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ORIGINAL RESEARCH

From the swine to the sausage: labor time, appropriation of nature, and socio-environmental conflict in intensive pig farming

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Abstract

This article is based on research on territorial logic and the definition of nature according to the pig production industry. It was drafted following qualitative fieldwork conducted in the Southeast Spanish region of Murcia between 2022 and 2024. We use the extraction–exploitation nexus as the analytical framework to present the research results, understood as a way of organizing social space and time for capitalist valorization. The pig production chain organizes, articulates, and coordinates social space and time according to the intensity of the production rate. The extractive logic of the pig farming production chain is also discussed. We pose that the meat farm production chain defines a frontier of appropriation of cheap nature for the accumulation of capital, transforming rural spaces both into territories where essential resources (such as water) are appropriated for the operation of large-scale pig farms, and into drainage areas for unpleasant waste (bad odors) and contaminants (slurry). Lastly, we suggest that the extractive appropriation of cheap nature requires abstraction according to the logic of value, which contradicts the specific ways of life in the territory and its alternative forms of social valorization.

Keywords Exploitation and time · Pig industry · Extractivism · Social protest movement · Large-scale farms

Introduction

It is early August 2023, and the heat is stifling in the center of the Iberian Peninsula. The road that runs through Serranía de Cuenca, one of the main areas of the so-called "Empty Spain," leaves behind small towns where visitors catch glimpses of attention-grabbing signs displayed in the windows. The signs sport various slogans, including "Villages aren't populated with pigs and slurry. Stop population decline!

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Say No to Factory Farming!" Between 2017 and 2023, similar messages could be seen in multiple villages across rural Spain.[1]

Simultaneously, the number of pigs increased by 34.8% between 2011 and 2021. This established Spain as the third-largest producer of pigs in the global meat market (only behind the USA and China) and the largest in Europe, producing some 5.07 million tons of meat, or 56.65 million animals slaughtered in 2022 alone (Interporc 2023a; 2023b). Out of this arises a connection between the meat requirements of the global-corporate food regime (McMichael 2016), the territorial expansion of pig farms throughout rural Spanish land, and the emerging protest movement against factory farming.

In this article, we raise the following questions surrounding the logic of territory and the definition of nature as per the pork industry underlying the aforementioned connection:

1 What type of production of space does the meat industry promote to enable the production intensity required by the global-corporate regime? We argue this is possible via the implementation of a streamlined pig farming production chain in the region. In "Territory and work in the pig farming production chain," we use the extraction–exploitation nexus as the analytical framework to present the research results, understood as a way of organizing socio-ecological space and time for capitalist valorization. From this perspective, pig farming operations entail a logic of value defined by the dominance of socially necessary labor time. The pork production chain organizes, articulates, and coordinates social space and time according to the intensity of the production rate.
2 Why do the most peripheral rural spaces become preferred locations for pig farming industry investment? The definition and organization of nature promoted by the pig farming industry explains why large-scale farms invest in rural spaces. "Extraction of territorial resources" addresses the extractive logic of the pig farming production chain, which requires the production and appropriation of cheap nature (Moore 2020). We pose that the meat farm production chain defines a frontier of appropriation of cheap nature for the accumulation of capital, transforming rural spaces both into territories for the appropriation of cheap labor and biophysical resources, and into sinks or drainage areas for unpleasant waste (bad odors) and contaminants (slurry).
3 What type of social rationality incites the rise of protest movements against pig farming investments in rural spaces? In "Disputed nature: social valuation logic,"

[1] See https://www.elsaltodiario.com/rural/espana-vacia-rebelion-macrogranjas-industriales-porcinas-cerdos. According to the above article, a movement against factory farming was started in 2017, organized by neighborhood groups collaborating with ecological groups such as *Ecologistas en Acción* and Greenpeace, leading to the emergence of widespread movements like *Stop Ganadería Industrial* (Stop Industrial Animal Farming) (https://stopganaderiaindustrial.org/). One of the first neighborhood movements to revolt against factory farming was the *Plataforma Loporzano SIN ganadería intensiva* (Loporzano Platform AGAINST Intensive Animal Farming) (at https://elpais.com/clima-y-medio-ambiente/ecologia/2021-10-13/cien-mil-cerdos-para-131-habitantes-la-espana-vacia-que-se-rebela-contra-las-macrogranjas.html).

we suggest that the extractive appropriation of cheap nature required by the pig farming industry necessitates abstraction according to the logic of value, which contradicts the specific ways of life of the territory and its alternative forms of social valorization.

This article is based on empirical research conducted in the region of Murcia. This Spanish Mediterranean region, despite representing only 2.24% of the country's surface area, concentrates 7.8% of its pig livestock, with a total of 2.63 million heads (2021 data, Interporc 2023a, b, c), ranking third in total Spanish production behind Catalonia and Aragón. A global meat processing center established itself in this region, whose territorial logic includes an extensive production process that joins numerous rural towns throughout Spain, where farms, feed factories, truck fleets, supply companies, etc. are located. At the same time, protest movements against these factory farms have also emerged in these areas. Table 1 shows the 22 interviews conducted during the fieldwork carried out between 2023 and April 2024 across the production chain, from the farm to the meatpacking plant. The interviews, together with the ethnography and observations, made up the methodological research strategy.

Furthermore, to study the appropriation of nature and the environmental conflict it incites, the research focused on the upper districts of the township of Lorca in the region of Murcia, an area where numerous pig farms have set up in the last decade. It is also home to multiple protest movements against these investments, as is the case of the district of Doña Inés.[2] Our fieldwork consisted of several successive research visits throughout 2022 and 2023, led by residents from the Doña Inés and Zarzilla districts and the Espartaria cultural association. In addition to visiting the region, we conducted several interviews based on a semi-structured questionnaire, as shown in Table 1.

Territory and work in the pig farming production chain

The highway between Lorca and Murcia, which runs parallel to the Guadalentín river, is a continuous flow of trucks carrying pig enclosures. A meat production center made up of large slaughterhouses and production plants can be found between Lorca and Alhama. Imagine if, instead of trucks, these millions of pigs, which typically weigh 115 to 120 kg, walked in orderly rows from the feedlot finishing farms toward the large plants where they are transformed into sausages. A sort of "pigway" would be created, whose length is difficult to imagine, though it would certainly extend beyond the confines of the highway and fill numerous secondary roads. The

[2] A district is an infra-municipal entity whose purpose is decentralized administration of population centers with characteristics that are specific to and/or different from those of the Town Council. Districts are recognized as having jurisdiction over collective property (fountains, communal washing areas and drinking troughs, rural roads, mountains, springs and rivers; street cleaning, etc.) article 24 bis, Law 7/1985, of 3 April, Law Regulating the Establishment of Local Government).

Table 1 In-depth interviews conducted during fieldwork

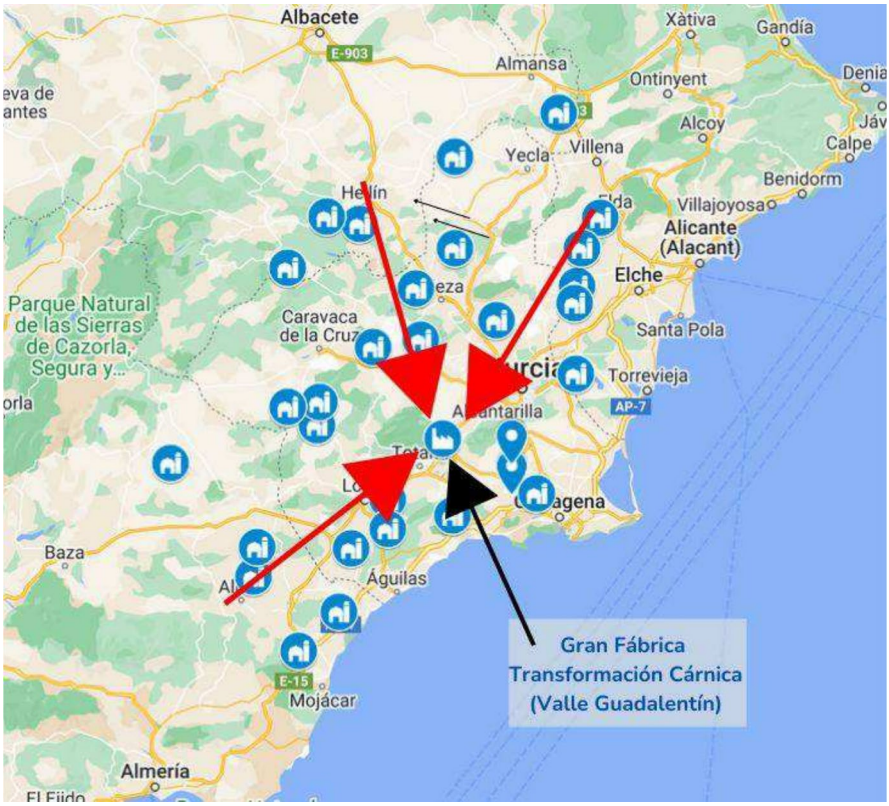
Section	Position	Interview codes
Animal farms	Farmers from integrated farms (5)	E8, E11, E15, E20, E21
	Wage laborers on own integrated farms (1)	E4
	Veterinary staff	E3
	Senior and intermediate positions in integrated companies with slaughterhouses (2)	E1, E6
Livestock farming auxiliary services	Digitalization services (3)	E2, E10, E12
	Environmental technical consulting (1)	E13
Meatpacking factories	Wage laborers in meatpacking plants (4)	E5, E7, E22, E18
	Small slaughterhouses (1)	E14
Local and environmental activism	Representatives from local and environmental associations (2)	E9, E17
Consumers	Representative association of ecological consumers (1)	E19

line of pigs would spread out in a widespread swathe across much of Andalusia, Murcia, La Mancha, and the Valencian Community, converging at the meatpacking plant in the Guadalentín Valley (see Map 1).

This fictional image represents the territorial logic of the pig farming industry. It is defined by its vast use of space, over which farms and livestock operations are distributed discontinuously, organized end-to-end, from the production centers that coordinate the flow of consumables required by farms (feed, veterinary care, etc.) to the transportation of pigs to the slaughterhouses. In this territorial logic, centrifugal forces (discontinuous distribution of hundreds of farms in rural areas) are counteracted by centripetal forces (centralized business coordination and transportation).

This territorial organization model is linked to two characteristic trends in the pig farming industry that have been operating intertwined for decades. On the one hand, the trend towards intensive and specialized production, and on the other, the trend towards concentration/centralization into large business units.

We explored this territorial logic based on two large-scale meat production companies whose core activity is located in the Guadalentín Valley (Murcia).



Map 1 Flow of pig farms towards the large meat production plant (GFTC as per the Spanish acronym). Source: Google maps. Own elaboration

On the one hand, we have a large breeding and finishing company located in Lorca (Murcia Region), hereafter referred to as GE. It arose as part of the "feedlot revolution" the area experienced in the 60 s and 70 s (Segura et al., 1991).[3] It currently encompasses over 600 farms, of which 80 are integrated farms (vertical integration contracts) while the rest (520) are own farms. The 520 own farms employ the 400 to 450 employees hired by G1 and have a total annual production of two million pigs. Approximately half of the production is sent to a slaughterhouse owned by the same family group as the company, while the other half is sent to slaughterhouses around the country (one of the closest clients is the GFTC slaughterhouse).

On the other hand, we have a large meatpacking plant located in the Guadalentín Valley in Murcia, referred to previously and hereafter as GFTC. With the global and corporate food regime (McMichael 2016), these large meat companies and food distributors started creating their own brands, positioning themselves at the center of the integrated pig farming chain. The company refers to this organization as "a unique circular management model called Integrated Process Control (IPC), which allows us to control all phases of the production process."

For decades, livestock farms have been connected or integrated into these large meat production companies. They make up an organizational "networking" model (Cooke and Morgan 1993) that organizes production as a continuous production chain scattered across the territory and practically covering the entire country. Following the network paradigm proposed by geographers P. Cooke and K. Morgan, this grid-based organizational model features two connected, differentiated areas: 1) intraorganizational networking, or organization of the company's internal production space and 2) interorganizational networking, or the organization of the company's relationships with other companies involved in the production network (Cooke and Morgan 1993).

Intraorganizational networking

Intraorganizational networking differentiates between three large production units. The first is the CPC (*Centro de Producción Cárnica,* or Meat Production Center), where more than 60% of the GFTC workers are employed preparing fresh meat products (includes the cleaning, primary, and secondary areas). The second unit is the CLY (*Centro de Loncheado y York,* or York Ham and Slicing Center), where lunch meat ham and sliced cured sausage are produced. The third is CLE (*Centro Loncheado y Elaborado*, or Slicing and Processing Center) where dry cured sausages sold in packages are made. This unit has the fewest and most experienced staff.

The process is as follows: Once the pigs arrive at the plant, they are isolated in stables for 24 h to allow them to calm down and adjust. They are then sent to the slaughterhouse, equipped with a rail system where they inhale gases and die of

[3] This transformation refers to the expansion of feedlot farms as spaces for intensive exploitation of the pig fattening or finishing cycle to the detriment of traditional piglet production, which represents a fundamental shift towards integration of the sector into the meat industry.

asphyxiation. The first task is for a worker to bleed the carcasses to prevent them from rotting.

They are then cleaned by removing all the viscera and cut open along the abdomen. There are two lines operating at the same time, with between 30 and 40 people performing these initial tasks during each 8-h shift. The carcasses are then left to rest for another 24 h.

The next area is the "primary" area, where the carcasses are quartered, separating the heads, bellies, hams, ribs, shoulders, etc., which are placed on tables for final cleaning. Once quartered and separated, the meat moves to the "secondary" area where the meat is processed to be sold fresh or to make sausages in another area. Depending on the product, it may be sent to the slicing area to make finished products for supermarkets. Last are the "dry" cured meats. These are the ham legs that are taken to drying facilities throughout the region, such as Jabugo, as the central factory does not have sufficient space to dry the massive number of hams produced.

The final phase is "logistics and shipping," where all the products are packaged and palletized and loaded onto trucks. No more than two days pass from the moment a pig enters the slaughterhouse until it is commercially distributed, with the exception of dry-cured products. In just 48 h, a live pig enters the plant and is reduced to a product (more than 1500 food items are produced, between fresh and processed products, a wide range of lunch meats, deli meats, sausages, and a wide variety of cured meats and hams). Imagine this on a scale of approximately 48,000 to 54,000 pigs per week during the high demand season.

The strategic variable that must be integrated and compressed as much as possible is labor time. To achieve this, all the production phases are streamlined by replacing space with time. Fordist technologies (conveyor belts, etc.), automation, and robotization, along with wage incentives to intensify work speed (such as performance-based wage bonuses).

Meatpacking workers have assimilated and normalized this constant intensification of work and gradual increase in production speed. The labor relationship is based on a system of "*incentives of the more I do the more I make*" and "*in all honesty, we've always lived like this*" because we work like "*animals*" and "*when you're already at your limit, you can't work any faster*." The problems this intensification causes are a structural issue of the neo-Taylorist organization of work, a model implemented years ago and little protested against by employees and unions; a way of organizing production that has been normalized over time because "*it is embedded in our genes (…) a [GFTC] worker always performs above their capabilities, it's always been that way"* because "*it's something we'd already come to terms with, since we weren't worried about whether we had to work 9 h, or 10 h, my hands will hurt more or less"* (discussion group with GFTC workers).

These representations of work intensification ("we work like animals" and "it's embedded in our genes") show how a specific way of organizing work to increase value can take shape. In short, they express how shaping human nature as cheap labor is a condition for labor exploitation (Moore 2020; Blanchette 2020).

Table 2 Three phases of livestock raising and finishing process

Production phase	Farm type
PHASE 1	"Sow" farms for insemination and gestation of "piglets." Sows feed the piglets with their own milk until they reach 6 kg (approximately), when they are weaned
PHASE 2	Farms with weaned piglets or nurseries. Piglets arrive weighing 6 kg and are fed with special feed until they reach a weight of 20 kg. At this point, the "pigs are stronger and are moved to growing and finishing farms" or feedlots
PHASE 3	Growing and finishing farms or feedlots. Pigs arrive weighing 20 kg and are fed until they reach 115 kg, at which point they can be taken to the slaughterhouse

Interorganizational networking

The trend towards the concentration and centralization of capital, as seen in our research on GE and GFTC, entails a similar model of interorganizational networking in both cases. Nevertheless, the trademark of the GFTC model deepens the real subsumption of producers in capital as it entails greater control and integration (both of producers and the integrated parties), which must adapt their processes to meet quality standards, delivery times, and greater product standardization (Soldevila 2006, p. 715).

Everything plays out as if the above tense and intense temporality of the internal organization of work in meat plants also applied to the territory, to interorganizational networking, and specifically to the production farms and the transport component that ensures movement. The way the pork industry organizes and exploits territory implies a specific model of labor organization and exploitation.

In this interorganizational networking, the livestock operations are not standardized but are differentiated according to their specialization in one of the three phases of livestock raising and finishing process (see Table 2).

Prepared by the authors based on interviews with GE farmers and directors

This breakdown of production phases and the resulting specialization of farms forms a network featuring a central meat plant coordination and control center. This entails a way of organizing space and nature. On the one hand, we have the extensive rural geography that houses thousands of production farms coordinated via the meat production center located in Murcia. Both GE and GFTC make up a geography that is mainly found across the southern half of the peninsula,[4] although in the case of GFTC, this may include other regions such as Castilla-León or the Valencian Community.

[4] The location of the five GE-owned factories that produce its own compound feed is an example of this southern geography: two in Lorca (Murcia Region), one in Jaén (Andalusia), one in Talavera (Castilla-La Mancha), and another in Toledo (Castilla-La Mancha).

Each phase is carried out at specialized and differentiated farms across the territory, as farms that integrate all three phases are not at all common (both GE and GFTC have some farms that combine phases 1 and 2).

A logic of production of nature is implicit in this way of organizing production. If farms are broken down into tasks and widely distributed, so too are the risks of disease transmission, environmental pollution (unpleasant odors and slurry), and the use of natural resources (soil, water, and atmosphere). The aim of this model is to disperse the socio-environmental risks of the production process.

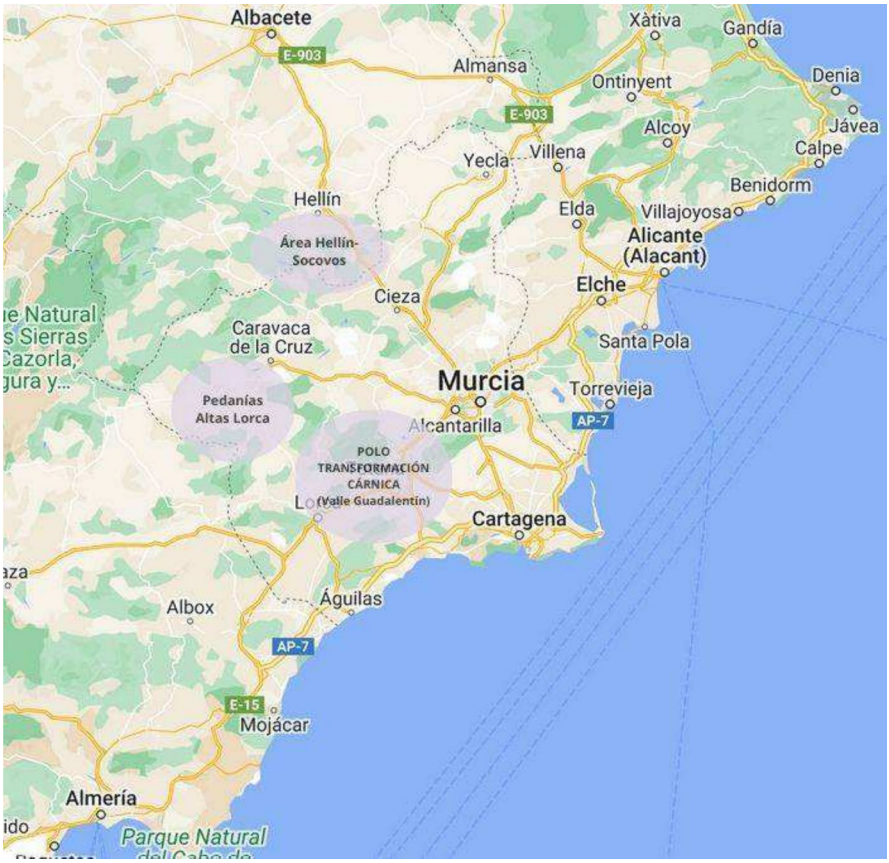
Geographical extension and dispersion require time–space compression (Harvey 1990) of the interorganizational networking group. This is achieved via streamlined organization of the social time involved, which entails replacing space with intensive and efficient time frames. The result is a process of abstraction with respect to the specific territory. In other words, the constitution of a standardized and abstract nature (Moore 2020; Blanchette 2020).

The concentration and centralization of livestock operations, known as "factory farms," has been a key driver of space − time compression in recent decades. With increasing production rates and product standardization as central requirements for competition in the global and corporate food regime, the pig farming sector has begun a shift towards a greater concentration of pig farms, causing a drop in family farms, especially the smallest farms, and the emergence of large-scale farming operations with salaried wage laborers that have grown by more than 60% in the last decade (Pedreño et al., 2021).

Space − time compression also occurs through an extensive network of specialized road transport, for example trucks with specific cages for transporting livestock between farms for the various phases.

Thirdly, the digitalization of processes on finishing farms or feedlots enables precise coordination and control from the central organizational unit and is also a form of replacing space with time, as the executive of the large meat production company (GE) explained in an interview: *"Our 600 farms are located across all of Spain, so they are very far apart. This is not a very local production center… No, no, in the southern half of the peninsula we have farms in almost all the provinces. So, the farmers have mobile applications that they use to enter a whole lot of data. They have an application to order the feed they need, and they log data of how much feed has been used"* (E1).

Fourth, spatial compression is achieved by streamlining labor time. Farm intensification and specialization has led to the digitalization of tasks such that fewer employees control a large number of farms with considerable production volume. In the case of GE, 400 wage laborers work on 600 farms with a production capacity of two million pigs. We visited a GFTC farm, one of the largest factory farms in Spain, in Cancarix (Hellín, Albacete, see location on Map 2). It is made up of twelve finishing units and four nurseries where 6000 to 7000 pigs are fattened in each unit (4 buildings with 1200 to 1500 pigs each). A single employee called a "unit supervisor" is responsible for the tasks of one finishing unit (i.e., 6000 pigs). This involves monitoring feeding and the general condition of the animals, vaccinations, etc. In total, there are 70 workers on the farms as



Map 2 Research and fieldwork territory. Source: Google maps. Own elaboration

well as 10 to 15 tractor drivers who remove slurry for an estimated production of 120,000 pigs.[5]

This streamlined workforce seems to fulfill the corporate dream of a worker-free farm. But this ideal is disproved, not only because farms still require humans for supervision, veterinary care, and manual labor (cleaning, tractor drivers, etc.), but also above all because of the increasing need for human labor in livestock transport.

The truck fleet deployed by pig farming production is supported by a vast number of self-employed truck drivers. Organizing livestock transport is the main centripetal force that counteracts the scattering over space of farms and replaces space with intensive labor time. Intense demand and strict scheduling, combined with hygiene and welfare regulatory requirements, make transportation management a tense issue. Considering these are live animals (moving cargo) transported by drivers who are

[5] All the data provided in E8 came from an interview with a GFTC integrated farm manager.

often subject to exhausting demands and travel many kilometers on country roads, all the conditions are in place for accidents to occur, which can sometimes be fatal.[6]

Since human labor is here to stay, the valorization of capital must find ways to obtain cheap labor: hiring immigrant labor, outsourcing tasks to falsely self-employed workers, extending working hours, etc. (Pedreño et al. 2021). The vertical integration contract with farmers, common in pig farming, is an efficient mechanism for asymmetric sharing of the risks of pig breeding and finishing between the integrating company and the integrated farmer, ultimately securing cheap or low-paid labor time.

During our fieldwork, we spoke with and visited several integrated farms that had opened in recent years in the town of Socovos, in the Sierra del Segura region of Albacete (see Map 2). There, one integrated livestock farmer told us of the asymmetry of risk distribution. The profit of the integrated livestock farmer depends on the total number of kilos of finished animals taken to the slaughterhouse: *"The more kilos taken to the slaughterhouse, the more kilos I produce, the more money I earn."* But if an animal dies for any reason (usually due to illness) during the finishing process and before being taken to the slaughterhouse, the integrating company loses the money invested in the animal up to that point: *"the company loses the vaccines, the feed that animal has eaten, the cost of the piglet… everything they've had to invest in it,"* while for the integrated farmer it means the complete loss of labor time dedicated to raising the animal. In other words, that labor would not have any value and would not count towards the capitalist calculation of the integrating company: *"I lose my job. If that animal is worth 13 euros, then if it was halfway through the finishing phase and was worth 7, then I lose those 7 euros."* Integrating companies use integration contracts to ensure the acquisition of a workforce, a commodity whose use value has "the property of being a source of value, so the consumption of this commodity generates value, and in fact more value than it costs" (Heinrich 2008, p. 101).[7]

Lastly, the animals' own life cycles are cut short due to the intensive logic of producing more in as little time as possible. In just three or four months, a suckling piglet is fattened to its optimal weight of 115–120 kg on a feedlot. At that point, a truck fleet immediately transports the pigs to the slaughterhouse and meatpacking plant on a daily basis. This space–time compression is achieved via 1) increasing sows' productivity to the greatest extent possible as measured in terms of yearly animals for slaughter,[8] and 2) feed efficiency with a total feed conversion ratio calculated for the number of kilos of feed required to produce one kilogram of pork: *"This this used*

[6] https://www.laopiniondemurcia.es/sucesos/2022/07/03/muere-conductor-precipitarse-camion-cargado-67929661.html

[7] The quotes from this interview are taken from E8, an interview with a farmer who owns a GFTC-integrated feedlot in Socovos (Albacete) where it raises 1646 pigs.

[8] Sow performance is an important production cost, leading countries to compete to increase their productivity as much as possible: "Denmark and the Netherlands lead the sow productivity list with about 28.0 weaned pigs sold per sow per year. They are followed by Germany, Belgium, France and Ireland, with 25–26 pigs sold per female per year. Meanwhile, most other European and American countries produce 22 to 24 weaned pigs per female per year" (Hoste 2020).

to be around 5, meaning you needed 5 kilos of feed to produce one kilo of pork, now it's around 2.5 or less. 2.5 kilos of feed to produce 1 kilo of pork… We produce over 600,000 tons of feed and produce 200 and some thousand tons of meat per year. So those two million pigs weigh 200,000 tons and change. To produce those 2 million pigs weighing around 200,000 tons, we needed around 600,000 tons of feed" (E1, GE manager interview).

This section presented an initial overview of the extraction–exploitation nexus, showing the logic of social production of the territory used by the pig farming industry. In the analysis, a territory and nature organization model emerged that is increasingly abstract compared to its specific characteristics, to the extent that it has become determined by the law of socially necessary labor time to make capitalization and accumulation feasible through the exploitation of labor. It is an "abstract nature" (Moore 2020) organized by the accumulation of capital.

Extensive use of nature has emerged as a condition for intensive pork production. We will next address the implications of this nature as required by accumulation. This leads us to delve into the other element of the nexus: the extraction or appropriation of biophysical resources produced by nature.

Extraction of territorial resources

Just 50 km from the meat production center located in the townships of the Guadalentín Valley, there is a large area of dry land, demarcated by the Sierra Espuña, Burete, and Sierra del Gigante mountain ranges, where there used to be large estates surrounded by small, inhabited population centers. There are seven upper districts in Lorca: Avilés, Coy, Culebrina, Doña Inés, La Paca, Zarcilla de Ramos, and Zarzadilla de Totana (see Map 2). The territory occupied by the seven districts is 452.573 km^2, with a population density of 7.32 inhabitants/km^2 (very close to that described for the so-called "empty Spain").

When we enter the upper districts of Lorca, the first thing to catch our attention is the proliferation of pig feedlot farms. The investment by the ELF group (a fictitious name) is particularly noteworthy, with feedlots located on a vast expanse of more than 2000 hectares of old non-irrigated fields and a production capacity of 90,000 pigs per year. This pig production center is located on what were once the grain-producing grasslands of the Casas de Don Gonzalo estate. The former grain-producing estate transformed into factory pig farming persists as a space of power.

During a tour of this territory during our fieldwork, we discovered that the buildings that once housed the day laborers of the old estate, located around Don Gonzalo's mansion and his chapel, are now home to Romanian immigrant families, of which the men work at the ELF feedlots. We found about ten occupied homes in apparently good condition after renovation, though they are far away from the urban center of the Doña Paca district. At our visit during working hours on April 4, 2023, we only saw women looking after the houses and a group of 8 to 10 children playing in the street.

From this immigrant sub-proletariat residential space, you can see just a few kilometers away where they work every day: the streamlined and abstract landscape

of the ELF group's factory farming operation. The feedlots are built in evenly distanced rows, identical in size and shape, and located according to their phase in the work process (feeding pens for sows, for suckling piglets, and for finishing). This "abstract nature" recalls the disciplinary and instrumental logic of a military camp. The distribution of the feedlots is measured and compressed as much as possible while complying with the regulations for space between farms. To maximize the land used for pig breeding and finishing, large vacant spaces are left between farms.

Within the township of Lorca, the upper districts form part of the large dry land surrounding the urban center and the Guadalentín River valley. Therefore, within the territorial dynamics of the pig farming sector, the dry lands of Lorca, and these districts specifically, we could say "a border" has been defined for two reasons. On the one hand, the town hall's decision to change land management in the Lorca valley, which is highly urbanized and oversaturated with pig feedlots. This land use change will focus the growth of pig farms towards the less-populated periphery. On the other hand, the expanding cycle of global pork production enabled the expansion of large local meat producers, whose valorization logic necessitated the search for peripheral territories to establish new meat production centers.

Looking at a map of pig farms in Murcia (in CARM 2019), we can see the existence of this same "border" idea. Of the agricultural regions with the highest saturation of pig farms, the highest concentration is found in the Campo de Cartagena region with 352 and in the Valle del Guadalentín region with 950 (CARM 2019); between the two, they represent 86.2% of existing farms (a total of 1509). On the other hand, those areas with lower concentration and greater availability of rural spaces with low population density (dry lands, natural spaces, etc.): the Altiplano region with 11 livestock farms, 37 in the Mula River, 54 in the Northwest, and 105 in the Vega del Segura (CARM 2019).

This side of the border, with its lower population density and lower pig farm development, is the area under dispute, driven by the expansion plans of meat companies mainly located on the other side of the border. There is now a movement to relocate these factory farms beyond the traditional pig farming areas where high levels of saturation have already been reached.

By expanding into new investment territories, the pork industry guarantees the spatial and natural conditions it needs to expand production. Referencing Jason W. Moore (2020), we will discuss a "frontier of appropriation" that has aimed towards rural areas with lower population density, such as the upper districts of Lorca, to set up factory farming in search of the intensive appropriation of "cheap nature."

One of these appropriations that is key to capitalization is water extractivism. As in other rural areas, the appropriation of water by large pig farms has been a key reason for their location in the upper districts of Lorca.[9]

On the one hand, groundwater and springs are overexploited to meet the pig industry's water demands. On the other hand is the problem of the Taibilla Canal

[9] Intensive livestock farming in Spain has greatly increased water demand. Animal feeding and feed production now accounts for 98% of the 48 billion cubic meters of water livestock farms use in Spain each year, equivalent to all the water used by Spanish households over 21 years (Greenpeace, 2018).

Association (MCT) appropriating water resources that were originally intended for human consumption. Given the scarcity of water in the area, the few existing freshwater reserves are at risk of constant and not always legal appropriation, within an institutional context that lacks planning and supervision of water use intended to supply industrial pig farms and the production of feed for livestock.

The upper districts of Lorca are mapped out by the Turrilla hydrographic network (López Fernández 2020). This region is characterized by a semi-arid climate and a lack of permanent waterways or surface resources. Therefore, the supply of water for people, livestock, and irrigation has traditionally occurred via groundwater sources, which led to the development of numerous horizontal galleries and the construction of ponds, canals, communal washing areas, or basins that are part of the cultural legacy of this space (López Fernández 2020).

Near towns, small vegetable gardens supplied with water from springs can still be found. Specifically, the Ojos de Luchena spring has supplied water to the town and created irrigated areas. This system runs into the Puentes reservoir, where its waters join the flow collected in the Turrilla river-ravine network (López Fernández 2020). In addition to these local systems, water availability is supplemented by deep wells and the use of wastewater. However, due to high salinity, underground resources are rejected by local farmers, especially the Campo Alto Irrigation Community in Lorca.

One recent social conflict surrounding water resource use in the area is related to the "la Mina" spring gallery system in the La Paca district. For some years, the flow of this natural spring has been claimed by the Campo Alto Irrigation Community to irrigate its members' numerous plots of land (López Fernández, 2015). In recent years, irrigation water in this area has come from the Don Gonzalo–La Umbría aquifer's own resources via deep wells, although overexploitation has increased following the 2013–2014 drought. However, the flow of the "La Mina" gallery has remained more or less stable, indicating that it belongs to a small but independent aquifer.

In 2014, the Campo Alto Irrigation Community requested to use a volume of 250,000 m^3/year from this spring from the Segura Hydrographic Confederation (CHS). The irrigation area was 435 hectares and covered the area between the towns of La Paca and Zarcilla de Ramos. While the irrigation community initially consisted of a total of 119 registered members, that number currently exceeds 300.

In response, the Avilés, Coy, and Doña Inés neighborhood associations feared that, once the irrigation community began to manage the water in these districts, a progressive change from traditional crops to other intensive uses (agricultural and/or livestock) would be legitimized in an uncontrollable manner.[10] Those other intensive uses include the pig farms that now make up part of the water demands of the irrigation community.[11]

[10] https://www.laverdad.es/murcia/lorca/agua-manantiales-enfrenta-20220824234037-ntvo.html

[11] According to Ecologists in Action, citing data from the Ministry of Agriculture and Livestock of the CARM, in 2022 the Region of Murcia had more than 5650 registered livestock farms, most located in the Guadalentín Valley (2561).

Paradoxically, even in times of scarcity, the Campo Alto Irrigation Community continues to grant licenses for water resources that, to this day, are unavailable. Therein lies the residents' distrust, as those new licenses could be used for pig feedlot operations.

Water extractivism or appropriation is a central argument for the extensive territorial location of farms or operations by the pig industry, especially in a biophysical context of aridity that limits resource availability. Unlike exploitation, appropriation often involves turning to practices that are legally questionable or at least ensuring that institutional regulations are adapted to facilitate extractive interests.[12]

Disputed nature: social valuation logic

In the last decade, significant social conflicts have arisen in rural areas against pig factory farms. Proponents of these investments argue that they are an asset in preventing rural depopulation. The business association Interporc, which unites the pork sector, states "that the more than 86,000 pig farms in the country provide employment to 400,000 families" directly and indirectly, mostly in rural areas, and therefore are"essential to fighting depopulation."[13] The representation of the "rural demographic void" has been a disputed signifier in this conflict.

In rural areas, there are many workers available to work on farms or even become integrated farmers, as is the case with several of the individuals we interviewed who, after losing their jobs in the 2010 crisis, turned to pig farming as an alternative to construction. In these rural population segments, the demographic void argument is also used to support factory farming and its positive effects on consolidating population in these areas.

Factory farming opponents argue that the environmental impact hinders the potential for rural development. This type of conflict challenges the boundaries of appropriation of nature and reinforces the dynamics of extractivism created by the global restructuring of pork production. The collective representation used by the anti-factory farming movement is that rural areas are becoming "sacrificial territories," as they are used for investments such as factory farms or solar/wind farms that have a negative impact on the population.

[12] Regarding the regular use of illegal actions in water extractivism, we recently discovered the Civil Guard's campaign titled "EEMAME" in Murcia. In this case, 15 individuals are being investigated for alleged illegal extraction of groundwater, dumping, and illegal accumulation of pig waste in Alhama de Murcia, Cartagena, Fuente Álamo, Torre Pacheco, and Totana (area with a high concentration of pig factory farming) (https://www.datadista.com/newsletter/89-operaciones-contra-la-extraccion-ilegal-del-agua-y-sorpresa-politicos-el-campo-no-es-negacionista-climatico/).

On the topic of the permissiveness of government regulations, it recently came to light that the Autonomous community of Murcia granted permits for 70 pig farms to practise intensive pig farming without submitting the files for environmental assessment or obtaining integrated environmental authorisation (https://www.laopiniondemurcia.es/comunidad/2023/07/03/afectados-falta-autorizaciones-ambientales-temen-89409646.html).

[13] In https://elpais.com/clima-y-medio-ambiente/ecologia/2021-10-13/cien-mil-cerdos-para-131-habitantes-la-espana-vacia-que-se-rebela-contra-las-macrogranjas.html

Underlying this controversy is the social production of territory by pork capital and its definition of nature. In contrast to this abstract nature, the territory's specific ways of life pose alternative logics of social valorization. The upper districts of Lorca reveal the logic of this dispute or controversy.

The upper districts of Lorca residents who are opposed to factory farming are people whose social reproduction strategies are not connected to the pig farming industry. They are small farmers, hotel and restaurant owners, new residents, etc. They try to define a social value of nature, demanding protection of the Cerro del Tornajo for its natural and paleontological value, community work by residents to channel and restore the Pocico spring, displaying the value of botanical heritage, and commitment to creating hiking and cycling routes, etc. They are practicing a kind of territorialization in which the neighborhood communities assign social, political, and cultural value to the territory in which they live (Beltrán & Vaccaro 2011).

The districts' neighborhood associations are encompassed within the Espartaria Federation of Neighborhood Associations based in La Paca, which includes neighborhood associations from 10 different districts (Doña Inés, Avilés, Coy, Las Terreras, Cercedilla, El Rincón, Don Gonzalo, and Nogalte). This Federation is the vehicle for community organization and action, not only to defend the territory against socio-environmental attacks from factory farms opening on its land. The Federation is also very active in defending the cultural and sporting values of the area.

Neighborhood associations are mobilizing to condemn the illegality of establishing factory farms near population centers. Furthermore, they are implementing various economic strategies to revitalize the area and apply a different land management model through organic farming (pistachios, almonds, and wine), promoting rural tourism (sports itineraries and restaurants), and enhancing environmental and cultural values, which they aim to protect through various measures.

Espartaria filmed a video complaint titled "Licenses to Kill," showing the damage the pork sector has caused. That was just the prelude to the mass arrival of factory farming in the territory. This initial disruption led members of the La Paca neighborhood association to consult the legislation regulating the installation of pig farming operations. They discovered that municipal decrees permitted their construction within 500 m of rural population areas, while the legal minimum for the entire territory was 1500 m for cities.

At that point, residents began to collect information about illegal farms and to organize around a different definition of nature, placing value on cultural and environmental heritage, and supporting long-standing forms of economic activity, ultimately demonstrating that the territory is definitely not "empty."

Conclusion

The territorial analysis of pig farming in this article has given us a glimpse of a scenario structured by what Jaume Franquesa called "the spatial logic of neoliberalization" of "emptying and filling" (Franquesa, 2007). In this production model, space and nature appear as fundamental structures for accumulation.

On the one hand, the integration of livestock into the meat industry requires an extensive use of space and nature to distribute the environmental risks across the territory, both those resulting from resource extraction (water and soil) as well as the effects of its role as a sink for unpleasant odors and slurry. It has also required the implementation of strategies to obtain cheap labor via vertical integration contracts, intensification of labor time, and taking advantage of flexible and unregulated methods of wage relations. To do this, scarcely populated rural areas are presented as "demographic voids" by business associations and development policies and thus are considered ideal for implementing large-scale farms. Though the underlying reason for this need for nature is extractivist, it legitimizes itself as a way of demographically "filling" in the depopulated rural territories.

On the other hand, the analysis revealed an intensive use of space and nature through its reorganization using the logic of socially necessary labor time. This compression of space through efficient and intensive organization of social time (streamlining of farms, movement and transportation, work speed, animal raising and finishing) is a necessary condition for exploitation and capitalization.

The territorial analysis of pig production organization reproduces the central periphery–periphery diagram that has been "emptying" rural spaces to "fill" them with abstract nature. The territorial logic of pork production is based on an economic model of agglomeration that creates an unequal territory: "On the one hand, economies of scale are based on the spatial concentration of capital, resources, and talent, whose externalities in terms of pollution and loss of environmental quality we recognize and even accept. But, on the other hand, the consequences that specifically affect rural territories have remained unclear, without explicit recognition: depopulation, demographic imbalance, devaluation of entire social groups, loss of social capital, or regional economic decline" (Camarero and Pedreño, 2021, p. 121).

The discourses that advocate filling "empty" rural spaces with large pig farms alter the causal explanation of rural depopulation, presenting themselves as a solution to the problem in the face of the rural populations' supposed inability to manage their own destiny. Therefore, the vaccine prescribed by the meat industry and rural development institutions, the "filling" with "capitalist pigs" (Anderson 2019), has been none other than "delving deeper into the same development model that places them on the periphery. It is not surprising, in this sense, that the analytical tool of "global commodity chains" has ended up becoming part of the recipe book issued by development institutions as a solution to the deficits of "integrating" peripheral territories" (Camarero and Pedreño, 2021, p. 124).

From this perspective, these emerging rural social movements against large farms must be understood as a struggle for recognition of the validity of their specific ways of life in light of the abstraction induced by capitalist assignment of value. Water extractivism or water appropriation is a key indicator for understanding these socio-environmental conflicts. These territories, characterized by their arid nature and limited water resources, are impacted by institutional practices that are often manipulated to facilitate extractive interests. The scarcity of water resources, either surface-level or underground, causes a vast imbalance between the elevated water demands of intensive livestock farming and the available resources.

The exploitation–extraction nexus has not yet led to a connection between labor battles and neighborhood struggles for other forms of nature valorization. Neighborhood protests center around the contradictions caused by the exploitation-extraction process that affect the biophysical environment and around proposals for alternative economies to pork production, which is disconnected from the sector's workspace (and despite its workers' discontent with the logic of exploitation-extraction they experience).

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