the crops and pasture” as fertilizer (Furuseth 1997: 393). By the 1970s, herd sizes of a hundred or less still constituted the largest group of farms, yet the number of farms producing more than a thousand hogs per year was 16,000 (Rhodes 1995: 108). Some of these large-scale farms were producing over 50,000 hogs per year. The wide variation between producer groups suggested potential profitable markets would-be large-scale contract-growers

(Lawrence 1992). High hog prices from the mid-1960s through the 1970s ensured prosperity to Corn Belt farms.

The farm crisis created the conditions for advancing contract hog farming in the Corn Belt. The Southern contract model was brought to the Corn Belt when farms faced low livestock prices, “debt problems and equity erosion” (Rummens et al. 1991: 1). While contract farming originated in poultry operations in the South, a development that undermined women’s productive labor on Corn Belt farms, it had spread to hog operations, especially in North Carolina. From the boom through the bust the Corn Belt lost more than half of its hog farms, but still fared better than the national average. However, over this period the number of hogs per farm in Iowa doubled, while North Carolina experienced an eight-fold increase in hogs per farm (Lawrence 1992: 1). Iowa remained the number one hog producer in the United States until 1980s when North Carolina became the top producer.

What is contract farming? Rhodes (2005: 108-109) defines hog contracting as follows,

“an owner of feeder pigs engages a producer/grower to take custody of pigs and finish them in the latter’s facilities to slaughter weight with feed and health items furnished by the pigs’ owner (the contractor). This producer/grower...usually receives from the contractor a set of fee per pig received and/or per hog marketed and often some performance incentives for providing custodial care”.

Importantly, the growth of contract production usually occurs in the context of market monopolization (Mooney 1986). Such was the case in poultry following World War II. It was also the case in hogs. One example illustrates this well. The Iowa Beef Packers (IBP) changed the terms of accumulation in meatpacking. IBP was a smaller

meatpacking company that had no prior experience in meatpacking, began slaughtering cattle in Denison, Iowa in 1961. IBP installed modern equipment in its “highly automated one-story facility” (Skaggs 1986: 190). Utilizing stunners, mechanical knives, power saws, and electronic slicing, labor productivity quickly outstripped demand, resulting in the displacement of nearly 100,000 meatpacking jobs (Skaggs 1986: 190). The major transformation that occurred during this period that accelerated circulation of pork was the development was boxed beef, which allowed IBP and others to reduce the number of workers in both meatpacking and retailing to process meat into finished goods. This entailed a deskilling of packers as well as butchers in retail stores (Page 1997). “One former IBP official acknowledged, ‘the goal was to be lowest cost producer [and] the lowest cost slaughterer, to enable us to pay a quarter a cent a pound more for desirable cattle and take them away from the competition’” (Lauck 2000: 51-2). While IBP paid some of the highest wages throughout meatpacking, its antiunion stance ensured workers little in the way of benefits. As such, farmers were primarily the beneficiaries of the revolution in meatpacking. By the 1970s the “Big Three” meatpacking companies dominated the industry: IBP (Tyson), ConAgra (Swift), and Excel (Cargill). Unlike earlier periods of meatpacking that focused on slaughtering of multiple species in a single plant, these companies specialized on a single species. The same companies began the practice of production contracts that would accelerate in the 1980s and 1990s under the farm crisis (Rhodes 1995). In fact, each of these companies have in some cases by-passed contracting with outside growers, utilizing company-run growers.

As the previous section explains the relationship between the boom and bust, hog farmers, too, had joined in the expansion frenzy. Buoyed by high hog prices, farmers

modernized their facilities that accommodated larger herds. Overall, there was a general tendency towards the substitution of capital for labor per hog (Rhodes 2005). A reversal of fortunes for hog farmers expressed in the farm crisis. Emerging from the farm crisis were new industrial hog producers linked to agribusiness through contracts. In many ways, the competitive pressures felt by beef and pork packers derived from the rise of industrial poultry operations that were primarily located in the South. Thus, it was easier to establish contract farming in these areas that had been accustomed to such practices. Contract farming was also easier to establish in areas with cheap land and cheap labor, such as North Carolina (Rhodes 1995). Through the crisis North Carolina established itself as the prominent hog producing state. Unlike Illinois and Iowa, who only had 21 and 14 percent of its farms producing more than 5,000 hogs a year, 82 percent of North Carolina farms produced more than 5,000 hogs a year (Rhodes 1995: 109). Corn Belt family farms on the whole were resistant to contract production based on a strong tradition of agrarian ideals (Page 1997). By 1995, *The Economist* had labeled North Carolina “Porkopolis” (Furuseth 1997: 392). Although agroindustrialization of hog production was initiated in Iowa, North Carolina’s agroindustrialization was unprecedented (Furuseth 1997). The 1980s farm crisis gave impetus to the rise of contract hog farming. When agricultural lenders restricted providing credit to farmers, agribusiness was capable and willing to provide the resources to hog farmers.

The Great Hope of Agrofuels

More recently, agrofuel development projects have been enacted with the promise of energy security, mitigating global warming, and revitalize rural economies (Bain and Selfa 2013). Agrofuels such as ethanol and biodiesel are derived “plants such as corn, oil

palm, soy, sugarcane, sugar beet, rapeseed, canola, jatropha, rice, and wheat” (Holt-Giménez and Shattuck 2009: 180). The development of agrofuels has engendered global inequality between the Global North and South centered on a food-fuel complex. Because of low crop prices for most farm commodities combined with growing debt, farmers of the Global South have been forced to grow crops for agrofuel production that supplies western economies with a cheap, somewhat renewable fuel source. The global agrofuel boom has spurred a wave of corporate land grabbing, increased contract farming, and expropriation (White and Dasgupta 2010).

While the Corn Belt was the epicenter of two agricultural revolutions, as well as the original source of the emergence of commercial soybean in the United States, it is no surprise that agrofuel development originated in the Corn Belt. Iowa is the largest producer of corn in the United States, with 86 percent of its farmland planted in corn and soybean (Bain and Selfa 2013: 354). While many crops can be used as sources for agrofuels, corn by-far outranks all other crops as a source. The United States produced 48 percent of ethanol used in the production of global agrofuels (Baines 2015: 295). Iowa produces roughly 30 percent of the United States ethanol (Bain and Selfa 2013: 352). The 2005 government mandates and tax credits have greatly expanded production in Iowa. In 2005 Iowa had 14 ethanol plants and by 2011 there were 41 plants operating (Bain and Selfa 2013: 355). While “between 1997 and 2007 Iowa lost nearly 12,000 mid-size farms,” the corn-ethanol boom has created 50,000 jobs in Iowa alone, giving Iowa farmers hope of prosperity (Bain and Selfa 2013: 356).

As might be expected the benefits of the ethanol boom are not shared equally amongst groups in agriculture. As agribusiness gained nearly monopoly power over

agriculture, they soon penetrated the ethanol market. Companies like Archer Daniels Midland (ADM) dominated ethanol markets. Monsanto and DuPont, too, were key players in the development of ethanol markets, as each saw profitable opportunities in the expansion of corn production through the use of their chemical-inputs and genetically modified corn seeds. The ethanol mandates of the early-2000s had rechanneled corn as feed for livestock to corn as a feed for fuel (Baines 2015). This was problematic for livestock growers whose largest expense was feed. Overall, as Baines (2015) argues, the corn-growers and traders, like ADM, benefited from the massive expansion of ethanol, and largely at the expense of livestock farmers and processors.

Beyond the benefits of corn-growers, the boom in agrofuels has been detrimental humans and the rest of nature. Agrofuels have been linked to rising food prices around the world. As an alternative to fossil fuel energy, the net energy gains from agrofuels have been minimal at best (White and Dasgupta 2010). Agribusiness giants like ADM and Petrobras have “rearrange[d] capital flows and relations of power, establish[ed] new forms of ownership over land and genetic resources, and transform[ed] markets on global scales (Holt-Giménez and Shattuck 2009: 181). Agrofuels, like oil palm and sugarcane, are notoriously land-intensive, giving rise to increased rural instability worldwide. The prospects and promise of agrofuels have certainly benefited corn growers in the Corn Belt, but at a high cost to rural producers worldwide.

Conclusion: Looking Back, Looking Forward

The following study has provided a world-ecological accounts of the origins, development and crisis of the Corn Belt family farm. I argued that Illinois and Iowa, the heart of the Corn Belt, were the epicenter of two successive agricultural revolutions that fundamentally transformed world accumulation and world nature. The study has contributed in two ways: historical and methodological. First, I have provided a nuanced historical reconstruction of capitalism's successive agricultural revolutions through the interrelationships of family farming, proletarianization-housewifization, and national and world markets. Utilizing a world-ecological framework, I historicized and theorized the contradictory nature of farm relations and world accumulation that gave rise to agricultural revolutions. Those agricultural revolutions, in turn, restructured the gendered division of labor on the farm, appropriating more unpaid work from extra-human nature. The net effect of agricultural revolution went far beyond the point of production, reshaping the capitalist world-ecology. Specifically, I demonstrated how agricultural revolutions resulted in the twin process of proletarianization-housewifization. Finally, the research demonstrated how cheap families and cheap food constituted the United States unique position in the capitalist world-ecology.

Prospective Research

The following study has provided a world-ecological account of the origins, development, and crisis of the Corn Belt family farm. I focused on the dialectical dynamics of social reproduction regimes in relation to production regimes of agrarian

households that underwrote America's cheap food model. The household and national and world markets formed the second dialectic, whereby the Corn Belt held a unique and relatively prosperous position within an international agrarian division of labor. The study has emphasized the importance of agricultural revolutions, specifically in terms of housewifization, proletarianization, and world accumulation in the web of life.

There are two avenues of research worth pursuing that build off the current study. The first is the question of the fate of the peasantry in China. In China's Corn Belt (Heilongjiang, Jilin, and Hebei provinces) existing at similar latitudes as the American Corn Belt, lies a mix of many small- (around 1-2 acres) and fewer large-scale farms (several hundred acres) producing commodity crops like corn and soybean. The Corn Belt of North China is the epicenter of farm mechanization due to the relatively flat landscape and close proximity to old industrial belt. Like the United States, China's Corn Belt produces feed primarily for hogs and other livestock. Today, China is the largest hog producer in the world (Schneider 2011). The Corn Belt also feeds the largest proletarian class in the world.

Chinese peasant producers are now facing international competition from the United States and Brazil. Since joining the World Trade Organization in 2001, China was required to reduce export subsidies on corn and open its markets (Schneider 2011). Cheap American and Brazilian corn and soy imports are undermining Chinese peasant households, requiring women to engage in a set of strategies to reproduce the household. Unlike agrarian development in the United States that shifted women into off-farm employment, in China men of peasant households are leaving for urban industrial centers,

resulting in what has been termed the “feminization of agriculture”. This has left women to care for the elderly and children while continuing to farm.

This raises several important questions for peasants in China’s Corn Belt. The first is to what extent are women relying on community relations to reproduce the household? Are they deepening market dependence by focusing on growing more corn and soy, or are they diversifying their operations? Are they expanding their farmland to increase overall production? Are they purchasing more commercial inputs to increase productivity?

The second set of questions relates more broadly to the relationship between peasant households and economic development. The PRC has imposed two contradictory models upon peasants in the Corn Belt. The first model is family farming based on the use of farm equipment, commercial inputs, and the use of some wage labor, emulating the American model. The second model is agroecology, or what might be referred to as sustainable agriculture. That is, farming should be practices with attention to maintaining soil nutrients, water-quality, and hygiene standards (Huang 2014). Which model is the reality in the Corn Belt? Will peasants in the Corn Belt be displaced as large-scale commercial farm units become more common? To what extent has cheap food advanced China’s economic prominence in the world-system?

The second prospective project could explain the re-arrival of small-scale, organic farming linked to building local sustainable food systems. In Iowa City, Iowa, a group called “Ecopolis” that included farmers, politicians, local businessmen, and urban citizens are seeking to remedy the unsustainable nature of the city’s food, energy, and transportation systems. In the process, Iowa City has been claimed a “regenerative city”.

Regenerative city projects around the world have been offered as the solution to restructure our food and energy systems to create long-term sustainability. The research asks to what extent are farmers in Iowa marketing their commodities to an emerging local food system? And, who are the kinds of farmers involved in reconstructing sustainable food systems in Iowa City?

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