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Meat Power in a Tropical Region of Mexico: Unequal Power Relations and Vulnerabilities Between the Transnational Beef Industry and Small- and Medium-Scale Cattle Raisers

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Abstract

Conventional extensive cattle raising has involved deforestation and biodiversity loss in tropical regions throughout the world. In Mexico, since the 1990s, cattle raising has largely undergone economic and political transformation from free-range grazing to feedlots owned by large transnational meat corporations, along with increased meat exportation. Transnational corporations exercise power over small- and medium-scale cattle raisers by setting prices and conditions upon purchasing their young cattle to complete their development in feedlots, leading to vulnerabilities and inequalities based on the scale of production. Low prices paid to cattle raisers result in a lack of investment in innovations and sustainable practices, while middlemen and feedlots earn very high profits. The corporations further increase their meat power by shortening the fattening period of the cattle and exercising control over the entire cattle production process. This article analyzes how the current cattle-raising model, which favors large feedlots, has led to vulnerabilities for small- and medium-scale cattle raisers of southern Veracruz, Mexico, as well as the economic, social, political, and cultural obstacles to sustainable forms of cattle raising as a result of the imposition of this model. Silvopastoral systems have been implemented to raise livestock while also recovering rainforests and water security in the study region. However, the fact that these cattle are sold to feedlots for their final stage of development limits the implementation of sustainable cattle raising systems. As a result of extensive fieldwork in the Los Tuxtlas region involving interviews, focal groups, and workshops, scholars (including the author), cattle raisers, and NGOs have been jointly developing and implementing a sustainable cattle-raising project based on silvopastoral systems since 2019.

Keywords meat industry, tropical cattle raisers, meat power, silvopastoral systems

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1. Introduction

Since colonial times in Mexico, cattle have been a symbol of power and prestige, and cattle raising has served as a means of appropriating land, leading to high rates of deforestation, particularly in tropical areas such as southern Veracruz. Prior to 1990, the extensive cattle raising model was the dominant model, exporting calves to the United States, as well as supplying the domestic market. Since the 1993 North American Free Trade Agreement (NAFTA), the meat industry has increasingly been controlled by transnational meat corporations. The growing establishment of feedlots has led to small- and medium-scale cattle raisers[1] being obliged to sell their calves (180–220 kg) to fattening ranches, which supply largescale feedlots that export meat to the United States and to more than 12 Asian nations.

This model devastates rainforests, while small- and medium-scale cattle raisers increasingly face economic, social, environmental, and political vulnerabilities[2] and uncertainties[3] that hinder the sustainable transformation of conventional extensive cattle raising. Given the high deforestation rates of southern Veracruz—including in a national protected area—in 2019, a sustainable cattle-raising project involving silvopastoral systems was initiated by academics, NGOs, and cattle raisers. Despite the progress of this project, persisting challenges hinder the regional transformation of livestock raising. The present article seeks to explore how the meat industry exercises its power structure over cattle raisers, as well as how this *meat power*—which involves cattle raisers, middlemen, feedlots, global meat corporations, and local and national authorities—obstructs the development of sustainable cattle raising.

Thus, the goal of this article is to analyze how the current model of cattle raising in southern Veracruz, which is based on large feedlots, has triggered unequal vulnerabilities and uncertainties between small- and medium-scale cattle raisers on the one hand and large-scale cattle raisers on the other, and how this conventional model poses economic, social, and cultural obstacles for implementing a sustainable cattle-raising model.

The article is divided into six sections. This introduction is followed by a brief economic and political history of cattle raising in Mexico—and in Veracruz in particular—exploring how cattle raising has been carried out. Conventional livestock raising currently covers 58% of Mexico's land (Torres & Rojas, 2018, p. 145). Section 3 presents the theoretical framework based on political economy that allows for understanding the concept of meat power and how such power is exercised by many interest groups in diverse political, economic, cultural, and social spheres. Section 4 describes the study region and the participatory methodology used. Section 5 presents the results, organized under the following topics: a) historical development of vulnerabilities and uncertainties of small- and medium-scale cattle raisers; b) inequalities experienced by small-scale cattle raisers as a result of economic and political power exercised by intermediaries, large-scale fattening ranches, and transnational meat corporations; and c) challenges faced by small- and medium-scale cattle raisers in establishing silvopastoral systems. Finally, the conclusions are presented.

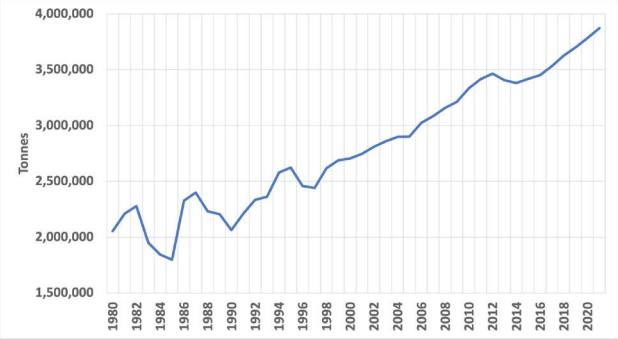
2. Historical Development of Cattle Raising in Mexico

The 1915 Agrarian Law (Article 120), passed as a result of the 1910 Mexican Revolution, defined small-scale properties used as cropland as those with a maximum of 100 hectares, and larger landholdings could be legally expropriated by the federal government to be redistributed to peasants in the form of communal landholdings known as *ejidos*. However, livestock raisers were allowed to own the amount of land necessary to maintain a herd of 500 cattle according to local environmental conditions. This allowed some landowners to own as much as 1,000 hectares (Chauvet, 1978). The cattle-raising elite's economic and political power was consolidated through legal endorsements, including Mexico's Law of Livestock Raisers' Associations, passed in 1936 during the administration of President Lázaro Cárdenas. Not surprisingly, wealthy livestock raisers have frequently occupied high-level government positions as governors, Congress members, and municipal presidents (Rutsch, 1980; Velázquez, 1992). Amendments to Article 27 of Mexico's 1917 Constitution during the administration of President Miguel Alemán (1946–1952) provided obstacles to repartitioning land used for extensive livestock raising to landless peasants and granted long-term protection to large-scale livestock hacienda owners. From the mid-1960s to the late 1970s, livestock raising in Latin America—particularly in Mexico—was highly molded by World Bank and International Development Bank

loan policies which had the objective of increasing livestock production, in turn providing large-scale cattle raisers with greater control over production, thus benefiting the U.S. meat industry. Such policies provided McDonald's with greater access to inexpensive foreign meat (Reign, 1982; Feder, 1982).

By the late 1970s, 55% of Mexico's land was already occupied by cattle, with the livestock population growing at a faster rate than that of the human population, and income from livestock raising consisting of 5.8% of the GDP (Chauvet, 1999). From the 1980s to the late 1990s, cattle production fluctuated greatly, as loans were drastically reduced due to the International Monetary Fund's so-called "Structural Adjustment Programs." Furthermore, international meat prices were highly volatile due to an increased market supply from other Latin American countries that had been forced to apply the same policy measures. From 1998 to 2020, cattle production in Mexico continually increased (see Figure 1).

Figure 1 Beef Production in Mexico (1980–2020)



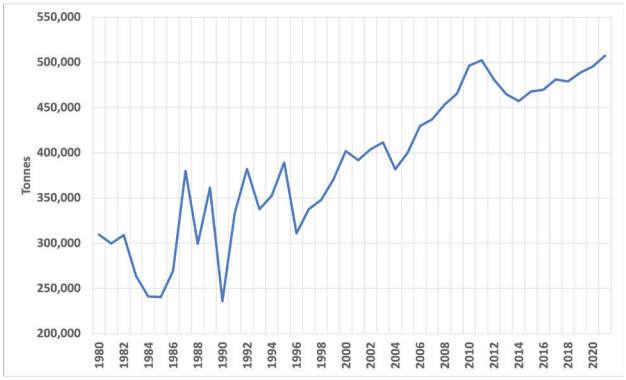
Note. Source: Servicio de Información Agroalimentaria y Pesquera (SIAP), Anuario Estadístico de la Producción Ganadera, consulted on March 22, 2023. https://nube.agricultura.gob.mx/cierre_pecuario/

Prior to the 1990s, most of the cattle raised in Mexico for export to the United States were sold either as calves to be fattened in U.S. feedlots or after having been fattened on large Mexican ranches near the border (Feder, 1982; Chauvet, 1999). However, since the signing of NAFTA, the cattle raising model has undergone economic and political transformation, with politicians supporting the establishment of large feedlots in Mexico. Thus, the exportation of calves decreased, while that of meat increased.

The new cattle-raising model has led to a variety of forms of accumulation by dispossession of land and nature, as defined by Harvey (2001), which has brought about environmental destruction. In southern Veracruz, from 1950 to 1980, forested surface area decreased by 50%— most markedly from 1970 to 1980—while from 1970 to 1979, the surface area covered by grassland increased by 157% (Rutsch, 1980, pp. 167–168). While in the 1970s, Veracruz had the third-highest level of biodiversity of all Mexican states and 65% of its surface area was covered by high evergreen forest accounting for 23% of the nation's forests, since the 1970s, 91% of its forest cover has been eliminated (Von Thaden et al., 2018).

In conjunction with this deforestation, cattle production in Veracruz generally increased (see Figure 2) from 1980 to 1996, with lower levels of production in 1984, 1985, and 1990 due to a lack of international loans and fluctuating U.S. cattle prices. Although beef production in northern Mexican states is competitive with that of Veracruz, overall beef production in Veracruz doubled from 1990 to 2020 (see Figure 2).

Figure 2 Beef Production in Veracruz (1980–2020)



Note. Source: Servicio de Información Agroalimentaria y Pesquera (SIAP), Anuario Estadístico de la Producción Ganadera, consulted on March 22, 2023. https://nube.agricultura.gob.mx/cierre_pecuario/

In the 1970s, cattle raising in Veracruz began to spread to ejidos and other types of communal landholdings smaller than five hectares. From 1960 to 1990, the percentage of head of cattle on properties smaller than five hectares increased from 25% to 43% (Lazos, 1996). In Nahua communities of the Sierra de Santa Marta, ejido members gradually became small-scale cattle raisers. Meanwhile, *mestizos* from central Veracruz established new communities in the region in the late 1960s and 1970s; many of

them brought cattle with them and became medium- and large-scale cattle raisers. Meanwhile, Nahua *milpas* (polyculture of maize, beans, squash, root crops, chili, and other crops) and much of the rainforest were converted into poor-quality pastures. This occurred due to several reasons. First, while maize prices were low from 1960 to 1985 and crop loans were unavailable, loans for livestock raising were easy to obtain. Second, the absence of a regional agricultural market, lack of labor due to high rates of seasonal migration to regional industrial cities, and uncertainty of harvests resulted in a lack of capitalization for agricultural crops, although more opportunities were available to capitalize on cattle raising. Thus, peasants gradually abandoned shifting cultivation (forest—maize polyculture cultivation—forest regrowth), adopting cattle raising, which promised them "a better future."

In the Sierra de Santa Marta of Veracruz, mestizos were the first to raise cattle, eventually establishing contracts with Nahua ejido members that involved renting out their land or cattle-sharing contracts[4] (Velázquez, 2000; Lazos, 1996). Mestizo as well as Nahua peasants dreamed of a way of life that would alleviate their poverty. One mestizo resident of the community, Benigno Mendoza, stated, "There where I'm from, the livestock owners are the rich ones. The poor peasants can't get out of poverty" (all translations of residents' interviews by the author of this article). A Nahua resident of Tatahuicapan stated,

> in the milpa, one works from six to six when it's clearing time. Then with the drought, it doesn't grow well, and even if it does grow—the maize, the beans … they're [sold] cheap. It doesn't pay off. Cattle raisers, when they sell their animals, they receive good money. So, really, can't we have that too?

3. Meat Power: Theoretical Framework

Under conventional capitalism, dominant classes are generally defined by their control over the means of production—the crucial resource base for class power (Whitt, 1979). However, this is only partially true for Veracruz cattle raisers. Large-scale cattle raisers control large land areas, water, cattle, and technology for processing meat and dairy products. Nevertheless, while they control space and accumulate land and cattle, they share cattle with small- and medium-scale landowners in order to have access to more land by renting from these landowners, and thereby increase their cattle. Though under very unequal conditions, small-scale landowners have gradually succeeded in accumulating cattle by renting out their land or through cattle-sharing contracts. Additionally, large-scale cattle raisers depend on the presence of these smaller landowners to provide them with young cattle to fatten. Thus, as large-scale cattle raisers depend on land and cattle-sharing contracts with small-scale cattle raisers, their power is not absolute. Nevertheless, despite their dependency, the large-scale cattle raisers obtain additional profit by paying a low price to rent land, and by stipulating in the contract that the small cattle raisers have the responsibility of taking care of the cattle. If calves die, small-scale cattle raisers assume the losses. Such exercise of power leads to economic and social vulnerability of the small cattle raisers.

Power circulates among many other interest groups—including middlemen, local authorities, governors, and presidents of livestock associations—according to the established political, economic, and cultural relations. In some regions, presidents of livestock associations favor large-scale cattle raisers by providing them with seed or fertilizer that has been politically negotiated with local or national agrarian authorities with the understanding that cattle raisers receiving these benefits will support the president of the livestock association in future campaigns.

Conflicts occur among cattle raisers competing for land, for control of the meat production cycle, and over market prices. Many contradictions within the structure of cattle raising lead to partial disruption of power and may limit the ability of the dominant class to fully control the meat production process. For example, a federal government program providing calves for small-scale cattle raisers at a low cost has disrupted the cattle monopoly. Furthermore, the previous administration implemented a "sustainable" cattle raising program, which distributed electric fences to cattle raisers interested in converting their conventional livestock farm to a more intensive system. While these examples illustrate partial disruptions of meat power, the concentration of "animal capital" by large feedlots—as well as political support from local and national authorities to export cattle—have provoked that large meat corporations control the entire meat value chain (Bernhold & Palmisano, 2022). Such manifestations of power—including through power networks established among ranch-

ers raising cattle on different scales and authorities—have led to unequal vulnerabilities and uncertainties among these actors.

This pluralist model of power—by which all interest groups are interrelated in a complex power network—actively involves numerous types of actors with vigorous competitive relations among them. Divisions occur among these groups based on their interests and alliances, and these continually shift. Networks of interest and power are constituted and reproduced through conscious strategies as well as practices unwittingly developed by the actors (Callon & Law, 1982). Political outcomes resulting from continual changes in interests and alliances benefit different dominant groups, depending on the political alliances of the moment.

The shifting terrain characterized by practices and interests discursively constituted among cattle raisers and other interest groups may be best explained by Foucault's theory of *microphysics of power* (Foucault, 1976/1984), which addresses how power is expressed among local actors and how micropolitics are embedded in all institutions (e.g., cattle associations, schools, agricultural departments). This occurs with cattle raising in southern Veracruz, involving numerous interest groups including small-, medium-, and large-scale cattle raisers; small- and large-scale cattle merchants; regional fattening ranches; regional and national medium- and large-scale feedlots; livestock associations belonging to the government-affiliated *Unión Nacional Ganadera*; independent cattle raisers' associations; municipal slaughterhouses; local and state politicians; agricultural government agencies; and transnational meat and dairy corporations. While confrontations and competitive relations exist among these actors, alliances are occasionally established among them. The more actors one has established alliances with, the more extensive the power network. As some large-scale cattle raisers of the region also cultivate crops (principally tobacco) or own factories or transportation services, they control broader socioeconomic networks. Diversification of capital by investing in multiple links of agribusiness value chains—together with the power resulting from these relations as a result of appropriating surplus value—tends to increase their control over the territory (Bernhold & Palmisano, 2022).

All interest groups exercise economic and political control in a variety of manners on multiple scales. Being a successful wealthy cattle raiser means having more than 200 head of cattle (some have as many as 700)—typically of expensive breeds. Culturally, owning cattle of more "noble"—or expensive—breeds provides more prestige, despite the fact that these breeds are not well-adapted to the tropical climate. "Successful" cattle raisers also hold powerful positions in the cattle market by controlling prices. Such actors develop relations directly with municipal and state authorities and cattle raisers' associations to increase their access to funding from the few existing development programs. This also allows them to improve their access to marketing channels and even evade taxes. In return, cattle raisers provide political support to candidates of those parties that have supported them, and many cattle raisers have become candidates of certain parties. These clientelistic relations reproduce existing power structures and mechanisms of the state (Marín, 2020). To exert their power, large-scale cattle raisers finance local festivals, cattle contests, horse races, and even beauty contests. This allows them to permeate regional cultural and identity dynamics in the region, for example, as illustrated by Atilano (2015), who analyzes the influence of cattle raisers' cultural and social power on the popular musical repertoire.

Currently, under neoliberalism, control of space is as essential as market control in the process of accumulation (Harvey, 2001). The concept of food regimes (Friedmann, 1987; Friedmann & McMichael, 1989; McMichael, 2009) highlights the importance of analyzing vertical inequalities involved in contractual relations between agribusiness and peasant sectors (Rivera et al., 2020). Such relations have resulted principally from international free trade agreements that have disrupted national regulations and policies regarding production and trade and furthered the globalization of food production, distribution, and consumption (Raynolds et al., 2007). A shift has occurred from focusing on the agrarian structure to partially or entirely controlling value chains and international markets involving transnational corporations. Control of the cattle export market has become as important as access to land. Consequently, interpretations of power have shifted from seeking to understand internal power structures (e.g., *cacicazgos*, or local "strongmen") toward comprehending power relations established by agri-food corporations (Scoones et al., 2018; Rivera et al., 2020). Previously, local authorities had

to extend favors to *caciques* in order to be recognized as leaders. However, establishing close ties with meat corporations has allowed them to receive higher prices for their cattle. Ironically, these large corporations tend to displace cattle raisers from the local markets, as occurs with large-scale soy producers in Argentina (Bernhold & Palmisano, 2022).

Worldwide, increasing dominance and control of transnational corporations over all sectors of society has boosted trade and market transactions, provoking commodification of communal natural assets as well as food. While this has accentuated asymmetric power relations between the Global North and the Global South, this article focuses on differentiated vulnerabilities and uncertainties among cattle raisers, feedlots, and meat corporations, resulting from existing power networks among Mexico's agrarian elites (large-scale cattle raisers, cattle merchants, feedlot enterprises, and politicians) on the one hand, and power networks among small- and medium-scale mestizo and indigenous cattle raisers of Veracruz on the other. For this, there is a need to understand the micropolitics of the contractual relations among cattle raisers on different scales and between intermediaries and cattle raisers. Foucault (1980, p. 39) describes this "capillary" nature of power, which "reaches into the very grain of individuals," as a "regime of exercise [of power] *within* the social body." The approach favored in this article is aligned with perspectives seeking to demonstrate how networks of interests are constituted and reproduced by local actors (Callon & Law, 1982, p. 622). In the study region, smaller cattle raisers depend on favors from large cattle associations to be able to function. However, upon receiving loans, fertilizer, or even cattle, they are expected to support the political campaigns of presidents of large cattle-raising associations.

The region's current cattle-raising model has accelerated deforestation, biodiversity loss, and degradation of agricultural land, while disrupting local communities' ways of life, in turn accentuating the socio-ecological and economic vulnerabilities and uncertainties of small- and medium-scale cattle raisers. These cattle raisers have over-exploited and degraded their land and soil, and deforested rainforests that previously provided them with water security. This model is a result of capitalist accumulation, which tends to reduce the time involved in production, transportation, and communications. As Harvey (2001) states,

> the experience of time and space has periodically been radically transformed … . We have recently been going through a strong phase of what I call "time-space compression": the world suddenly feels much smaller, and the time-horizons over which we can think about social action become much shorter. (Harvey, 2001, p. 123)

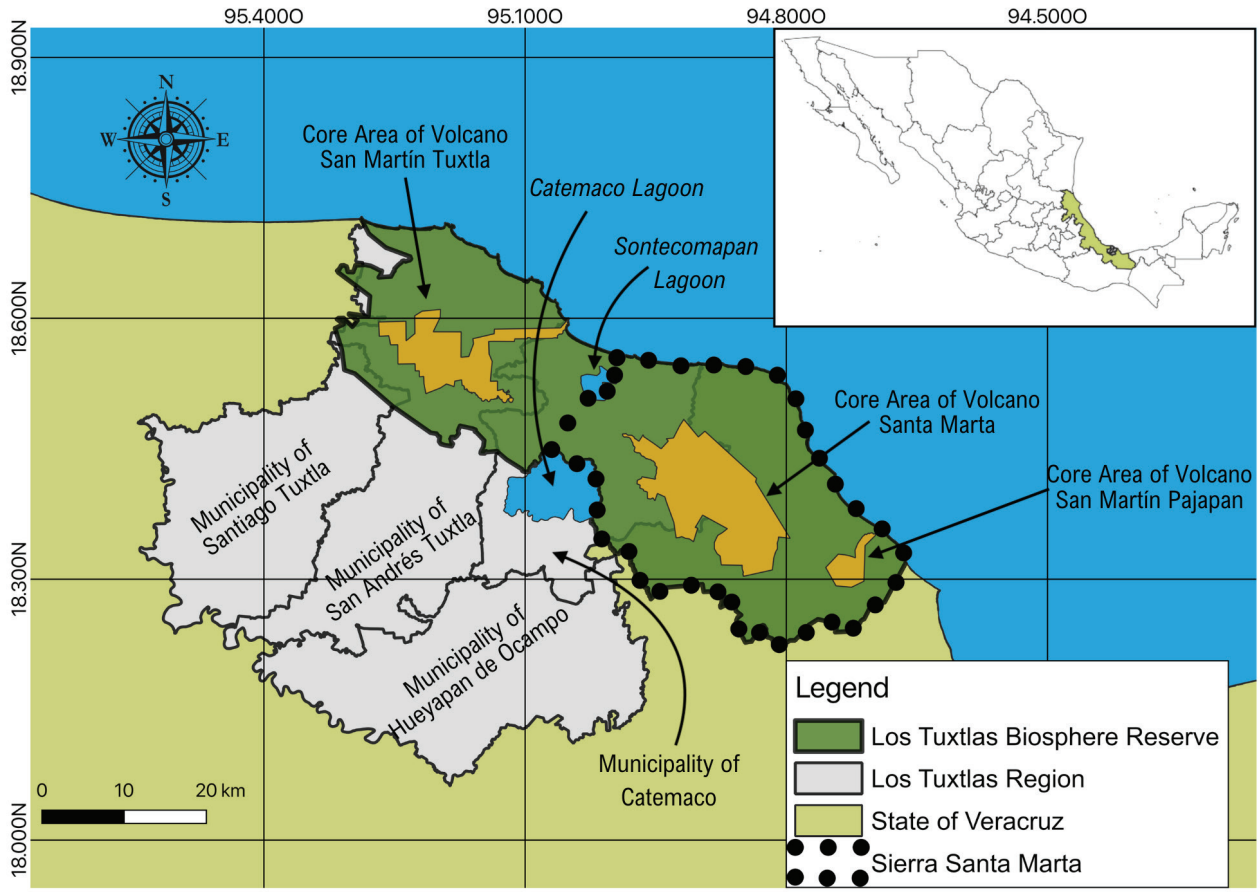
This notion of time compression is applicable to livestock and crop production. Fattening livestock as fast as possible is an extreme form of time compression, even reducing the animals' normal life cycle. Free-range chickens raised by peasants are typically slaughtered at the age of 4–5 months; meanwhile, industrial chickens are deemed fit for consumption at the age of only 42 days. Similarly, cattle enterprises attempt to continually reduce the fattening period; compared to the typical age of slaughter at 4 years for peasant-raised free-range cattle, feedlots have reduced the age to 2–2½ years. Regarding this process, Stache (2021, p. 11) has applied the notion of animal capital (first coined by Shukin [2009, p. 17, as cited in Stache, 2021, p. 11]) based on the argument that "capital becomes animal, and animals become capital," as capital appropriates animals as well as their work, bodies, reproduction, and lives. Although this concept highlights how animals are transformed and killed by capital and is fundamental to understanding the accumulation of capital in the cattle industry, the concept of meat power addresses the entire network of power relations from local to national and global actors. Based on arguments advocating meat as a protein source, this concept illustrates how small-, medium-, and large-scale cattle raisers interact within a highly dependent structure and how they justify deforestation as forests are transformed into pasture to produce meat for national and international markets.

4. Methodology

4.1 Study Area

The study area consists of two regions defined according to ecological differences as well as cultural and economic characteristics: the Sierra de Los Tuxtlas and the Sierra de Santa Marta, which together form a volcanic mountain range along the Gulf Coast of southeastern Veracruz (see Figure 3). The region has one of Mexico's highest levels of precipitation (4,700 mm annually), includes North America's northernmost high evergreen rainforest, and contains Mexico's largest

Figure 3 Los Tuxtlas Region of Southern Veracruz



Note. Source: Own elaboration.

extension of elfin forest (Von Thaden et al., 2018). In 1998, part of its territory was designated as the Los Tuxtlas Biosphere Reserve due to its high level of biodiversity and endemism (Figure 3). Cloud forest covers 6% of the mid- and high-altitude zones of the three volcanoes (Paré et al., 1997). Culturally, the Sierra de Santa Marta is a mosaic of Zoque-Popoluca and Nahua indigenous populations as well as mestizo populations that have immigrated from a variety of areas in several waves since 1950 (Lazos & Godínez, 1996).

Prior to NAFTA, land tenancy was a mixture of private property, ejidos, and communal landholdings. Since Mexico's 1992 Agrarian Reform, many ejidos and communal landholdings have been transformed into private property. Currently, the region consists of a mixture of peasant agriculture, mestizo ranches, and landholdings belonging to bourgeois landowners residing in urban centers of the region (Lazos, 1996; Von Thaden et al., 2018). However, in the mid-20th century, oil became the principal driver of the regional economy, absorbing much of its labor force (Leonard & Velázquez, 2000).

In Los Tuxtlas, free-range cattle are raised on year-round grassland with a quality that varies according to weather conditions. Pastures are continually subjected to grazing and stomping, with no attempt to improve their nutritional quality. The resulting fodder has a low protein content (7%) and a low rate of digestibility (55%), resulting in a relatively low animal carrying capacity of 0.6 cattle per hectare (Lazos, 2001; Chará et al., 2019) and thus low levels of productivity and competitiveness. Furthermore, livestock raising in Mexico's tropics requires costly inputs—including purchased fodder during the dry season, processed feed, vitamins, deworming medicine, fertilizer, and herbicide, while meat and milk are sold at low prices to middlemen and industrial dairy processors. As a result, cattle raisers in the region no longer consider cattle raising to be profitable, and it is no longer the principal income source for many small- and medium-scale farmers.

4.2 Transdisciplinary Methodology

Throughout the 1990s, a team of academics, including myself—together with regional NGOs—carried out participatory research in the Sierra de Santa Marta. The objectives were to analyze agrarian dynamics as well as socio-environmental transformation related to land use, and to jointly develop agricultural alternatives to the conventional livestock raising system with the Nahua population to improve their socioeconomic well-being (Lazos, 1996; Lazos & Godínez, 1996). The findings from that research provide us with a baseline historical perspective of the region. Years later, in 2019, given the deforestation and deterioration of water sources, some cattle raisers, convinced of the need to transform the agricultural system, along with an academic group and regional NGOs, initiated a transdisciplinary project to implement sustainable cattle raising following the principles of silvopastoral systems, sharing knowledge and practices, and collectively developing technical and organizational capacities until 2024 (Boege et al., 2019). For this article, we organized:

a) Forty structured interviews with livestock raisers and 20 structured interviews with livestock merchants, administrators of slaughterhouses, local politicians, and government functionaries;
b) Consultation of web pages of newspapers and livestock corporations—to obtain information regarding meat packing corporations.

5. Results

5.1 Small- and Medium-Scale Cattle Raisers: Vulnerabilities and Uncertainties

Cattle raising in southern Veracruz spread in several ways, depending on the type of land tenancy. Owners of large landholdings acquired cattle through inheritance or purchase. Meanwhile, Nahua ejido members and communal landholders principally cultivated milpas under shifting cultivation, deforesting land to prevent Mexico's Ministry of Agrarian Reform from confiscating it as so called idle land—based on the fact that it was forested—for redistribution to other landless peasants (Leonard & Velázquez, 2000). Misguided federal policies favoring cattle raising led to a reduction of milpas (Lazos, 1996; Blanco, 2006). Nahua farmers gradually transformed milpas into pasture to raise livestock, initially with 2–10 cattle per family, setting them free in forests surrounding the communities. Medium-scale mestizo cattle raisers from nearby villages rented grassland from small-scale mestizo or Nahua peasants to raise their cattle. In exchange for one year of use of grassland, they set up the region's first barbed wire fences to contain their cattle. Local Nahua and mestizo cleared rainforest to rent out their land to large-scale cattle raisers or host their livestock through cattle-sharing contracts (Chevalier & Buckles, 1995; Lazos, 1996; Velázquez, 2000). Once the land was fenced in, the peasants also began to purchase cattle with profits from sale of crops or pigs or raise calves received through cattle-sharing contracts. One Nahua cattle raiser from Tatahuicapan stated,

> the savings to purchase cattle came from selling piglets because beans and maize were sold very cheap. My dad bought 15 piglets and we raised them and then took them to sell, and with that money my dad purchased calves little by little.

Initially, naturally growing grasses were used for cattle, but later grasslands were planted using seed provided by large-scale cattle raisers, and more pastures were fenced in, resulting in the privatization of communal land. This model of livestock raising permanently transformed rainforest into grassland by interrupting the cyclical process of shifting cultivation. Although complex ecological rotations are practiced in livestock raising among grasses, milpa, and fallows —or between pasture and crops—(Lazos, 2001; Flores, 2014), mature rainforest is unable to regenerate as the time of fallow has been reduced, and to this day, cropland is increasingly being replaced by grassland. Three technological changes radically transformed livestock raising in the 1980s: the introduction of cultivated grasses, the use of agrochemicals, and the crossing of Zebu breeds—considered to be of poor quality—with Swiss and Holstein, with the aim of improving the herd. However, grass and cattle yields did not improve; rather, land degradation and socio-environmental crises have been exacerbated. Livestock raisers referred to the current ecological situation as: "rivers dry up," "grass no longer turns green," "droughts have intensified." The few reforestation efforts carried out have been unsuccessful due to a top-down policy approach.

Livestock policies implemented from 1980 to 2018—as the *Programa de Fomento Ganadero* (PROGAN)—have further fueled the extensive cattle raising model.

In spite of extreme cattle price fluctuations, farmers consider extensive cattle raising to be more economically stable—involving less risk and uncertainty—than crop agriculture (Velázquez, 1992; Lazos, 1996; Lazos, 2020). Livestock raisers have developed various strategies in an attempt to reduce market risks and uncertainties. Somewhat less than half of the 40 livestock raisers interviewed (40%) raise dual-purpose cattle, producing both meat and milk; 38% primarily produce milk, and the rest primarily produce meat. The majority of milk producers sell their milk for cheese production. Small- and medium-scale conventional cattle raisers are obliged to sell their cattle at a young age as breeding stock to middlemen who then transport them to industrial feedlots. Maintaining their cattle for longer periods involves enormous economic risk as they are unable to compete with industrial feedlots. Therefore, a majority (73%) of small- and medium-scale cattle raisers sell their cattle at the age of 10 months to 2 years (160–230 kg), and only 12% sell cattle older than 3 years of age (~350 kg; see Table 1).

The above-mentioned constraints in production lead small- and medium-scale cattle raisers to face more vulnerabilities than large-scale cattle raisers. The former reproduce their herds, raising their cows to reproductive age, watching over the birth process, and caring for cows and calves, including feeding and vaccination. Upon weaning (at 160 kg), they sell the majority of calves due to a lack of grass for fodder. Additionally, the fact that the price of live cattle per kilogram decreases with weight (see Table 2) further motivates them to sell their animals at a young age (<250 kg). Merchants pay less per kilogram for larger cattle in order to oblige cattle raisers to sell them young cattle so they may in turn sell them to larger ranches or to feedlots for fattening. Free range calves reach an approximate weight of 200 to 250 kilograms at 1–2 years of age, depending on the proportion of mothers' milk they are allowed to suckle daily during lactation (7 to 11 months), as well as other aspects of management and the occurrence of drought.

Table 1 *Age and Weight of Cattle Sold by Small- and Medium-Scale Cattle Raisers of Southern Veracruz, Mexico*

Cattle age and weight	% (#)
< 1 year (<180 kg)	35% (14)
1-2 years (180-230 kg)	38% (15)
2-3 years (230-350 kg)	15% (6)
> 3 years (350-400 kg)	12% (5)

Note. Source: Forty interviews carried out with cattle raisers in 2022–2023 in the municipalities of San Andrés and Santiago Tuxtla, Veracruz, Mexico.

Table 2 *Price of Cattle Purchased and Sold by Cattle Merchants According to Age, Weight, and Sex in November of 2023 in the Los Tuxtlas Region of Veracruz, Mexico*

Growth stage of cattle	Age* (months)	Weight (kg)	Price (pesos/kg)					
			Purchase price		Sale price		Price set by UG	
			male	female	male	female	male	female
Weaning	7–11	140–160	51	46	54	50	56	56
Calf	9–20	160–230	52–53.5	47–48.5	54	50–51	56–57	47–48
Steer / heifer	16–26	231–250	51–52.5	47–48.5	54	50–51	54–55	45–46
Steer / heifer	22–36	251–300	48–52	45–46.5	54	50.5	54–55	45–46
Bull / cow	24–38	300–350	49–51.5	45–46.5	53	50.5	52–53	41–42
Bull / cow	30–40	351–420	48–50.5	39–41	52.5	47	50–51	35–36
Older bull / cow	Over 40	low					37–38	29–31

Note. Source: Interviews with cattle merchants; prices set by the Central Veracruz Livestock Union (Unión Ganadera [UG]).
*Age varies depending on breed and nutrition. Farmers sell cattle upon reaching a certain weight.

Thus, small- and medium-scale livestock raisers occupy most of their time reproducing their herd, which involves great expenses for feeding, vaccines, and medicine, particularly during birth and while raising small calves. Livestock raisers' risks and vulnerabilities are highly variable due to climatic conditions and other socio-environmental variations—including drought—which affect the growth of grasses and may result in springs and rivers drying up; crop pests; health and environmental consequences of agrochemical use; an increase in the tick population, which inhibits the growth of calves; and lack of capital for investment in infrastructure, which in turn obstructs proper maintenance of the herd. Although cattle raising involves less uncertainty than cultivating crops, it does involve some risk, principally due to these socio-environmental fluctuations, but also with respect to obtaining a profit as a result of socioeconomic variations due to instability of prices for livestock, inputs (vaccines, medicine, and herbicides), and labor. Furthermore, over the last decade, cattle raisers of all scales have become increasingly vulnerable to cattle theft by organized crime.

5.2 Inequalities Among Cattle Merchants, Transnational Industrial Meat Corporations, and Small-Scale Cattle Raisers

5.2.1 Cattle Merchants and Merchant-Raisers

> Many years ago [1970–1980], the Mexican government gave rich farmers loans to buy cheap land, and it was good business to begin by raising cattle. Cattle merchants earned a lot of money because during the foot-and-mouth disease [1946–1955] they purchased cattle for $10 pesos instead of paying $100 pesos, as the Health Ministry obliged them to kill their apparently healthy animals. The merchants accumulated a lot of money. There wasn't good cattle around here. The Reyes family in the Huasteca region had ranches here, in Texas, Guatemala… They were producers of many cattle, and after the [foot-and-mouth] epidemic was over, the business was about producing breeding bulls, fattening them, and taking them to the US. Now the big business is to fatten cattle and export meat to many places around the world. The feedlot owners are the rich ones. The medium-sized merchants, like me … now all of us sell cattle to big livestock fatteners. (Interview with Manuel, a prominent cattle merchant of Los Tuxtlas, October 2022)

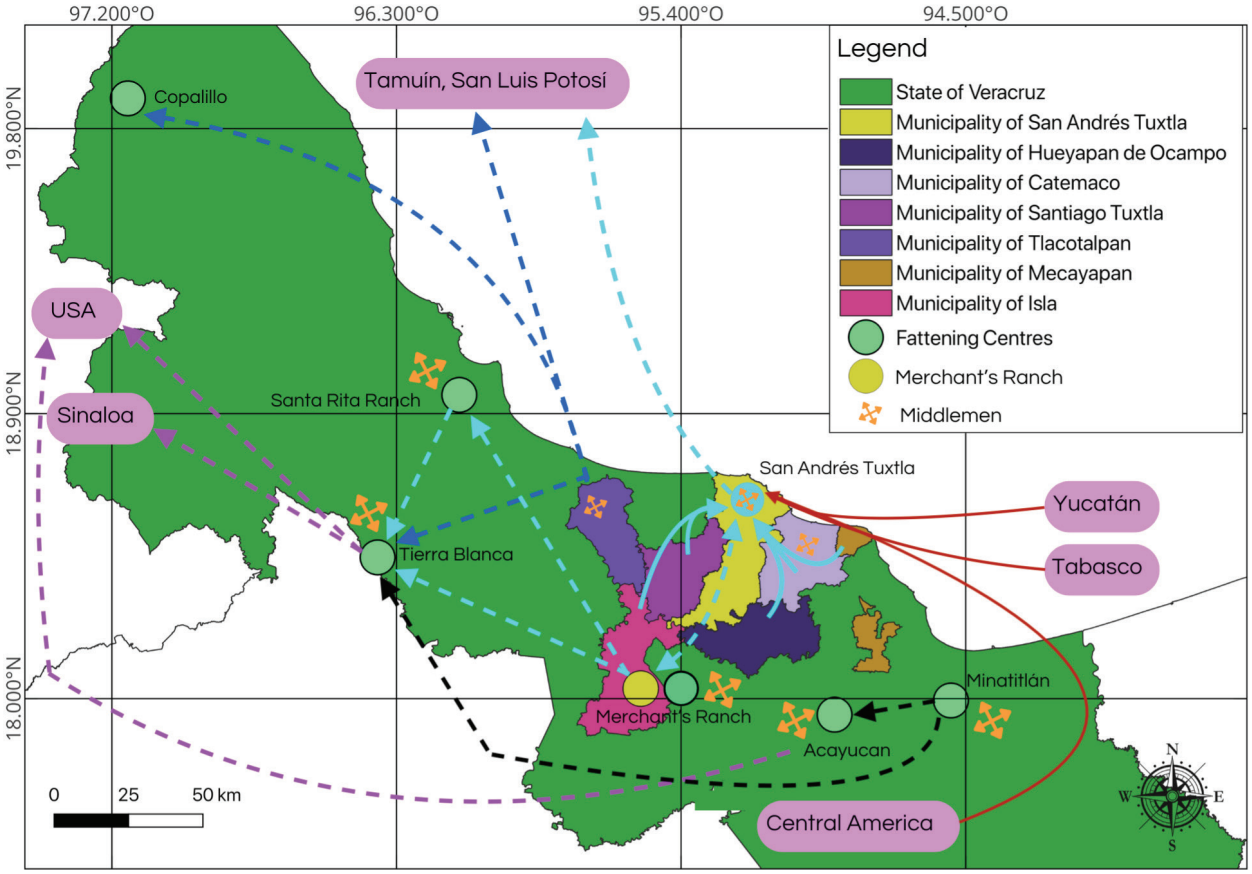
From 1980, large-scale cattle raisers of northern Veracruz purchased and/or rented large land areas in southern Veracruz to establish extensive livestock units, where they fattened the cattle they had purchased at low prices in the southern Mexican states of Veracruz, Tabasco, and Yucatán, as well as in Central America (Guatemala and Honduras; Marín, 2020). Currently, livestock merchants of Veracruz continue to purchase livestock from these regions, weighing less than 250 kg, which they take to their ranches to fatten for several months until reaching 350 kg, upon which they sell them to regional fattening centers, or directly to Mexico's large-scale fattening corporations, where they are fattened on industrial feed until reaching 550 kg, upon which they are ready for slaughter (see Figure 4).

One exemplary cattle merchant-raiser is Manuel, who has traveled throughout southern Veracruz, as well as to the state of Tabasco and the livestock-raising municipality of Tizimín in Yucatán (see Figure 4) to purchase calves and heifers weighing 160–230 kg. In the 1980s, he purchased 300 to 400 calves in one trip, selling the fattened cattle to Mexico's Ministry of Agriculture, which provided them to ejido members through livestock development programs. These programs included the Programa de Desarrollo Rural Integrado del Trópico Húmedo (Proderith, Program of Integrated Rural Development for the Humid Tropics), in operation from 1978 to 1995. Manuel purchased cattle from large-scale livestock raisers and small-scale merchants.

> The greatest livestock purchase I made was here in Covarrubias [in 2007]. There were 800 head, and I bought them cash down. I sold 700 to another man who fattened cattle, and I kept 100 to fatten them on my ranch. … I came to have over 1,000 head of cattle [800 cows and their calves]. I focus on raising and marketing calves. Each year, I sold 500 to 600 calves [he now sells fewer]. They would grow, and at 300–350 kg I sold them. I gave them molasses and 3% urea. That shoots up the protein. (Interview with Manuel, May 2022)

On occasions, Manuel has associated with other merchants or owners of large ranches (e.g., in Tlacotalpan) who fatten cattle until they reach 300–350 kg. In the 1980s and 1990s, he purchased 350–400 kg steers that he fattened and sold, initially to a slaughterhouse in Mexico City and later to another in the State of Mexico. Currently, Manuel uses a diversified strategy to

Figure 4 Commercial Routes of the Cattle Merchant Manuel of San Andrés Tuxtla, Veracruz



Note. Source: Own elaboration.
Solid light green arrows: Manuel purchases cattle from small cattle raisers in and near the Los Tuxtlas region.
Dotted light green arrows: Manuel sells cattle to ranches or large fattening enterprises.
Dotted royal blue arrows: Medium-scale fatteners sell cattle to large fattening enterprises through Manuel as a middleman.
Dotted black arrows: Large-scale fatteners sell cattle to large fattening enterprises through Manuel as a middleman.
Dotted purple arrows: Manuel sells cattle for fattening to corporations, which later export them to the US, Middle East, and Asia.
Red lines: Manuel purchases cattle from cattle raisers in Tabasco, Campeche, Yucatán, and Central America.

market cattle (see Figure 4). Typically, he purchases calves weighing 160–220 kg to fatten them to 350 kg on his ranches, or he establishes cattle-sharing contracts to fatten them and sell them to large fattening corporations. Less frequently, he purchases 350–400 kg steers and sells them immediately to slaughterhouses in the State of Mexico.

> We purchase more cattle to fatten than other merchants because I have a ranch on the edge of the highway. The cattle raisers sell me 100–200 animals per week, besides what they offer me around here. On my ranch … I put them in cattle trucks of 70 young bulls weighing 300–350 kg or 120 smaller animals and send them to the big fattening centers. (Interview with AS, October 2022)

Other cattle merchants of southern Veracruz operate on a similar scale as Manuel, while many in Veracruz and other states operate on a smaller or larger scale. Some have their own ranches—as does Manuel, who owns over 500 hectares, while others rent ranches from smaller cattle raisers. Other merchants who do not own ranches purchase cattle and fatten them on the ranches of several other cattle raisers, establishing profit-sharing contracts with the owners by which they split the profits from the sale of fattened cattle.

Manuel complains that due to intensified competition resulting from an increase in the number of cattle merchants, a reduction in the size of livestock herds in southern Veracruz, and a high level of organized crime, it has become increasingly difficult—and even dangerous—to purchase large quantities of cattle. While 20 years ago he sold 140–180 trucks full of cattle (see Figure 5) each year, currently he sells half that amount. As another cattle merchant explains:

> The economic situation has changed. There's been a lot of need, and the people sell [the cattle they have]. There are people who live only off the sale; they sell one or two animals every 4 to 6 months. The countryside is becoming impoverished. Sons no longer want to head the ranch. And there's less livestock raising due to organized crime. Many farmers from the zone … they've been kidnapped from their ranches. There's a lot of danger since 2007, when the Zetas [drug cartel] began during the administration of Governor Fidel Herrera [2004–2010]. (Interview with TM, October 2022)

Figure 5 Cattle Truck, Known as Jaula or Panzona

Note. Photography taken by Elena Lazos-Chavero.

Since the 1980s, some cattle merchants have illegally purchased livestock from Central America (Marín, 2020; Sanders, 2022), passing through sanitary inspection, which has fallen under the control of drug cartels.

> There [in Central America] the ranches are very big—5,000–8,000 hectares. There are no ejidos, so it's easier to purchase [large quantities of] livestock. They pay their workers half of what we pay here, so they sell the cattle very cheap. They're large livestock raisers that control entire regions, protected directly by federal authorities. Before [merchants] took up to a million head a year [illegally over the border]. Someone from the government was doing business [by allowing them to cross]. But as there was no sanitary control, the US detained entry of cattle from Mexico, and then the livestock owners were affected. They've protested. (Interview with AM, cattle merchant, May 2022)

5.2.2 Large-Scale Fattening Ranches and Corporations in Veracruz and the Neighboring State of San Luis Potosí

Throughout Mexico, many large-scale livestock fattening enterprises—which originated from the late 1960s to the late 1980s as individual cattle merchants but greatly increased in scale in the 1990s—principally depend on livestock production in Veracruz. These businesses include Grupo Gutiérrez-Silva (GUSI) and Praderas Huastecas in San Luis Potosí, and Grupo Veracarne in northern and southern Veracruz (consisting of several ranches and fattening corporations).

Grupo GUSI and Praderas Huastecas are owned by two brothers who began to produce and market beef products in the late 1970s. Their father, who was the founder—M. Gutiérrez—had marketed livestock from southeastern Mexico and Central America on a large scale in the Huasteca region of southern Mexico since the late 1960s.

Praderas Huastecas, in operation since 1967, has its headquarters in the municipality of Tamuín, San Luis Potosí. As with Grupo GUSI, it owns facilities for livestock production from grazing to fattening, a federally inspected slaughterhouse (TIF according to its Spanish initials), as well as three automated food processing plants with a capacity to process and package a total of 2,000 tons of a total of 21 different beef products per shift. With at least 12 facilities in northern and central Mexico, it sells products with and without processed value added to a variety of domestic and foreign markets, including wholesalers, restaurants (including chains), slaughterhouses, butchers, large supermarket chains, caterers, food distributors, and hotels.

Grupo GUSI began to fatten cattle in the early 1990s. In 2005, it installed a meat packing plant to process hamburgers and other meats for diverse markets, and in 2014 it established its own slaughterhouses and several viscera processing plants. According to

interviews with regional merchants who sell calves and heifers to Praderas Huastecas and Grupo GUSI, each enterprise maintains approximately 150,000 head of cattle in its corrals and slaughters an average of 1,000–1,500 animals daily. Grupo GUSI's market is similar to that of Praderas Huastecas and includes supermarket chains such as Soriana and Bodega Aurrera, to which they sell cold cuts. Grupo GUSI exports to the United States, the Middle East (Israel, Qatar), and Asia (China, South Korea).

Grupo Veracarne—as the producers and fatteners of cattle in Central Veracruz are known—is Mexico's other principal beef company that both produces and markets, and is reportedly its sixth largest producer. It began operation shortly after 2000 as a result of meetings in which large-scale cattle raisers of central Veracruz received financial advisory from Mexico's Trust Funds for Agricultural Development (FIRA). Its members have received loans through cattle-raising development programs. Grupo Veracarne provides specialized technical and financial services to its 11 associates, with the objective of maximizing its competitiveness through the consolidation of the purchase of inputs and product sales, and by jointly taking advantage of opportunities resulting from purchasing and selling national and international meat. The group owns two federally inspected slaughterhouses that provide quality control and added value to products. It uses small- and large-scale merchants to purchase the large number of calves that it requires, and as of a decade ago, it reportedly fattened 62% of all calves raised in Veracruz (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación [SAGARPA]- Food and Agriculture Organization of the United Nations [FAO], 2013).

Grupo Veracarne's member businesses include Ganadería Addtul, Corrales El Bajo, Rancho Santa Rita, Rancho Las Maravillas, Puente La Reyna, Dos Matas, Corrales de Tierra Blanca, Agropecuaria Domínguez, Ganprover, and Agropecuaria Carluz (Veracarnes, 2023). Together, their corrals have a capacity of 75,000 head of cattle and are used to fatten 240,000 head per year, yielding approximately 65,000 tonnes of meat. Each of the fatteners has its own feed factory. Grupo Veracarne sells its products in the states of Nuevo León, Jalisco, Puebla, Morelos, Oaxaca, Chiapas, Tabasco, Guerrero, Veracruz, and Hidalgo, as well as in Mexico City. Veracarne participates in international expositions to promote the consumption of Mexican meat under the brand name "Res Mexicana" (Mexican Beef) and to develop export markets in Japan, Korea, China, Russia, Europe, and the United States. An estimated 30% of Veracruz's livestock products are sold to U.S. and Asian markets (Veracarnes, 2023).

5.2.3 SuKarne: A Successful Meat Corporation in Northern Mexico

Although the meat processing corporation SuKarne was initiated 50 years ago in the northern Mexican state of Sinaloa, it now purchases cattle from ranches in Veracruz, as well as throughout Mexico and Central America. SuKarne is the world's third largest cattle fattener (Redacción Noreste, 2022). It began to export its products to the United States in the late 1990s, growing exponentially from 2000 to 2010, and is currently the United States' fifth largest meat provider—with 33 points of sale in the United States (Redacción Noreste, 2022). It has the capacity to process two million head of cattle annually. Since approximately 2005, it has exported to its multiple subsidiaries in over 12 nations—including Japan, South Korea, China, the United Arab Emirates, Canada, and the United States—to which it sold 74% of its exports in 2021. Approximately 40% of its income is from international markets (Redacción Noreste, 2022). As Mexico's largest meat production and distribution corporation, SuKarne received the Ministry of Economy's National Prize for Exportation in 2010, 2014, and 2021 for making Mexico "a nation more competitive in international markets and having demonstrated its significant role in foreign commerce and its commitment to the nation" (Redacción Noreste, 2022; all direct quotations from sources that are not available in English have been translated by the author of this article).

SuKarne has followed a comprehensive production and marketing model involving all stages of the chain of production from primary production to exportation. It owns approximately 220 cattle purchasing centers in Mexico and Central America, four comprehensive livestock production units in Mexico, one in Nicaragua, and nine processing plants in different regions of northern Mexico, and has developed a system of exportation as well as domestic distribution through national and international supermarket chains, industrial slaughterhouses, hotels, and restaurants. It directly employs 15,000 workers, sells a variety of products, including specialized cuts, to over 100,000 clients, and purchases from 100,000 livestock and feed providers (Ramírez, 2023).

Over 50 cattle collection centers are located in Veracruz, of which approximately 10 are in the southern region of the state and were established from 2010 to 2015 (interview, cattle merchant, July 2023). The oldest in southern Veracruz—in Acayucan—currently receives more cattle than any other center of the region.

As explained by one of its cattle merchants, the strategy of SuKarne's collection centers is to purchase cattle weighing approximately 350 kg and transport them to its feedlots, or purchase calves and establish cattle-sharing contracts with local ranches to raise them and later transport them to their feedlots.

> As [cattle raisers of the region] already know [SuKarne's collection centers], they [the cattle raisers] already know where we [SuKarne's collection centers] are located. They bring [the cattle to us], but when the company doesn't have enough animals to sell, we also go out to look for cattle. We go or they come, according to the needs of the business. (Interview, anonymous cattle merchant, July 2023)

When SuKarne's collection centers are unable to obtain cattle weighing 300–350 kg, they purchase smaller cattle (150–250 kg) from small- and medium-scale cattle raisers, who are pressured to sell due to lack of grass to feed their cattle. In this case, SuKarne establishes profit-sharing contracts with regional fattening ranches, usually for a period of 60–90 days, during which a herd of 400–500 cattle is fattened from 150 to 350 kg. Allowing the fatteners to raise the cattle for more than 90 days would not be profitable for SuKarne. Upon reaching 300–350 kg, the livestock is transported to SuKarne's feedlots in northern Mexico, where they are fattened on industrial feed and maize until ready for slaughter.

> There are livestock owners who deliver [cattle] to us at that weight [350 kg]; they're the ones that have larger areas of land. Instead of selling them at 180–250 [they say], "I'd better hold on, I have sufficient grass." There are [other] livestock owners who sell upon weaning, which is at 130–180 kg. Then the usual average price is $10,000 per animal; 50 animals are 500,000 pesos. But there are people who—if they have more land—say, "instead of earning 500,000 pesos, I'll double that and better earn a million pesos." (Interview with a middleman of SuKarne, AM, July 2023)

SuKarne's requisites for purchasing calves are that they be healthy, well-developed, without ticks, and without papilloma or hernias. SuKarne only purchases cattle with a maximum of two adult teeth (interviews with livestock raisers, April 2022), and does not purchase livestock that have been administered the hormone Clenbuterol to accelerate growth, as Mexican law prohibits selling such meat. Before cattle are sent to the company's fattening centers, they are dewormed and vaccinated. Each of SuKarne's collection centers is authorized to purchase a maximum of 200 animals daily; however, the actual number purchased varies from week to week, depending on the quantity required by SuKarne's feedlots. Before 2020, SuKarne's collection center in the Los Tuxtlas region purchased up to five trucks of 350–400 kg cattle per week, which are shipped by truck (see Figure 5) to its feedlots in northern Mexico, stopping halfway to allow the cattle to recover for 24 hours in local corrals. Despite its scale, SuKarne has experienced an increase in competition from other regional and national fattening corporations that export meat, including GUSI, Praderas Huastecas, and Veracarne.

SuKarne owns no fattening centers in southern Mexico and therefore could be considered a northern regional corporation; all its political and economic contacts are in the north, which facilitates fattening, transportation of cattle, and distribution of meat products. As SuKarne divulges little information, it is difficult to obtain a complete panorama of its operations.

Much of SuKarne's exponential growth appears to be due to the political activity and connections of its president and founder. During the 1990s and 2000s, when SuKarne expanded into the U.S. market, he maintained relations with one of the U.S. Secretaries of State of that period. Some news sources have even accused him of having connections with drug trafficking (Cárdenas, 2010).

5.3 Challenges to Establishing Silvopastoral Systems

Given the many vulnerabilities and uncertainties of livestock production for small- and medium-scale cattle raisers, along with increasing environmental deterioration caused by extensive cattle raising (e.g., biodiversity loss, pollution and reduction of water sources, soil erosion and compaction), participants in the project proposed to implement sustainable cattle

raising strategies that would allow for transitioning from extensive conventional cattle raising to intensive silvopastoral systems, which have been proposed for Latin American tropical areas since the 1990s (Pezo & Ibrahim, 1996; Lazos, 2001) with the aim of reducing deforestation and protecting water sources, while generating income for local farmers (Ferguson et al., 2013; Douterlungne & Ferguson, 2016; Chará et al., 2019; Murgueitio et al., 2015; Marinidou et al., 2017; Santos & Boege, 2022). Intensifying livestock management by rotating cattle daily in enclosures with electric fences has been found to increase nutrient recycling and improve soil fertility, thereby increasing the system's ecological sustainability while improving the cattle's diet (Marindou et al., 2017; Santos & Boege, 2022).

Despite the benefits of silvopastoral systems, many social, economic, cultural, and political challenges exist to their implementation. Cattle fed on grass and other plants may take approximately four years to be fit for slaughter, depending on the environmental and economic conditions, while feedlots with over 50,000 animals take only 6–7 months to fatten them from 250 to 500–600 kg. Livestock raised in confined spaces in feedlots are essentially treated as fattening machines, ignoring their well-being (FAO, 2006). Furthermore, in order to maximize profits, feedlot workers are paid very low wages. Therefore, it is difficult for free-range systems to economically compete with feedlots, despite the high cost of feed and vaccines used by conventional systems.

In addition to economic challenges, silvopastoral systems also confront cultural challenges. While many cattle raisers recognize the benefits of such systems, the prevailing image of a successful livestock raiser is one who controls a large number of cattle in an extensive area. The most difficult challenge is to obtain political support for silvopastoral systems, as they present a challenge to the existing economic model of meat production. Given political alliances among governors, presidents of livestock associations, municipal presidents, and meat corporations, the profit-maximizing feedlot model is prioritized, disregarding its environmental, animal, and human costs. As a result, feedlots have increased in number and size in Mexico, which is now the world's seventh largest meat producer, exporting meat products to 15 nations (Servicio de Información Agroalimentaria y Pesquera [SIAP], 2023).

Transforming the predominant livestock-raising model requires changes in public policy related to meat production. There is a need for policies that promote sustainable livestock production based on: 1. respect for ecological dynamics, including restoration of forests, protection of water sources, soil enrichment, and pest and disease management through rotation of pastures; 2. respect for animal well-being; and 3. respect for the well-being of livestock raisers and fair working conditions for all workers involved in the value chain.

Silvopastoral systems prioritize sustainable farming practices that result in a smaller ecological "hoofprint" (Weis, 2013), and better living conditions for peasants and indigenous peoples. Transforming food systems to incorporate agroecological principles demands shifts in the meat power structure. Such an approach may allow for the possibility of reducing vulnerabilities and uncertainties for small- and medium-scale cattle raisers so that they may continue to possess their land. There is a need for policies that contribute to developing agroecological alternatives for confronting climate change and that facilitate participation by small-scale and medium-scale farmers in decision-making regarding the future of meat power structures.

6. Discussion and Conclusion

The neoliberal capitalist cattle-raising model in tropical regions has led to diverse forms of accumulation by dispossession of nature (Harvey, 2001). Commodification and privatization of nature to produce meat and dairy products has resulted in high levels of ecological degradation. This model of cattle raising, based on large feedlots to produce meat, has been imposed on small- and medium-scale cattle raisers, appropriating their decision-making power while jeopardizing the cattle's welfare.

One of the greatest economic challenges for small- and medium-scale livestock raisers is to raise their livestock until they are ready for slaughter, as the greatest profit is made during the fattening stage. The capitalist model of meat production in feedlots has so greatly accelerated the growth process that it has drastically shortened the life cycle of livestock, such that those raising free range cattle cannot compete with those fattening cattle in feedlots, in which—furthermore—animal rights are continually violated.

Furthermore, this model has resulted in unequal social and economic vulnerabilities for small- and medium-scale cattle raisers versus feedlot corporations. Small- and medium-scale cattle raisers must raise their cattle on rapidly deteriorating pastures characterized by low productivity, and frequently deal with prolonged drought, grass pests, and tick infestations that inhibit cattle fattening. They must continually invest in infrastructure, improve pastures, and acquire more productive cattle breeds, medicine, and vaccines. Meanwhile, feedlots are able to purchase young, healthy cattle cheaply for fattening, thus obtaining great profit in a short time (350 kg cattle reach 600 kg in 5–7 months).

Cattle prices are negotiated between cattle merchants and livestock associations, which, in turn, respond to prices imposed on them by feedlots and meat corporations. Although prices are legitimated by the livestock associations, small-scale cattle raisers in need of cash may even sell their calves to intermediaries at lower prices. Furthermore, merchants often find reasons to pay less (e.g., poor cattle health, presence of ticks, a high level of supply). Merchants compete among each other by offering payment in cash or in a single payment, generally within the limits of the price negotiated between intermediaries and cattle raisers.

The dynamics of capital accumulation lead to extremely difficult conditions for small- and medium-scale cattle raisers, many of whom have expressed that they are considering selling their ranch and cattle, given that their expenses exceed their income. The smaller the scale, the more difficult it is to earn a living through cattle raising. Furthermore, small-scale cattle raisers frequently decapitalize upon selling cattle to pay debts, often due to family medical needs or expenses for children's education.

The imposition of this model is a result of the political meat power network of governors, national and local authorities, congress members, small- and large-scale intermediaries, and cattle raisers of different scales. The founder of SuKarne ran for governor of Sinaloa, demonstrating the relationship between economic and political power. While power circulates among many interest groups and is exercised by all actors in the sense of Foucault's notion of the microphysics of power, fundamental power inequalities exist between agribusiness and cattle raisers. Meat power exercised by transnational meat corporations and local and national authorities has increasingly been enacted through political and economic control of the entire value chain of meat production, marginalizing and creating economic and social vulnerabilities and uncertainties for small- and medium-scale cattle raisers. Moreover, the dominant cattle-raising model provokes deforestation, biodiversity loss, and land degradation, and leaves little space for developing alternatives based on silvopastoral systems.

In this context, given that fattening cattle is principally carried out by big business, and that feedlots experience few of the environmental and economic vulnerabilities faced by small-scale cattle raisers, overexploitation and destruction of rainforests are not a principal concern for them. Despite evident advantages of silvopastoral systems, those cattle raisers promoting such systems face so many environmental, political, economic, cultural, and social challenges that it is very difficult to scale them up. Meat power exercised by transnational meat corporations, political actors, and large-scale cattle raisers is used to overexploit land and reduce the time necessary to market cattle, thereby providing them with access to the big business of meat exportation.

Finally, there is a need to change the predominant model of meat consumption. Reducing or even eliminating meat consumption in our diets would lessen massive livestock production and, in turn, its hoofprint. There is a national—as well as global—need for policies promoting the reduction of meat consumption as the sole protein source, rather promoting the cultivation and consumption of a wide variety of legumes and other protein-rich crops. To avoid the imposition of a meat power future, food models must be jointly developed by farmers, NGOs, consumers, and researchers through a democratic process in order to guarantee food justice as well as socio-environmental justice.

Notes

[1] Small-scale cattle raisers of the study region are characterized by having 8 to 20 head of cattle on 15 to 25 hectares; medium-scale cattle raisers have 20 to 100 head on 20 to 100 hectares; and large-scale cattle raisers own or rent several ranches with a total of 100 to 400 hectares housing 100 to 400 head of cattle.

[2] Vulnerability has been defined in multiple ways, depending on the theoretical framework. From a political ecology perspective, vulnerability is defined as people's "capacity

to anticipate, cope with, resist, and recover from the impact of a disaster" (Wisner et al., 2004, p. 11). Currently, vulnerabilities are also considered to result from diverse social, economic, and political conditions which, in turn, result from historical inequities in accessing resources and power structures that limit the physical, social, economic, and environmental capacities of an individual or a community to respond to the negative impacts of social interactions or hazards. Vulnerability is a multidimensional concept related to equity and socio-environmental justice (Lazos-Chavero, 2020).

[3] Uncertainty refers to future epistemic situations for which information is incomplete or unknown. Farmers continually face a variety of types of uncertainties, including market opportunities, climate variability, crop pests, price fluctuations, and health emergencies.

[4] Through cattle-sharing contracts, large-scale livestock raisers from elsewhere give ejido members half of all newborn calves (with the landowner choosing which calves will be theirs) in exchange for the ejido members providing pasture, labor, and inputs (fencing, grass seed, fertilizer, vaccines, and any necessary medicine) to raise the cattle.

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