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The Costa Rican Agrifood System, 1961-2014: Assessing Neoliberalism's Impacts on Agriculture and Diets

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Introduction

The agrifood system structures society's relations to its supporting ecosystems and people who work the land. Costa Rican agriculture has a long history, starting with indigenous people's cultivation of maize, beans, and other crops. Spanish colonialism introduced the agro-exports of coffee, cattle, and sugar cane. Since colonial times, the development of agrarian capitalism — production for exchange value rather than subsistence with the increased dependence of farmers on purchased off-farm inputs and services (Goodman, Sorj, and Wilkinson 1987) — has proceeded. It occurred through relatively slow (agri)cultural change fostered by market integration, and was pushed by land reform to create a more economically-viable smallholder agriculture based on production for exchange and, most recently, by large political economic shifts pushed by neoliberal ideology.

This chapter examines the dynamics of the Costa Rican agrifood system over the last half-century, a period of considerable demographic change.[1] Urbanization shaped the country's agrifood system, as food flows had to expand considerably to feed the growing urban population. This time frame provides an excellent case to assess neoliberalism's effects on agriculture and diet, since neoliberal policies introduced in the mid-1980s can be juxtaposed to the previous structuralist ones. I also assess whether Costa Rica's agrifood system reflects its image as a green, social-democratic, and progressive nation.

This chapter shows that neoliberal developments drove the massive expansion of oil palm and pineapple — agrochemically-intensive crops that have largely excluded smallholders — and the decline of maize and beans — low-external-input crops in which smallholders have been and remain dominant — while smallholder coffee farmers persisted (Babin, this volume). The neoliberal push toward high-value crops means higher pesticide use; indeed, Costa Rica has the dubious honor of having the world's most pesticide-intensive agriculture (Galt 2014). Neoliberal policies also enabled the rapid rise of concentrated animal feeding operations (CAFOs) through cheap feed imports. As with bananas (Vandermeer and Perfecto 1995), capital accumulation in these new production systems — oil palm, pineapple, and CAFOs — occurs through externalizing ecological destruction, the costs of which are paid by workers, broader society, ecosystems, and other species. In short, neoliberalism has caused Costa Rican agriculture to become more unequal and less sustainable. As for diets, neoliberal policies accelerated a shift toward the "standard American diet" (SAD), greatly increasing the environmental damage caused by the Tico diet and the rates of heart disease, cancer,

[1] Costa Rica's population was 1.3 million in 1960, and reached 4.8 million in 2015. In 1960, the population was about two-thirds rural, whereas in 2015 the population was less than 25% rural, a trend consistent with urbanization throughout Latin America (FAO 2016).

obesity, type 2 diabetes, and high blood pressure. The resulting environmental, societal, and human damage requires rejecting the idea of Costa Rican agrifood exceptionalism, and rethinking Costa Rica's development model.

Framework

Following a political ecological approach, I emphasize sustainability and equity in the agrifood system (Galt 2013; Moragues-Faus and Marsden 2017), asking *for whom agrarian capitalism works*. I operationalize equity by engaging "the agrarian question" about the fate of smallholder agriculture (Banaji 1980). Key concepts and theories from agrarian political economy animate this analysis. I use agricultural census data to examine the effects of neoliberalism on farm structure, i.e., the proportion of farms of various sizes and the concentration of production. For the question of agricultural sustainability, I focus on ecological destruction and the resulting transfers of wealth, using indicators of pesticide intensity and land use change.

Dietary sustainability can be approached in various ways. I assume that whole-food, plant-based diets are healthier for the planet — from greenhouse gas emissions to localized pollution (Carlsson-Kanyama 1998; Eshel and Martin 2006) — and for individuals, as they prevent cancer, heart disease, and many other noncommunicable diseases (Greger 2015). Thus, I use food availability data to analyze dietary sustainability by focusing on the proportion of Tico diets composed of key elements of the SAD: animal products, sugars, and vegetable oils. In terms of equity, I engage briefly with literature on neoliberalism and public health, yet consumption by socioeconomic class is outside of this chapter's scope (see Dowd-Uribe and Raser, this volume).

Methods and Data

This chapter relies on two secondary data sources. The first is the Costa Rican Censuses of Agriculture from 1963 (DGEC 1965), 1984 (DGEC 1986), and 2014 (INEC 2015c, 2015d, 2015a, 2015b, 2015e). These censuses bookend the two time periods of structuralism from 1963 to 1984 and neoliberalism from 1984 to 2014.

The second source is FAOSTAT of the UN Food and Agriculture Organization (2016), specifically the domains of production, trade, food balance, and population. For Costa Rica, these datasets are available from 1961 to recent years (2011-2013). They complement the Censuses of Agriculture by with additional contextual data.

I first examine trends in Costa Rican agriculture: land use, farm structure, shifts in crops and market orientation, and the rise of concentrated animal feeding operations (CAFOs). I then examine food consumption trends. The conclusion considers implications of the findings.

Agricultural Trends

Agricultural Land Use

Agricultural land area doubled between 1961 and 1984 — to 54% of national territory — then declined sharply in the late 1980s, and leveled out to 36% in the 2000s (Figure 1). Declines in permanent pasture/meadow drove the decline. An important constraint on expansion of agricultural area is Costa Rica's Forest Law, passed in 1996, which prohibits deforestation even on private lands (Fagan et al. 2013). This restricts agricultural production to land deforested before 1996, leaving intensification and higher-value crops as ways to increase capital accumulation.

Two processes drove the decline in permanent pasture/meadow starting in 1985. First, the cattle sector reached crisis in 1985. Cattle production faced a negative rate of return, and "the Minister of Agriculture declare[d] a 'state of emergency' for the livestock sector" (Edelman 1995: 27). The rapid disinvestment from the sector spurred the decline in permanent pasture (Figure 1). Second, in the 1980s debt crisis, Costa Rica engaged in debt-for-nature swaps to reduce its debt. Conservation funding was provided in exchange for reduction in the principle owed, and between 1988 and 1991, Costa Rica was involved in six such swaps, more than any other country, although this only reduced its debt by 5% (Thapa 2000: 270-1). The swaps converted some of agricultural land, including pasture, into protected areas (Isla 2015).

Area in permanent crops rose steadily from 3.8% to 6.4% of national territory, while arable land declined from 5.6% to 4.9% of national territory (Figure 1). This involved shifts toward a crop mix with a higher gross returns per hectare, a trend common within agrarian capitalism (Guthman 2004; Galt 2014). Several perennial crops, notably pineapples and oil palm, were boosted by structural adjustment's promotion of export-oriented agriculture, as shown below.

Farm Structure

Farms numbers rose between 1963 and 1984, and fell since (Table 1). However, the data are not directly comparable; making them so[2] we see the following numbers of farms larger than one hectare: 60,960 in 1963, 79,818 in 1984, and 76,219 in 2014.[3] These shifts reflect three major processes: land reform, the cattle crisis discussed above, and agrarian capitalism's tendency toward concentration.

Land reform in Costa Rica started in 1961. External pressures included the Cuban revolution and the U.S. response of pushing for land reform through the Alliance for Progress, while internal pressure arose from the formation of the Partida Agraria, with the slogan "land for the man who tills it" (Seligson 1980: 126). Seligson's (1980: 125-152) comparison of the 1963 and 1973 census tapes shows an additional 14,428 farms owned by farmers in 1973, evincing a successful effort to create mid-scale farms. Table 1 compares the 1963 and 1984 censuses, showing that land reform increased farms of 2-3 and 4-5 hectares.

Between 1984 and 2014 there was an 8.8% reduction in the number of farms (Table 1). This decline likely occurred through competition between farms, a process common in agrarian capitalism, with more profitable farms purchasing less profitable ones (Cochrane 1979; Levins 2000). Yet this reduction was not distributed equally. Rather, minifundios under 1 hectare declined rapdily, while farms between 1 and 10 hectares increased in number. Farms over 10 hectares declined at rates considerably higher than the average rate; since 25% of cattle farms were lost in this period (Table 4), these losses likely contributed to the decline in larger farm numbers.

These data suggest that the tendency toward a polarizing farm structure common in agrarian

[2] The 1963 census and before did not report farms under a manzana (0.69 hectares) (INEC 2015e: 23). Removing farms under one hectare is the closest one can come to standardizing the data across the three censuses, but results in undercounting minifundios.

[3] For 1963 this involves removing farms between 1 and 1.4 manzanas — 3,661 (DGEC 1965: 17). For 1984 this involves removing all farms under one hectare — 16,724 — and farms without land — 5,396 (DGEC 1986: 1). For 2014 this involves removing all farms under one hectare — 13,683 — and farms without land — 3,115 (INEC 2015c: 33).

capitalism — the decline of the middle (Lyson, Stevenson, and Welsh 2008) — has not been a dominant trend in the last 30 years. Previous agrarian reform efforts likely have a continuing impact, showing how Costa Rica's previous social-democratic efforts at equitable land redistribution have provided a buffer to the middle vis-à-vis neoliberal policies. Two caveats are needed, however. First, concentration could be occurring amongst farms over 200 hectares, but it is impossible to know.[4] Second, when concentration is examined by crop, as below, four of the eight most important crops show rapid concentration. Thus, the overall trajectory of farm structure hides important variation.

Shifts in Dominant Crops, Market Orientation, and Pesticide Intensity

Large changes occurred in the specific crops planted over the last 50 years. In the 1960s, many regions focused on major staple crops — beans, rice, and maize — for subsistence and domestic markets (Edelman 1999). With the spread of agrarian capitalism, commodity markets for agricultural products increasingly dictate farmers' well-being, and market prices commonly drop below costs of production (Galt 2014). This shift has important environmental dimensions. While Costa Rican agriculture is very pesticide intensive, pesticide use is very unevenly distributed: sugar cane and coffee are the least pesticide intensive; staple grains and pulses are moderately sprayed; and vegetables and fruit grown for market receive considerable agrochemical inputs (Castillo, de la Cruz, and Ruepert 1997; Galt 2008). Generally, the higher the crop value per hectare, the higher is agrochemical input use, so the shift from subsistence orientation to market orientation greatly increases agrochemical use (Galt 2008).

These continuities and shifts in land use by crop and, by extension, market orientation and environmental impact, are revealed in Table 2, which shows the 5-year running averages of hectares planted to the top 12 crops in 2013. There are continuities with some crops, rapid rises of others, and sharp declines of yet others. The top six most-planted crops in 1961 and 2013 (a total of eight crops) are discussed in detail below. Table 3 shows the farm structure producing these eight crops in 1984 and 2014, illuminating the effects of neoliberalism on farm structure.

Areas in four crops — coffee, rice, bananas, and sugar cane — remained stable over the last 50 years, and all are important crops for over a century. Coffee has remained Costa Rica's top crop by area planted for 50 years, although its acreage has declined in the last decade (Table 2). Coffee remains the crop planted by the most farms; in 2014, 28.5% of farmers grew it (INEC 2015d: 130). Smallholders remain key coffee producers (Babin, this volume), as farms under 10 hectares make up 84% of farms growing coffee and 42% of the cultivated area (INEC 2015d: 130). Concentration has not been occurring among coffee farms (Table 3). Environmentally, while coffee is not heavily sprayed, the percentage of coffee under traditional shade management has declined since the 1990s (Jha et al. 2014), resulting in reduced wildlife habitat.

Rice, bananas, and sugar cane have long been dominated by large-scale farms. Costa Rica still produces most of its own rice; in 2011, 24% of rice consumed in the country was imported (FAOSTAT 2017). Concentration proceeded quickly in rice, with farms over 100 hectares accounting for 55% of land in rice in 1984, and 76% in 2014 (Table 3) (Kudzas and Warner, this volume). Bananas remain the most important export crop by dollar value (Table 2). Large

[4] In both 1984 and 2014, farms over 200 hectares controlled 47% of the agricultural land, but the 2014 census does not provide any categories within the class of farms greater than 200 hectares, while the 1984 census does.

plantations dominated banana production in both 1984 and 2014, showing almost no changes in farm structure (Table 3). Sugar cane farm structure shows rapid concentration, with farms over 100 hectares accounting for 66% of area planted to sugar cane in 1984 and 81% in 2014 (Table 3).

Oil palm and pineapples are neoliberalism's export superstars, with dramatic increases in area (Table 2). In the early 1980s, 14,000 hectares was devoted to them, while today they occupy over 110,000 hectares. Demand for a solid-at-room-temperature replacement for partially-hydrogenated oils in shelf-stable processed foods has driven the oil palm expansion worldwide (Koh and Wilcove 2007). World production increased 4.6-fold between 1980 and 2000 (Koh and Wilcove 2007: 993), and Costa Rica's palm oil area increased similarly (Table 2). In other countries, vast swaths of lowland tropical forests were cleared for it, while in Costa Rica it took over already-cleared lands, mostly pasture, banana, and other crops (Furumo and Aide 2017: 5). The speed of concentration in oil palm between 1984 and 2014 is unrivaled; in 1984, farms of 20-50 hectares planted almost all palm oil, while in 2014 farms above 100 hectares planted 67% (Table 3).

Costa Rica is now the world's top pineapple producer, which drove the largest shift in land use in recent decades. Indeed, area in pineapple recently surpassed that in bananas (Table 2). A detailed analysis of northern Costa Rica showed pineapple cropland "expansion after 1996 has primarily replaced pasture and exotic tree plantations" (Fagan et al. 2013: 4). Concentration in pineapple farms proceeded rapidly in the neoliberal period; farms over 100 hectares planted 43% of the area in 1984, while in 2014 they planted 91% of the area (Table 3). Like bananas, pineapples are a heavily sprayed crop, resulting in chronic illness among those living nearby (Lawrence 2010) and in surface water habitat degradation (Echeverría-Sáenz et al. 2012).

Two crops of decreased importance today — maize and beans — were dominant in previous decades as hallmarks of the Costa Rican peasantry's subsistence agriculture. Their production systems are some of the least pesticide intensive (Galt 2008). Maize covered the most area after coffee in 1961-65, whereas by 2011-13 it declined to the twelfth most important crop by area. Structural adjustment in the mid-1980s destroyed government price supports and protections, allowing cheaper imports to outcompete domestic production (Edelman 1999). Presently, smallholders continue to dominate maize production (Table 3), and farm structure became less concentrated, with larger farms planting less area in 2014 compared to 1984 (Table 3). Beans also declined 54% in area planted, from the fourth largest coverage to the seventh (Table 2). Beans presently cover a larger area and have more interest from larger-scale farms (Table 3).

Overall, examining changes in farm structure and area planted for the most important crops shows:

- rapid increases in pineapples and palm oil as export crops;
- the persistence of rice for domestic consumption and of bananas and coffee for export;
- the decline of maize and beans as domestic- and subsistence-oriented crops;
- continuing smallholder dominance in coffee, maize, and beans, and;
- strong concentration within most major export crops, with the largest farms increasingly dominating palm oil, sugar cane, and pineapples, as they long have bananas.

Neoliberalism has undermined subsistence-oriented and environmentally-benign staple-grain agriculture, and has increased the power of the largest farms in major export crops other than coffee. Thus, neoliberal agroexport growth has largely excluded small and medium-scale farmers;

only in export-oriented vegetable production, not analyzed here, have smallholders benefitted from access to new markets (Galt 2014). As for environmental consequences, the increase in area of pesticide-intensive crops — especially bananas and pineapple — means increased exposures of workers, rural residents, wildlife, soil, surface water, and groundwater to many toxins. Thus, a hallmark of neoliberalism — restructuring the economy and society-environment relationships to benefit the wealthy — manifests in Costa Rica, with wealth accruing through environmental destruction as unpaid environmental costs. These findings strongly undermine the narrative of Costa Rican environmental and social exceptionalism in agriculture.

The Rise of CAFOs

Per capita consumption of chicken and pork increased considerably since the 1960s, through the concentration and intensification of domestic animal production using imported feedstocks. Recent decades show the increased importance of farms raising animals "without land" (*sin tierra*), a category in the 1984 and 2014 Censuses of Agriculture that I refer to as Concentrated Animal Feeding Operations (CAFOs).[5]

Table 4 shows the 1984 and 2014 data for the farms focused on animal production, separated between CAFOs and those with land. Overall, the number of farms raising animals declined considerably from 148,443 to 94,656 (36%), despite a large rise in livestock head. CAFOs held 2.7% of all livestock in 1984, but by 2014, this increased 9-fold to 25.1%. CAFOs have expanded greatly for chicken and pig production, whereas the ruminants — cattle steers and dairy cows, goats, and sheep — are largely unaffected. This mirrors trends elsewhere, and derives from the difficulties of confining ruminants, since the majority of their lives must be spent on pasture (Gardner 2009).

Chicken CAFO growth was strongest.[6] Chicken numbers increased more than ten times between 1963 and 2014 (Figure 2), while chicken farm numbers dropped. The average flock size rose 14-fold to 500 head. While chicken CAFOs are 3.9% of chicken farms, they raise 29% of chickens (Table 4), with strong geographical concentration. In 1963, San José province produced the most chickens, but presently Alajuela produces the vast majority. The number of chickens in Alajuela increased by 36-fold between 1963 and 2014 to more than 15 million, and Alajuela has the largest flock size per farm (Figure 2).

Pork production also expanded through CAFOs. Hog numbers increased by 3 times between 1963 and 2014, while pig farm numbers declined 50%. The average herd size increased 6-fold to 30 head. In 2014, the 2% of the pig farms that were CAFOs accounted for 18.7% of pigs raised, up from 7.1% of pigs raised in CAFOs in 1984 (Table 4). Alajuela raises the most pigs (44% of the nation's) and has the largest average herd size (100 head). Cartago and Limón provinces have also experienced large increases in pig production.

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[5] The 1984 census implies the definition of farms without land where it notes that farms also include "establishments that are dedicated to cattle/dairy, poultry, pigs, [and] beehives, even if they do not have land" (DGEC 1986: xv). The 2014 census defines farms without land as either being very small ("its equivalent in hectares is 0.0") or that the entire farm is covered by a structure, so that "the land is not an indispensable input" (INEC 2015e: 109). In the U.S., the latter category is commonly called "CAFOs." Costa Rican CAFO numbers could be higher, as farms with land can also have CAFOs but are not counted here.

[6] This includes broilers, laying hens, and roosters.

CAFOs rely on feed sources imported into the production system. Feedstuffs for Costa Rica's livestock have changed dramatically in the last 50 years (Table 5). The near self-provisioning of animal feed in 1961 flipped to a large dependence upon imported feed. The volume of human-food-consumed-by-animals increased 11-fold from 1961 to 2011, with maize accounting for the majority (Table 5). In 2011, 525,000 tonnes of maize were used as feed, a 52.5-fold increase since 1961, and more than 99% of maize is now imported. Maize also is Costa Rica's top agrifood import, at 18.8% of all imported agricultural products (Figure 3). Maize imports are one lasting impact of structural adjustment, and 1985 was a watershed year in a regime shift to a heavy and consistent dependence on maize imports (Figure 3).

In Costa Rica's animal agriculture, the concentration of production on fewer farms and the rapid rise of CAFOs show that the dynamics of agrarian capitalism shape the production of livestock most conducive to it. Indeed, Costa Rica's CAFO trajectory supports theorizations — building on the Mann-Dickinson thesis (Mann and Dickinson 1978) — that ruminant livestock are "troublesome commodities" (Gardner 2009) not as easily subjected to the logics of capital, while chickens and hogs are much more amenable to making production time and labor time correspond (Boyd and Watts 1997). Cargill and Corporación Multi-Inversiones, a Guatemalan company, have both invested in chicken processing plants in recent years (Anonymous 2007; Arias 2015), raising the question about whether contract farming, with very low returns to farmers, now structures production relations as in the USA (Heffernan 2000). CAFOs' environmental consequences are well-documented (Burkholder et al. 2007; Donham et al. 2007), and will likely drive environmental conflicts unless serious efforts are made to address manure runoff and odors, such as developing biodigesters (Font 2013). However, issues of antibiotic resistance and resulting human disease epidemics are less easily addressed (Gilchrist et al. 2007). These trends thus further destabilize Costa exceptionalism in the agrifood sector.

Food Consumption Trends

This section examines changes in Costa Rican food consumption in two ways. First, I use FAO data on food availability to examine these changes in an open-ended way. Second, I operationalize the concepts of the neoliberal diet and standard American diet (SAD) to examine dietary changes' impacts on environmental and human health.

The Tico diet was transformed in the last half century, from one based primarily on whole plant foods — grains, pulses, fruits, and vegetables — with small amounts of beef, to one based on processed foods and chicken, beef, and pork.[7] Per capita consumption of meat — beef, pork, and poultry — more than doubled from 1961 to 2011, from 23 kg/capita/year to 49 kg/capita/year (Figure 4). Combined with a growing population, Costa Rican meat consumption rose from 34 million kg in 1964 to 225 million kg in 2011.

There were also large shifts in specific animal-based foods consumed (Figures 4 and 5). Beef consumption and overall meat consumption were strongly coupled from colonial times until 1985. The cattle crisis marked a turning point, with a long downward beef consumption trend until 2002 (Figure 4). Since the mid-1980s, poultry consumption (mostly chicken) increased greatly, surpassing

[7] This section uses FAOSTAT data on domestic food supply as a proxy for consumption. These data are determined by domestic production and imports minus exports, use in food processing, animal feed, and waste. This is not precisely the same as consumption, but is generally close to it.

beef. Other increases include milk consumption (doubling from 84 kg per capita in 1961 to 170 kg in 2010), a doubling of egg consumption, a quintupling of fish consumption, and a large rise in raw animal fats consumption (Figure 5).

Plant-based food consumption also shifted. The largest changes have been a steady increase in vegetables and fruit consumption (Figure 6). Pulses, mostly black beans, have remained a staple. Cereal consumption — mainly rice, wheat, and maize — has gradually increased, and the overall composition shifted, with wheat most important in 1961 and rice most important in 2011. Sugar and sweetener consumption increased steadily until the mid-1980s, when it stabilized.

Two concepts help connect these dietary changes to broader societal changes. Otero and colleagues' (2015: 47) "neoliberal diet," typified by "energy-dense, nutritionally-compromised food," is close to the concept of the "standard American diet" (SAD), used by doctors and nutrition scientists (Campbell and Jacobsen 2013; Greger 2015). Otero et al. (2015: 50) operationalize the neoliberal diet using FAO data on country-level food availabilities for four categories: animal products, cereals, sugars, and vegetable oils. Yet, from a nutrition standpoint, one needs to differentiate between whole grains (to be prioritized) and refined grains (to be moderated or eliminated) (Wang et al. 2014).[8] FAO's cereal category does not differentiate, making it unhelpful from a nutrition standpoint, and as a metric of neoliberal processes, since the data cannot show a replacement of whole cereals — a common peasant food — by refined flour products.

Dietary quality and the SAD have been operationalized with more nuance than the neoliberal diet, especially in the USA where detailed food consumption data is available (Wang et al. 2014; Greger 2015: 5-6). Yet, such detailed data are not available for Costa Rica. Thus, I modify the neoliberal diet concept to exclude FAO data on cereals, retaining animal products, sugars, and vegetable oils. Table 6 shows these three SAD components in 1961 and 2011, as total kcal/capita/day and as a percentage of total calories available, and compares Costa Rica to the world and the USA. Costa Rica shifted strongly toward the SAD, with almost a doubling of these components, and is now closer to the USA than to the rest of the world.

How neoliberal policies and processes have driven dietary changes is an important question (cf. Bell and Green 2016; Schrecker 2016). Figure 7 shows annual data for the three SAD components, and reveals nuances vis-à-vis neoliberalism. Sugar, showing a different trend than the other two components, starts a slow decline in the mid-1980s. Neoliberal policies might have decreased sugar consumption, but how is unclear, as state support for domestic sugar cane production remained high into the late 1990s (Fernández Arias 1999: 134). This warrants further investigation, as it is counter to trends in other countries (Otero et al. 2015).

In contrast, animal products and vegetable oil show steady increases, with their slopes increasing slightly since the mid-1980s (Figure 7). Thus, neoliberalism, through the destruction of domestic grain protections, allowed for rapid growth in animal product consumption, and the strong shift toward chicken, called the "neoliberal meat" (Otero et al. 2015).

[8] Indeed, increasing evidence from nutritional science suggests that a diet based on a range of whole plant foods is health maximizing, while diets based on everything else — animal products and processed plant foods high in refined carbohydrates and oils — are less nutritious and disease inducing (Campbell and Jacobsen 2013; Greger 2015).

For vegetable oils, an indicator of processed food consumption, the slope also increases in the mid-1980s, suggesting a link with neoliberal policies. Ticos have embraced fast food in the last few decades[9] (Monge-Rojas et al. 2002; Monge-Rojas et al. 2005), a likely source of vegetable oils, but more analysis of the fast and processed food industries in Costa Rica is needed to show causal links to neoliberal processes.

These dietary changes have important consequences. Environmentally, increased consumption of animal-based food means greater per capita greenhouse gas emissions since animal products' emissions, especially those based on non-grazing feedstuffs, are considerably higher than plant-based foods (González, Frostell, and Carlsson-Kanyama 2011; Scarborough et al. 2014). This complicates Costa Rica's "carbon neutrality" pledge (Flagg, this volume), which does not include the agrifood system, one of the largest contributors to global warming (Tukker and Jansen 2006). Making the Costa Rican agrifood system carbon neutral will require considerable change away from an animal-based diet.

For human health, the increase in consumption of animal-based, processed, and fast food, including among youth (Monge-Rojas et al. 2002), corresponds with increased heart disease and cancer rates (Campbell and Campbell 2006; Greger 2015). Heart disease is now the top killer of Ticos, at 16.4% of all deaths, although cancer becomes the top if one combines all sites (IHME 2017). Other health indicators — type 2 diabetes, high blood pressure, and obesity and overweight — show similar increasing trends (Dowd-Uribe and Raser, this volume). This has occurred despite widespread knowledge of the harm of adopting the SAD (Bermudez and Tucker 2003).

Conclusion

To conclude, we return to the question of *for whom does agrarian capitalism work*, particularly under neoliberalism? Neoliberal policies imposed in the mid-1980s spurred a large shift to high-value, pesticide-intensive crops, allowing for the growers of pineapples, oil palm, and bananas — sectors dominated by large-scale producers — to "win" through accumulating capital. The removal of supports for domestic basic grain producers both greatly disadvantaged these eco-friendly smallholders, and opened the door cheap grain imports, spurring the rise of CAFOs. While international and national corporations and larger farmers benefit from plantation crops and CAFOs by accumulating capital, the environmental and social damages caused by agro-exports are not calculated into the commodity prices, which means that Costa Rican environments and society subsidize this capital accumulation nationally and internationally (Guha and Alier 2013).[10] This wealth transfer from ecological destruction needs to be addressed to create a more ecologically-beneficial and socially-just agrifood system in Costa Rica.

An important equity question examined above is the fate of the smallholder. Although smallholders

[9] Frozen potatoes, used mostly for French fries, also provide an indication of the trend. Frozen potato imports started in 1993 at 329 tonnes, and rose steadily to 17,590 tonnes in 2011, a 53-fold increase. As of 2011, imported frozen potatoes accounted for 25% of all potato consumption, up from none in 1992 (FAO 2016).

[10] These unequal transfers also occur for agricultural commodities grown and sold domestically (Galt 2014), which represents an ecological and social subsidy — through pollution, erosion, and higher cancer rates of rural areas — paid by rural areas for mostly urban consumers.

overall did not decline relative to other farmers since the 1980s, the fate of smallholders within dominant crops shows considerable divergence. Smallholder coffee farmers are the exception: they and their crop remain central (Babin, this volume). In all other major crops — rice, sugar cane, pineapple, and oil palm — smallholder production declined considerably while the largest farms became dominant, making them similar to plantation-dominated bananas. With maize and beans, smallholders continue to be important producers, yet reduction in these crops' areas shows another route through which smallholders have been disadvantaged through neoliberalism. Remaining smallholders are not necessarily financially viable or thriving; empirical work on small farm well-being is needed.

Ticos' adoption of the SAD — with high consumption of animal products, sugar, and vegetable oil — means higher mortality and morbidity from preventable diseases. Despite this national trend, one of the Blue Zones — areas in the world where life expectancy is very high — is Costa Rica's Osa Peninsula, where diets remain centered around whole plant foods (Buettner 2008). Further research into the persistence of this diet in some regions could inform policies and social movements to re-valorize whole-food, plant-based diets nationally.

Creating a national agricultural and food policy that is consistent with Costa Rica's environmental and public health values and its historical emphasis on the well-being of smallholders — including their ability to remain viable within agrarian capitalism — is a tall order, but could reinvigorate rural agricultural areas and improve health. Neoliberal economic policies are unfavorable in these regards, and must be actively contested for the well-being of Costa Rica's population and ecosystems.

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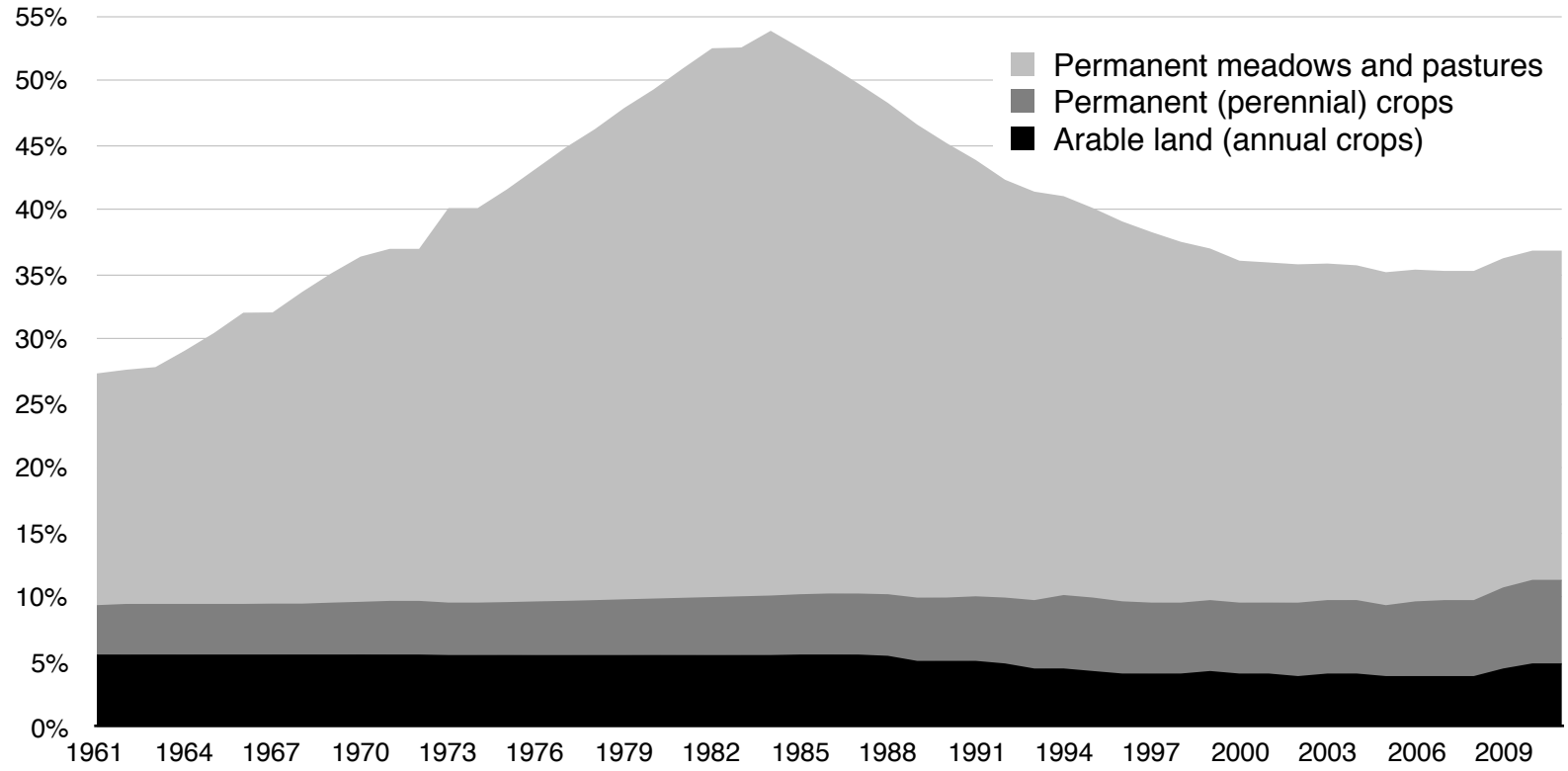
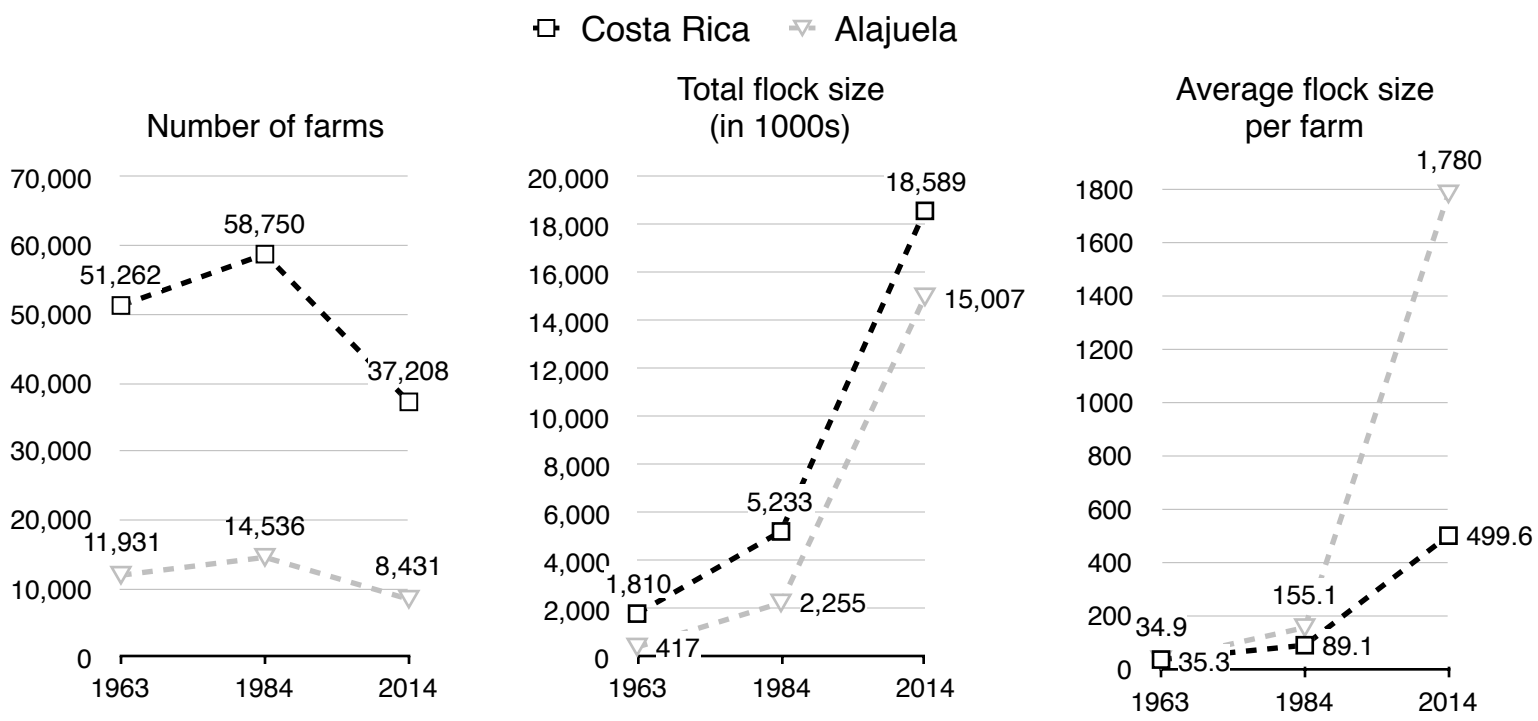
Figure 1: Stacked chart of agricultural land area as a percentage of total land area



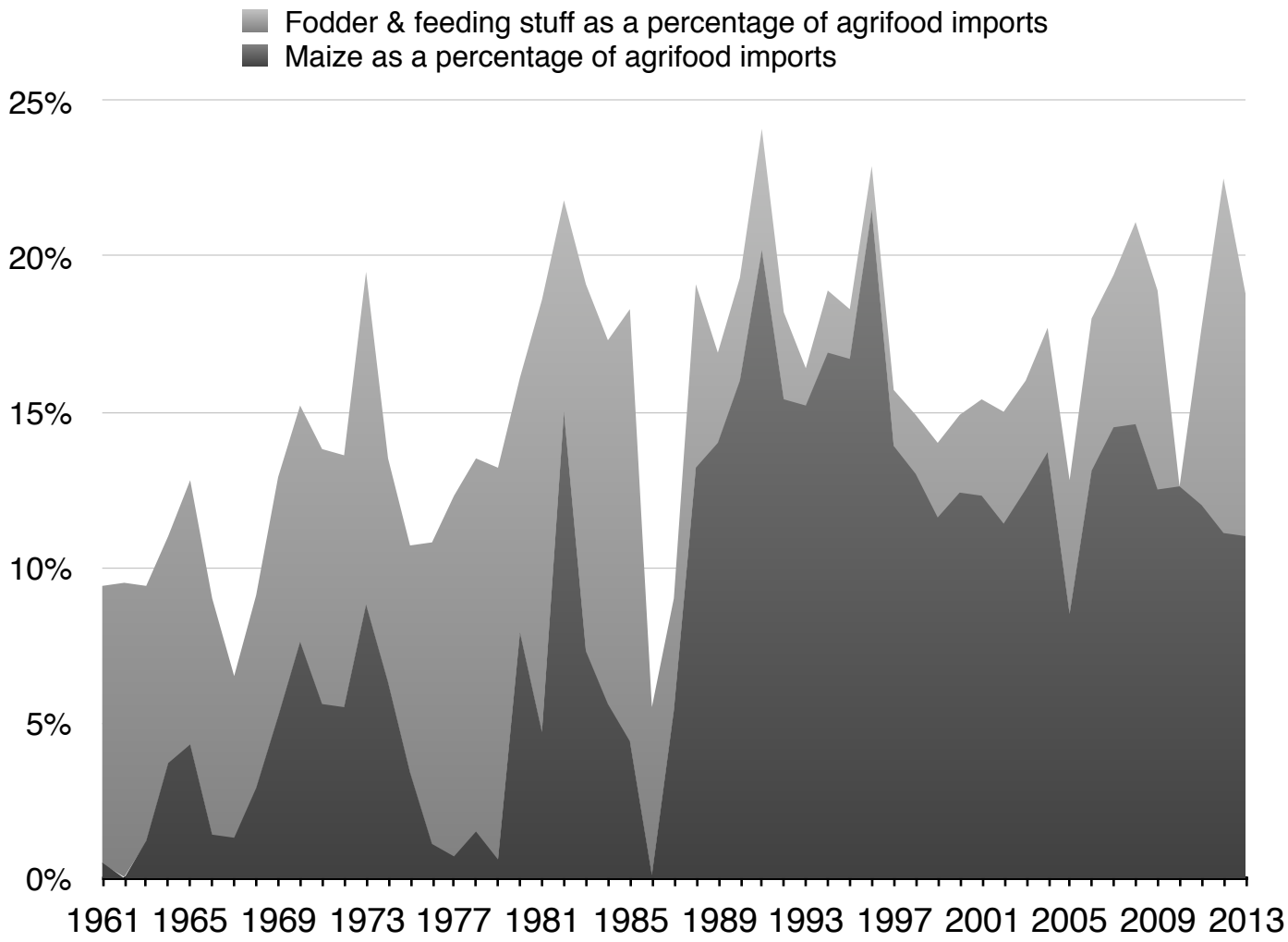
Source: FAOSTAT 2016.

Figure 2: Chicken* production, 1963-2014



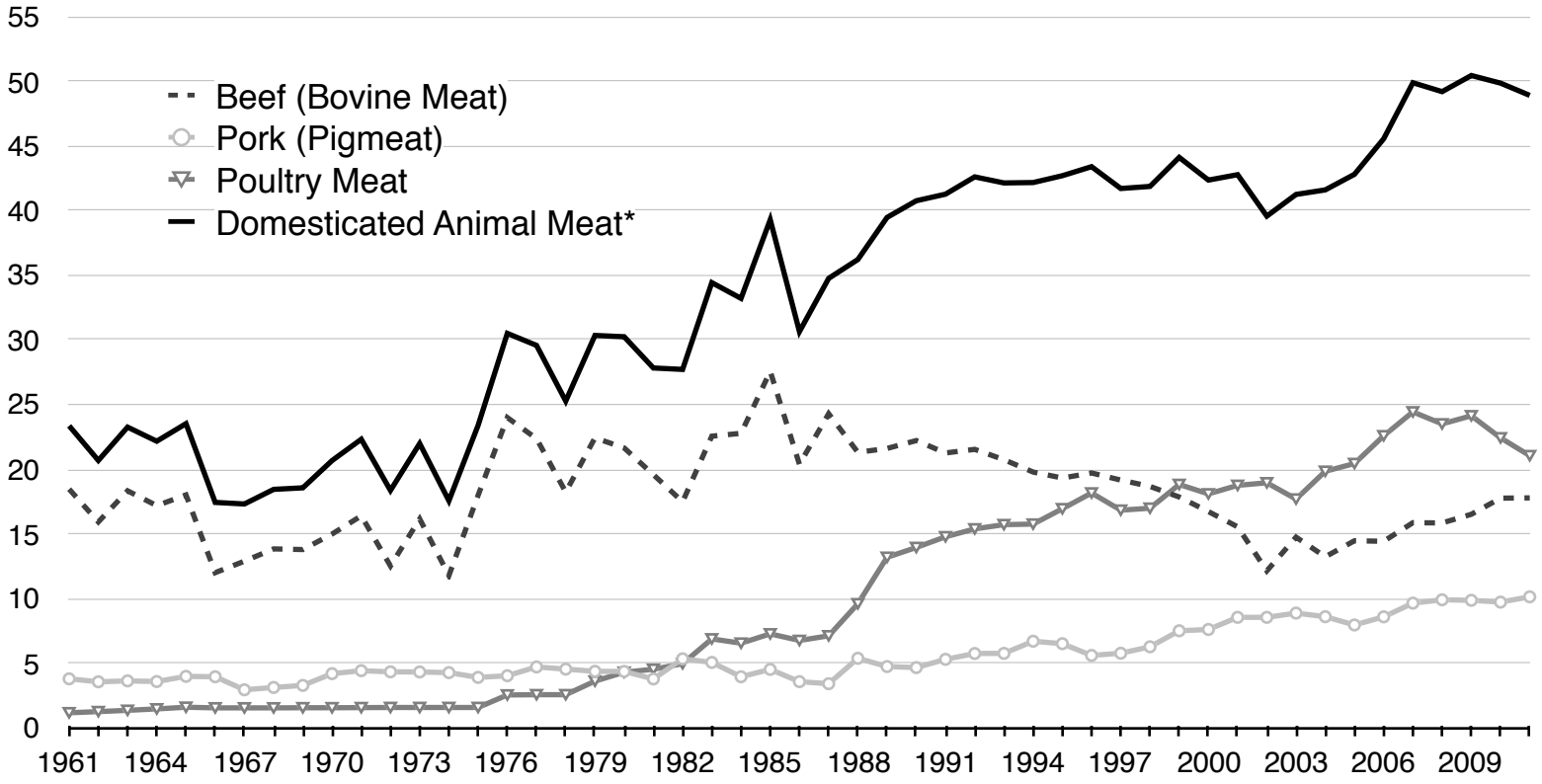
* includes broilers, hens, and roosters; 1984 data includes ducks and geese, which are less than 1% of flock size.
Sources: DGEC 1965: 233; DGEC 1986: 171-2; INEC 2015d: 139-141.

Figure 3: Stacked Chart of Imported Maize and Fodder as a Percentage of Total Imported Agricultural Products, 1961-2013



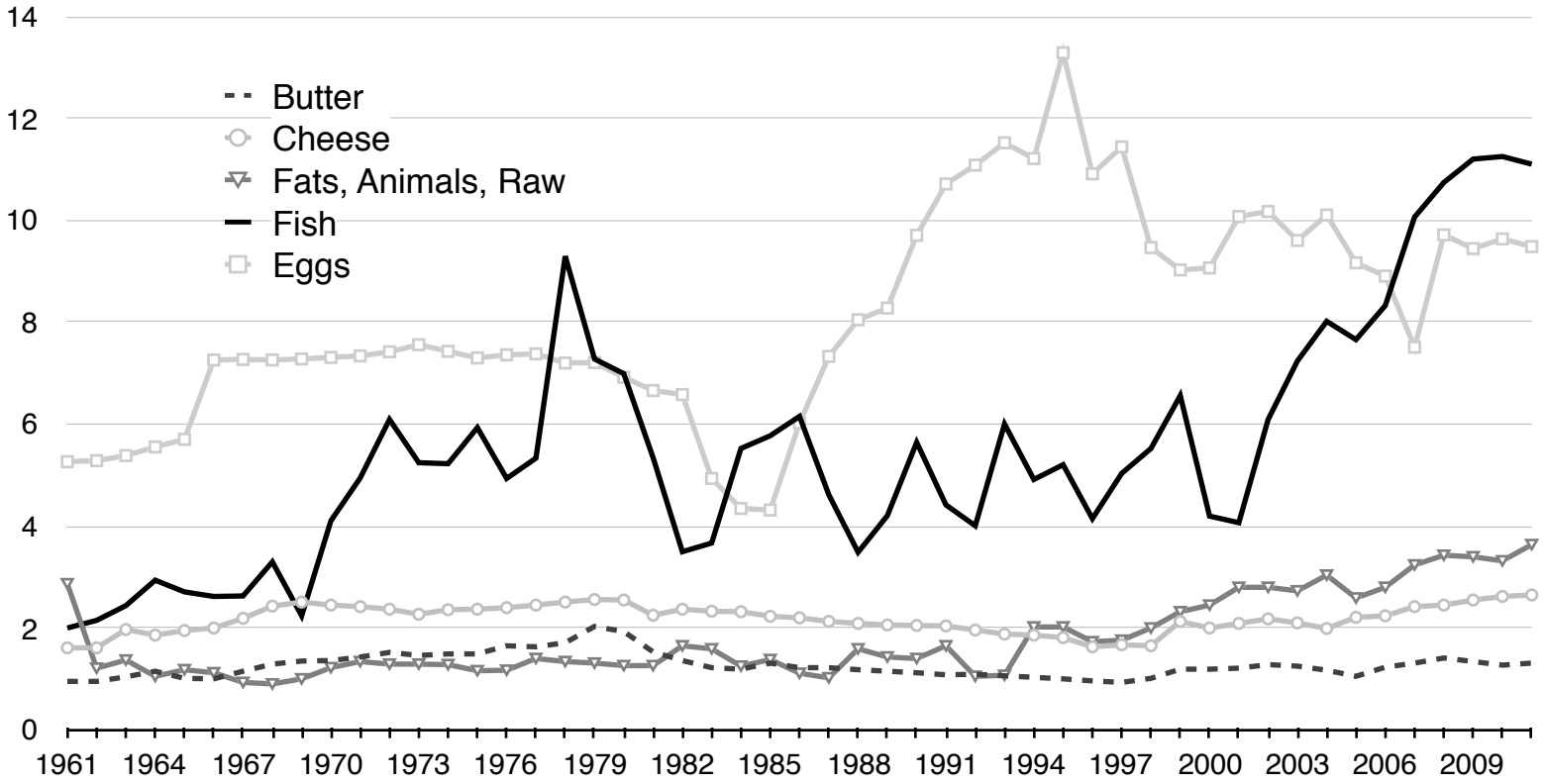
Source: FAOSTAT 2016: Trade / Crops and Livestock Products / Import Value

Figure 4: Food supply of main meats consumed, Costa Rica, 1961-2011 (in kg/capita/year)



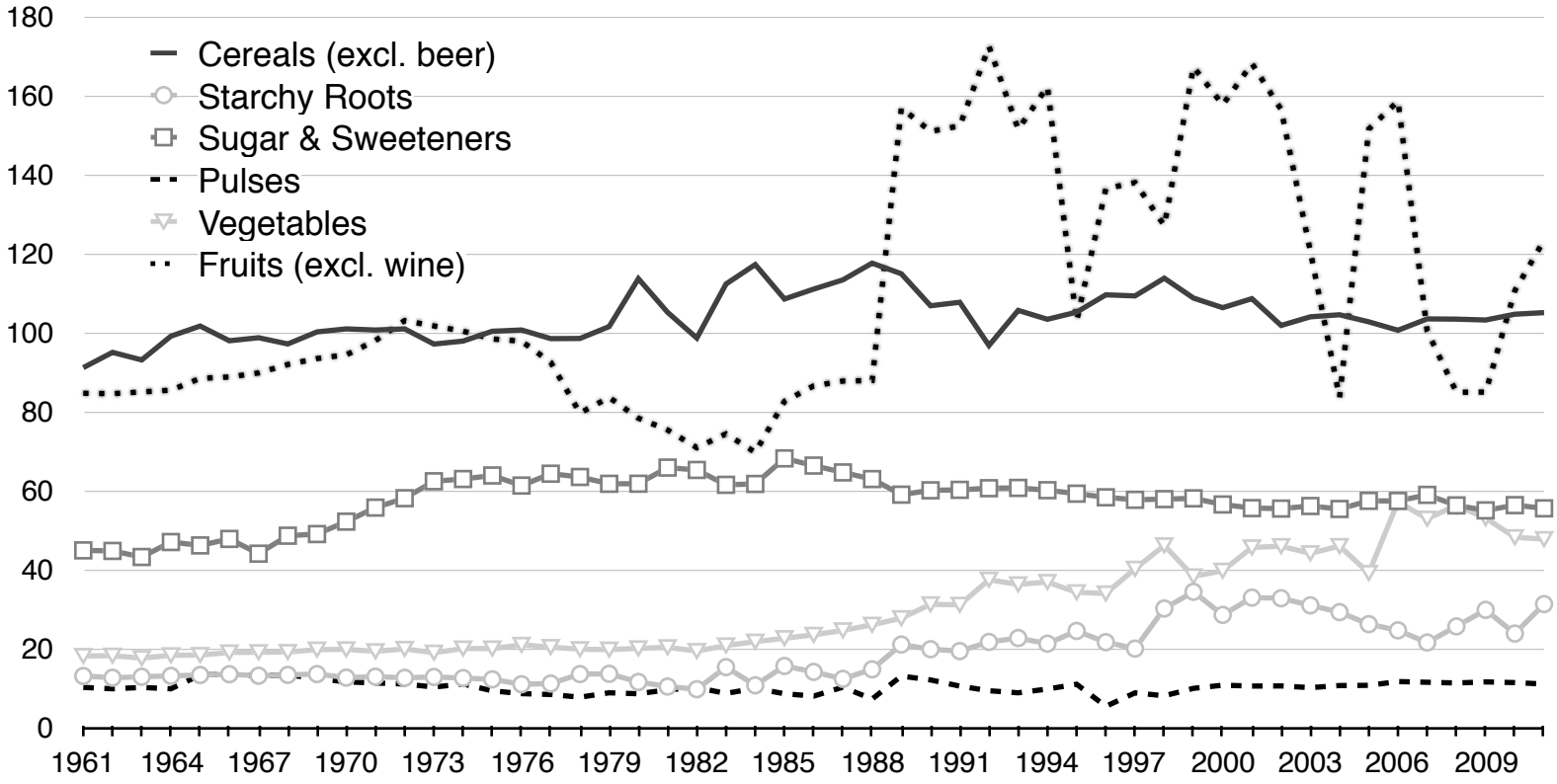
*Goat meat and "meat, other" are not depicted since their consumption is near zero.
Source: FAOSTAT 2016 (Food Balance, Food Supply-Livestock and Fish Primary Equivalent, Food supply quantity [kg/capita/yr])

Figure 5: Food supply of other animal products consumed, Costa Rica, 1961-2011 (in kg/capita/year)



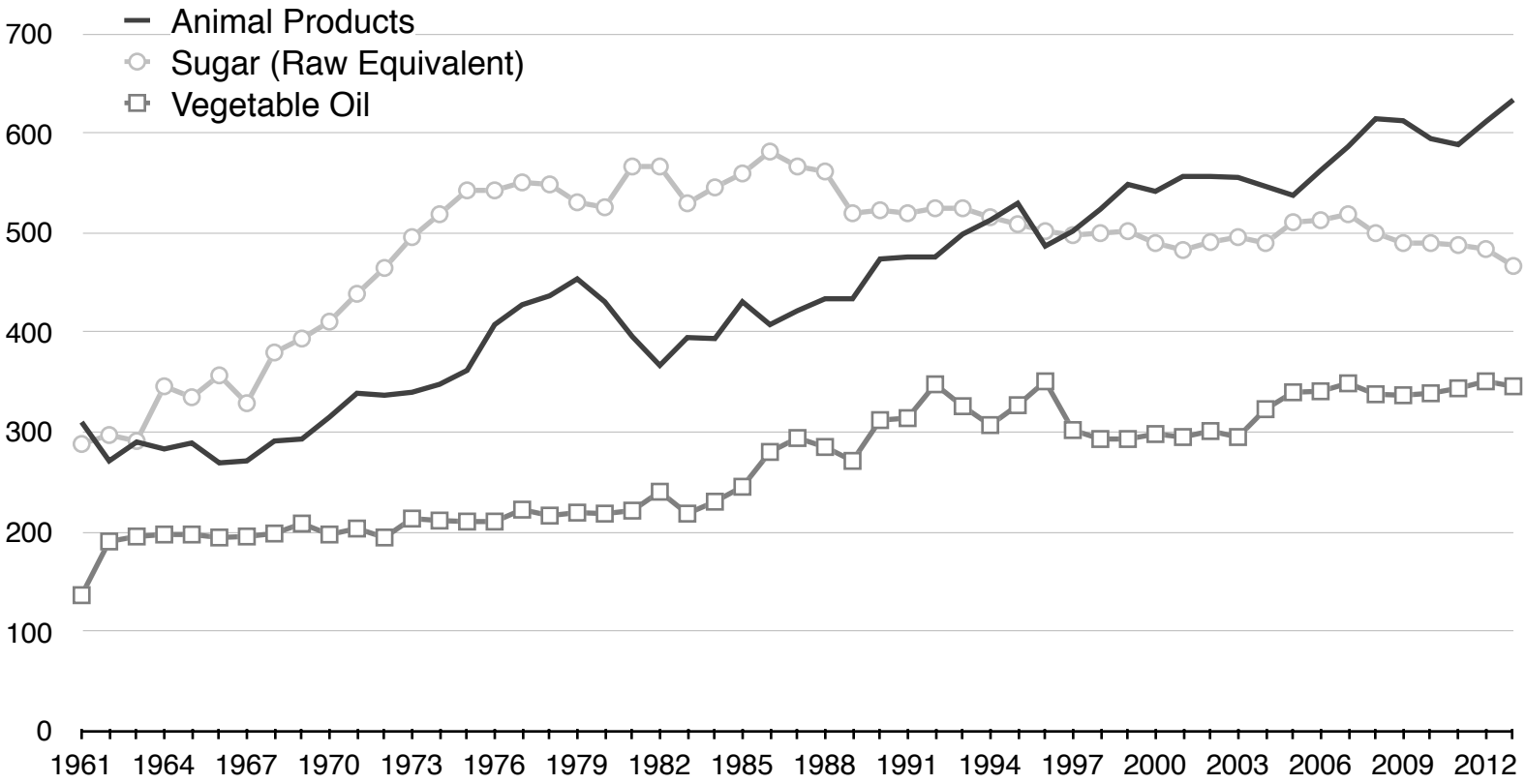
Source: FAOSTAT 2016 (Food Balance, Food Supply-Livestock and Fish Primary Equivalent, Food supply quantity [kg/capita/yr])

Figure 6: Food supply of main plant foods consumed, Costa Rica, 1961-2011 (in kg/capita/year)



Source: FAOSTAT 2016.

Figure 7: Food supply of standard American diet components, Costa Rica, 1961-2013 (in kcal/capita/year)



Source: FAOSTAT 2018, “Food Supply - Crops Primary Equivalent” and “Food Supply - Livestock and Fish Primary Equivalent.”

Table 1: Costa Rican farm structure, 1963, 1984, & 2014

	1963				1984				2014			
	Number of farms	% of all farms	Total area (hectares)	% of area	Number of farms	% of all farms	Total area (hectares)	% of area	Number of farms	% of all farms	Total area (hectares)	% of area
All farms*	*64,621*	*100.0%*	*2,668,076.9*	*100.0%*	101,938	100.0%	3,070,340.1	100.0%	93,017	100.0%	2,406,418.4	100.0%
Farms without land (CAFOs)*	—	—	—	—	5,396	5.3%	0.0	0.0%	3,115	3.3%	2,163.7	0.1%
Farms with land*	*64,621*	*100.0%*	*2,668,076.9*	*100.0%*	96,542	94.7%	3,070,340.1	100.0%	89,902	96.7%	2,404,254.7	99.9%
Less than 1 hectare^	*3,661*	*5.7%*	*2,759.0*	*0.1%*	16,724	16.4%	7,344.2	0.2%	13,683	14.7%	6,488.6	0.3%
1 to 2 hectares	7,513	11.6%	10,776.6	0.4%	10,811	10.6%	14,131.8	0.5%	11,356	12.2%	14,503.4	0.6%
2 to 3 hectares	3,757	5.8%	8,399.9	0.3%	8,573	8.4%	20,088.7	0.7%	8,673	9.3%	19,701.3	0.8%
3 to 4 hectares	6,158	9.5%	20,157.8	0.8%	4,637	4.5%	15,573.2	0.5%	6,089	6.5%	19,781.6	0.8%
4 to 5 hectares	2,144	3.3%	9,232.8	0.3%	4,552	4.5%	19,916.4	0.6%	5,556	6.0%	23,611.0	1.0%
5 to 10 hectares	10,805	16.7%	76,881.8	2.9%	12,530	12.3%	88,263.0	2.9%	14,453	15.5%	98,630.5	4.1%
10 to 20 hectares	9,161	14.2%	135,026.4	5.1%	12,790	12.5%	172,960.4	5.6%	10,755	11.6%	145,027.1	6.0%
20 to 50 hectares	11,443	17.7%	353,974.2	13.3%	13,407	13.2%	412,026.5	13.4%	10,034	10.8%	306,568.3	12.7%
50 to 100 hectares	5,754	8.9%	387,035.3	14.5%	6,469	6.3%	443,493.5	14.4%	4,774	5.1%	324,889.2	13.5%
100 to 200 hectares	2,237	3.5%	308,161.5	11.5%	3,216	3.2%	431,518.1	14.1%	2,383	2.6%	316,387.8	13.1%
200 hectares and above	1,988	3.1%	1,355,671.6	50.8%	2,833	2.8%	1,445,024.3	47.1%	2,146	2.3%	1,128,665.9	46.9%

Sources: DGEC 1965: xliii, 17; DGEC 1986: 1; INEC 2015c: 33.

* Farms under 1 manzana are not included in the 1963 census reporting.

^ The category in 1963 is farms between 0.7 and 0.9 hectares, but not below 0.7 hectares, and therefore is not directly comparable.

	Change, 1963-1984		Change 1984-2014	
	% change in farm number, 1963-1984	% change in area, 1963-1984	% change in farm number, 1984-2014	% change in area, 1984-2014
All farms*	NA	NA	-8.8%	-21.6%
Farms without land (CAFOs)*	NA	NA	-42.3%	NA
Farms with land*	NA	NA	-6.9%	-21.7%
Less than 1 hectare^	NA	NA	-18.2%	-11.7%
1 to 2 hectares	43.9%	31.1%	5.0%	2.6%
2 to 3 hectares	128.2%	139.2%	1.2%	-1.9%
3 to 4 hectares	-24.7%	-22.7%	31.3%	27.0%
4 to 5 hectares	112.3%	115.7%	22.1%	18.6%
5 to 10 hectares	16.0%	14.8%	15.3%	11.7%
10 to 20 hectares	39.6%	28.1%	-15.9%	-16.2%
20 to 50 hectares	17.2%	16.4%	-25.2%	-25.6%
50 to 100 hectares	12.4%	14.6%	-26.2%	-26.7%
100 to 200 hectares	43.8%	40.0%	-25.9%	-26.7%
200 hectares and above	42.5%	6.6%	-24.2%	-21.9%

Table 2: Top 12 crops by area planted, 1961-2013

	1961-65		1966-70		1971-75		1976-80		1981-85		1986-90		1991-95		1996-2000		2001-05		2006-2010		2011-13		% change, 1961-65 to 2011-13
	Area	R*	Area	R	Area	R	Area	R	Area	R	Area	R	Area	R	Area	R	Area	R	Area	R	Area	R	
Coffee	80,360	1	91,800	1	88,314	1	81,450	1	87,400	1	103,400	1	106,593	1	106,800	1	107,453	1	98,681	1	95,410	1	18.7%
Rice (paddy)	52,100	3	54,100	3	59,916	2	73,389	2	75,316	2	52,702	4	45,789	3	60,703	2	55,254	2	55,985	2	68,013	2	30.5%
Oil palm	2,630	14	3,802	14	6,740	10	9,640	10	13,374	8	18,519	7	25,987	6	31,515	6	44,439	4	52,282	4	66,004	3	2409.7%
Sugar cane	23,980	7	33,120	5	37,632	5	43,163	4	47,190	4	43,032	5	39,266	5	45,260	4	48,442	3	54,562	3	59,465	4	148.0%
Pineapples	200	25	280	25	384	24	476	24	941	26	6,218	12	6,613	14	9,813	10	17,960	9	33,944	6	44,333	5	22066.7%
Bananas	26,500	6	31,940	6	38,275	4	31,078	5	24,787	6	24,037	6	45,157	4	49,006	3	42,372	5	43,309	5	42,094	6	58.8%
Beans (dry)	46,683	4	35,160	4	31,310	6	25,553	6	37,041	5	57,330	3	60,992	2	36,166	5	19,789	8	14,986	9	21,448	7	-54.1%
Oranges	5,320	9	6,800	8	7,860	9	8,900	12	8,060	11	7,683	10	18,363	8	24,500	7	25,600	6	24,600	7	21,333	8	301.0%
Vegetables	3,864	13	4,950	12	6,051	11	7,148	13	8,443	10	9,252	9	12,371	10	17,076	8	21,904	7	20,062	8	15,348	9	297.2%
Cassava	1,560	18	1,830	19	2,120	17	3,523	15	5,116	12	4,520	13	5,284	16	5,729	14	9,704	11	12,342	10	11,627	10	645.3%
Plantains	5,360	8	5,720	10	5,443	12	4,932	14	4,600	14	4,040	14	6,860	13	8,179	11	9,869	10	8,700	12	9,167	11	71.0%
Maize	55,126	2	60,520	2	52,042	3	45,333	3	59,596	3	59,919	2	21,411	7	15,041	9	7,154	14	8,746	11	7,309	12	-86.7%

Source: FAOSTAT 2017: Production, Crops, Area Harvested, 1961-2013

*R = rank by area planted

Table 3: Farm structure change for major crops, 1984 and 2014

Coffee	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	34,464	89,881.4	100.0%	26,527	84,133.1	100.0%	—
Less than 1 hectare	8,783	3,384.3	3.8%	6,710	2,735.9	3.3%	-0.5%
1 to 2 hectares	5,512	5,441.7	6.1%	5,020	5,326.6	6.3%	0.3%
2 to 3 hectares	4,181	6,321.8	7.0%	3,534	6,129.8	7.3%	0.3%
3 to 4 hectares	2,144	4,148.2	4.6%	1,984	4,500.5	5.3%	0.7%
4 to 5 hectares	2,070	4,688.3	5.2%	1,708	4,731.6	5.6%	0.4%
5 to 10 hectares	4,684	12,801.9	14.2%	3,363	12,612.5	15.0%	0.7%
10 to 20 hectares	3,180	11,639.7	13.0%	2,016	11,301.2	13.4%	0.5%
20 to 50 hectares	2,511	13,304.2	14.8%	1,395	12,666.1	15.1%	0.3%
50 to 100 hectares	1,399	28,151.3	31.3%	797	24,129.0	28.7%	-2.6%
100 hectares and above							

Oil Palm	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	no data	16,830.2	100.0%	2,169	66,419.7	100.0%	—
Less than 1 hectare	—	1.9	0.0%	11	3.0	0.0%	0.0%
1 to 2 hectares	—	2.4	0.0%	45	48.8	0.1%	0.1%
2 to 3 hectares	—	2.2	0.0%	55	109.8	0.2%	0.2%
3 to 4 hectares	—	0.0	0.0%	91	262.6	0.4%	0.4%
4 to 5 hectares	—	4.9	0.0%	105	377.9	0.6%	0.5%
5 to 10 hectares	—	15.0	0.1%	589	3,558.8	5.4%	5.3%
10 to 20 hectares	—	51.0	0.3%	507	5,461.6	8.2%	7.9%
20 to 50 hectares	—	16,752.8	99.5%	430	7,785.9	11.7%	-87.8%
50 to 100 hectares	—	0.0	0.0%	149	4,491.5	6.8%	6.8%
100 hectares and above	—	0.0	0.0%	187	44,319.9	66.7%	66.7%

Rice	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	15,205	86,439.4	96.2%	4,467	58,539.7	69.6%	—
Less than 1 hectare	6,613	3,268.1	3.6%	103	34.0	0.0%	-3.7%
1 to 2 hectares	4,528	5,308.8	5.9%	260	178.3	0.2%	-5.8%
2 to 3 hectares	1,878	4,037.2	4.5%	298	220.7	0.3%	-4.3%
3 to 4 hectares	575	1,818.7	2.0%	249	213.2	0.3%	-1.7%
4 to 5 hectares	331	1,378.9	1.5%	290	250.4	0.3%	-1.2%
5 to 10 hectares	515	3,282.0	3.7%	896	2,024.9	2.4%	-0.3%
10 to 20 hectares	287	3,667.8	4.1%	741	2,259.1	2.7%	-0.4%
20 to 50 hectares	204	5,805.8	6.5%	871	4,094.2	4.9%	0.3%
50 to 100 hectares	123	8,738.3	9.7%	396	4,549.7	5.4%	-2.3%
100 hectares and above	151	49,133.8	54.7%	363	44,715.1	53.1%	19.5%

Pineapples	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	3,197	2,474.2	100.0%	1,228	37,659.9	100.0%	—
Less than 1 hectare	173	14.6	0.6%	143	13.8	0.0%	-0.6%
1 to 2 hectares	230	70.5	2.8%	111	36.5	0.1%	-2.8%
2 to 3 hectares	190	76.0	3.1%	102	61.7	0.2%	-2.9%
3 to 4 hectares	132	71.3	2.9%	91	71.6	0.2%	-2.7%
4 to 5 hectares	178	73.7	3.0%	119	179.7	0.5%	-2.5%
5 to 10 hectares	560	308.9	12.5%	216	384.8	1.0%	-11.5%
10 to 20 hectares	749	448.9	18.1%	170	755.1	2.0%	-16.1%
20 to 50 hectares	571	221.8	9.0%	110	822.3	2.2%	-6.8%
50 to 100 hectares	229	116.4	4.7%	58	1,022.8	2.7%	-2.0%
100 hectares and above	185	1,072.1	43.3%	108	34,311.6	91.1%	47.8%

Bananas	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	4,229	32,316.1	100.0%	15,924	51,758.1	100.0%	—
Less than 1 hectare	230	54.3	0.2%	3,128	86.7	0.2%	0.0%
1 to 2 hectares	206	196.5	0.6%	2,258	325.7	0.6%	0.0%
2 to 3 hectares	161	89.4	0.3%	1,810	475.3	0.9%	0.6%
3 to 4 hectares	136	85.5	0.3%	1,233	519.8	1.0%	0.7%
4 to 5 hectares	164	129.1	0.4%	1,012	437.5	0.8%	0.4%
5 to 10 hectares	451	379.7	1.2%	2,426	1,362.2	2.6%	1.5%
10 to 20 hectares	790	1,158.1	3.6%	1,647	1,359.1	2.6%	-1.0%
20 to 50 hectares	1,065	1,467.0	4.5%	1,332	1,650.9	3.2%	-1.3%
50 to 100 hectares	528	1,162.7	3.6%	567	936.6	1.8%	-1.8%
100 hectares and above	498	27,593.8	85.4%	511	44,604.4	86.2%	0.8%

Maize	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	35,411	58,721.9	100.0%	17,756	15,768.8	100.0%	—
Less than 1 hectare	3,682	1,419.8	2.4%	2,731	394.7	2.5%	0.1%
1 to 2 hectares	3,186	2,110.9	3.6%	1,910	840.5	5.3%	1.7%
2 to 3 hectares	2,748	2,483.7	4.2%	1,627	978.9	6.2%	2.0%
3 to 4 hectares	1,564	1,676.8	2.9%	1,325	961.6	6.1%	3.2%
4 to 5 hectares	1,643	1,881.3	3.2%	1,138	845.9	5.4%	2.2%
5 to 10 hectares	5,193	7907.3	13.5%	3,012	2,836.2	18.0%	4.5%
10 to 20 hectares	6,072	11,333.2	19.3%	2,305	2,748.1	17.4%	-1.9%
20 to 50 hectares	6,638	14,778.5	25.2%	2,176	2,897.2	18.4%	-6.8%
50 to 100 hectares	2,877	7,680.1	13.1%	937	1,645.7	10.4%	-2.6%
100 hectares and above	1,808	7,450.3	12.7%	595	1,619.9	10.3%	-2.4%

Sugar Cane	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	7,376	47,286.4	100.0%	4,880	65,061.9	100.0%	—
Less than 1 hectare	524	183.9	0.4%	470	87.5	0.1%	-0.3%
1 to 2 hectares	644	444.4	0.9%	447	254.1	0.4%	-0.5%
2 to 3 hectares	656	699.3	1.5%	451	406.1	0.6%	-0.9%
3 to 4 hectares	418	600.2	1.3%	343	427.8	0.7%	-0.6%
4 to 5 hectares	489	752.6	1.6%	294	383.1	0.6%	-1.0%
5 to 10 hectares	1,290	2575.3	5.4%	920	2,254.9	3.5%	-2.0%
10 to 20 hectares	1,176	3,252.2	6.9%	689	2,538.3	3.9%	-3.0%
20 to 50 hectares	1,192	4,352.9	9.2%	639	3,089.1	4.7%	-4.5%
50 to 100 hectares	542	3,229.0	6.8%	303	2,645.2	4.1%	-2.8%
100 hectares and above	445	31,196.6	66.0%	324	52,975.9	81.4%	15.5%

Beans	1984 Number of farms	1984 Area planted	1984 % of area planted	2014 Number of farms	2014 Area planted	2014 % of area planted	Change in % of area planted
All	25,923	40,671.0	100.0%	14,707	19,470.5	100.0%	—
Less than 1 hectare	2,474	1,007.0	2.5%	1,841	283.3	1.5%	-1.0%
1 to 2 hectares	2,234	1,515.2	3.7%	1,565	714.6	3.7%	-0.1%
2 to 3 hectares	2,121	1,948.9	4.8%	1,357	903.2	4.6%	-0.2%
3 to 4 hectares	1,109	1,183.6	2.9%	1,069	870.7	4.5%	1.6%
4 to 5 hectares	1,187	1,333.9	3.3%	888	856.6	4.4%	1.1%
5 to 10 hectares	3,451	4223.8	10.4%	2,581	2,983.1	15.3%	4.9%
10 to 20 hectares	4,218	6,433.3	15.8%	2,058	3,198.6	16.4%	0.6%
20 to 50 hectares	5,218	10,585.6	26.0%	1,990	3,679.7	18.9%	-7.1%
50 to 100 hectares	2,422	6,325.9	15.6%	837	1,846.1	9.5%	-6.1%
100 hectares and above	1,489	6,114.5	15.0%	521	4,134.6	21.2%	6.2%

Table 4: The rise of CAFOs in Costa Rica, 1984 and 2014

		Number of farms					Number of animals					Average number of animals per farm		
		Farms without land (CAFOs)*		Farms with land		All farms	Farms without land (CAFOs)*		Farms with land		All farms	Farms without land (CAFOs)	Farms with land	All farms
		n	%	n	%	n	n	%	n	%	n			
1984	Beef cattle and dairy cows	1,532	3.0%	50,213	97.0%	51,745	8,732	0.4%	2,046,376	99.6%	2,055,108	6	41	40
	Pigs	3,681	9.7%	34,267	90.3%	37,948	19,974	7.1%	262,554	92.9%	282,528	5	8	7
	Chickens^	3,133	5.3%	55,617	94.7%	58,750	178,774	3.4%	5,054,119	96.6%	5,232,893	57	91	89
	Goats	—	—	—	—	—	—	—	—	—	—	—	—	—
	Sheep	—	—	—	—	—	—	—	—	—	—	—	—	—
	Total	8,346	5.6%	140,097	94.4%	148,443	207,480	2.7%	7,363,049	97.3%	7,570,529	25	53	51
2014	Beef cattle and dairy cows	1,893	5.1%	37,060	95.1%	38,953	8,258	0.6%	1,278,276	99.4%	1,286,534	4	34	33
	Pigs	286	2.0%	14,069	98.0%	14,355	81,286	18.7%	353,957	81.3%	435,243	284	25	30
	Chickens^	1,446	4.0%	35,762	96.1%	37,208	5,011,034	27.0%	13,578,421	73.0%	18,589,455	3,465	380	500
	Goats	74	3.3%	2,274	96.8%	2,348	486	3.8%	12,366	96.2%	12,852	7	5	5
	Sheep	17	1.0%	1,775	99.1%	1,792	176	4.6%	3,624	95.4%	3,800	10	2	2
	Total	3,716	3.9%	90,940	96.1%	94,656	5,101,240	25.1%	15,226,644	74.9%	20,327,884	1,373	167	215

* for 2014, data include farms without pasture for beef cattle and dairy cows.

^ for both years, data include broilers, hens (for eggs), and roosters; for 1984, data include ducks and geese (which are less than 1% of the total).

Sources: DGEC 1986: 119, 159, 171; INEC 2015d: 37, 40, 112, 118, 124, 139.

Table 5: Major animal feed sources,* 1961-2011 (in 1,000 metric tonnes)

	1961	1971	1981	1991	2001	2011
Human-foods-consumed-by-animals (domestic & imported)						
Maize and products	10	31	70	170	475	525
Sorghum	6	15	29	1	0	0
Other cereals	0	0	62	0	1	1
Potatoes and products	1	1	1	2	4	3
Sugar cane	9	5	3	5	7	6
Bananas	41	76	68	50	50	214
Plantains	2	3	4	2	4	5
Fish, Seafood	0	13	1	0	9	0
Subtotal	69	144	238	230	550	754
Imported fodder						
Fodder and feed stuffs	10	37	52	26	30	191
Total	79	181	290	256	580	945

*Excludes feed sources that do not exceed 2 metric tonnes for any year.

Source: FAOSTAT 2016: Food Balance Sheets, & Trade / Crops and Livestock Products / Import Quantity.

Table 6: Components of the standard American diet, 1961-2011

As kcal/capita/day

	— Animal Products —			——— Sugars ———			—— Vegetable Oils ——			Aggregated SAD components		
	1961	2011	% change	1961	2011	% change	1961	2011	% change	1961	2011	% change
World	338	507	50%	192	229	19%	113	280	148%	643	1016	58%
Costa Rica	310	589	90%	288	488	69%	136	344	153%	734	1421	94%
USA	1010	995	-1.5%	296	357	21%	276	701	154%	1582	2053	30%

As a percentage of total calories available

	— Animal Products —			——— Sugars ———			—— Vegetable Oils ——			Aggregated SAD components		
	1961	2011	% change	1961	2011	% change	1961	2011	% change	1961	2011	% change
World	15.4%	17.7%	15%	8.7%	8.0%	-9%	5.1%	9.8%	90%	29.3%	35.4%	21%
Costa Rica	15.7%	22.3%	42%	14.6%	16.4%	12%	6.9%	12.1%	76%	37.2%	50.8%	37%
USA	35.1%	27.3%	-22%	10.3%	9.8%	-5%	9.6%	19.2%	100%	54.9%	56.3%	2%

Sources: FAOSTAT 2018 for Costa Rica and for total calories available for world and USA; Otero et al. 2015: 50, Table 1 for kcal data for world and USA