Insular Cowscapes: Technologies of Ecological Restoration

Inês Vieira Rodrigues
University of Porto, Portugal

Abstract
The Azores is an archipelago known for its Edenic landscapes, strongly symbolised by cows grazing in vast pasturelands. These 'natural' scenarios, however, obfuscate technologies of ecological restoration resulting from cattle exploitation, which seem to be in a clear collision with the perception of the Azorean scenery as 'a good way of life'. Impelled by the focus of this *Footprint* issue, I recently visited two farms in São Miguel Island: a medium-size dairy farm and an intensive beef farm. Through this field inquiry, in this article I intend to problematise the fabrication of productive farming landscapes or, rather, the production of cowscapes. The current livestock political vision appears as twofold: a restorative ideal, promoting the 'return to' a supposed bucolic state; and the synchronization of livestock activities through the reconfiguration of the terrain, machines, animals and work. The triad efficiency-optimisation-specialisation might be symptomatic of the current path in the archipelago, within which extensive farming translates into an increased farmland footprint. After all, more efficiency requires more pastureland. Ultimately, the contemporary Azorean cowscapes perpetuate the loss of resilience in global food systems, and the island is only the beginning of the evidentiary trail.

Keywords
cowscapes, metabolic surveillance, bacterial symbiosis, efficiency, extensive farming, farmland footprint.

In this article I problematise the fabrication of productive farming landscapes, or the production of cowscapes. Through fieldwork conducted on São Miguel Island in the summer of 2022, involving an exploration of the techniques and methodologies practiced in one dairy farm and one beef farm, I intend to advance an interpretation of the current entanglement in the productive relation between cows, humans, labour, technology and land.

Rebranded territory, or cowscapes

Let us start by clarifying the 'rebrand' concept, which is here used in the sense of creating a new, competitive territorial identity, capable of being positioned in the global market flows. Indeed, the nine Azorean islands, located in the Atlantic Ocean, are known for their 'natural' landscapes and Edenic scenarios, a connotation which is the outcome of an intensive and relatively recent operation of landscape modification propelled by means of agrarian conversion. The farming modernisation project on São Miguel began in 1843 with the foundation of the first agricultural association on the island, Sociedade Promotora da Agricultura Micaelense, which implemented a system of intense land reform.[1] Prior to this event, during the eighteenth and nineteenth centuries, the biggest island of the archipelago was covered by citrus orchards, responsible for the most important economic activity at that time: the export of oranges to England as a remedy for scurvy.[2] From 1840 to 1860, a plague destroyed the stock of citrus trees, leading the farmers to find alternatives and to farm high-value crops, such as tea, tobacco and pineapple.[3] Along with it a livestock vision for the Azorean islands was slowly starting to be conceived and put in practice, following some examples observed in other European countries.[4] More than a hundred years have passed since the island was conceived as a livestock territory until its actual realisation. The post-war period saw the intensification of livestock breeding and the consequent advance of artificial pastures in the landscape, as companies from the Portuguese mainland established on the island, encouraging and financing farmers to build herds.[5] At first at

an insular scale, farming and livestock rearing ultimately became archipelagic projects.

On the one hand, the perception of these islands as bounded and isolated, with 'visible' limits, means that the main economic activity is in the primary sector, revealed through pineapple greenhouses, beet plantations, passion-fruit trees, immense tea-fields, and almost as an ever-present element, cows. On the other, in the presence of the continuous prospect of endless expansion, and still through the lens of contemporary landscapes of primary production, the island might be a productive 'figure through which a new form of universalism can be conceived.'[6] In short, this insular duality is useful for the purpose of this article: to explore beyond the evident layers of these cowscapes. In the face of climate change, and as Víctor Muñoz Sanz urges, in the following I will attempt 'to reimagine the relationships between society and nature beyond overproduction and domination'.[7]

When I moved to São Miguel Island as an eleven-year-old in 2000, I was told that there were more cattle than residents on the archipelago – a fact that remains true. According to recent data there are roughly 289 000 animals and 242 497 inhabitants.[8] Currently, the production of cow's milk and beef are the main farming activities, and the sector has been growing.[9] The Azores accounts for approximately 35 per cent of total Portuguese dairy production; additionally, 75 per cent of Azorean dairy products is exported to the Portuguese mainland, 15 per cent is distributed on the archipelago, and the remaining 10 per cent is shipped to the Madeira archipelago and to other countries.[10] Contrary to the policy of mainland Portugal, milk production on the Azores increased about 25 per cent from 2003 to 2015, from 507 000 to 629 000 tons.[11] Effectively, milk is the main agricultural product of the autonomous region.[12] [Fig. 1] As a matter of fact, if the Azores 'is one of the most suitable regions for dairy production in Portugal', I ought to add that this is because the archipelago was designed for that purpose.[13]

In 2015, dairy quotas were abolished, following a period of thirty-one years of control by the European Union. The Common Agricultural Policy instituted a different direction, 'to allow farmers the flexibility to expand their production and to profit from the growing extra-EU demand for milk products.'[14] The regional government of the Azores took advantage of the opportunity, investing in the promotion of the islands as a cow's wonderland. Indeed, Azorean tourist marketing rests upon the 'fortunate cows' narrative, formalised in the Happy Cows (*Vacas Felizes*) milk programme launched in January 2015.[15] The organisation's motto is printed on milk packaging: these are 'happy cows that live outdoors and eat fresh grass 365 days a year'.[16]

São Miguel Island has the highest rate of milk production, reaching 89 per cent of the archipelago's total output in 2017.[17] As anyone traveling on the island might notice, the mobile milking systems result from the landscape's idiosyncratic character, due to the fact that 'a typical Azorean farm comprises different plots of land of varied sizes that are rarely contiguous', resulting in a disaggregated field area, which 'creates several problems to dairy farmers that have to move their stock and equipment (milking and feeding equipment) from plot to plot across public roads and paths.'[18] [Fig. 2, 3] These movable instruments are used in the prevailing way of milking cows, entailing pasture rotation methods in conformity with the prevalence of farms with small inventories and size (twenty to a hundred animals and twenty to fifty hectares).[19] The field plot dispersion is very common; thus, only wealthy landowners can afford to have the production concentrated on a single, larger plot of land. Nonetheless, the archipelagic cowscapes have been changing, given that the number of dairy farms in the Azores has been decreasing (by 19 per cent from 2007 to 2017), even though the average number of dairy cows per farm grew by 36 per cent.[20] Apart from this portable device, the so-called traditional system of fixed milking parlours has been gaining presence in the insular landscape.[21] [Fig. 4]

Though less representative than the dairy sector, meat production is growing as well, in tandem with a significant increase in the shipment of carcasses, replacing overseas shipments of live animals.[22] Apart from São Miguel, Terceira and Graciosa islands, most of the meat produced has its origin on extensive farms (99 per cent on Corvo, 63 per cent on São Jorge, 59 per cent on Santa Maria, 58 per cent on both Flores and Pico, and 50 per cent on Faial).[23] On São Miguel Island, 67 per cent of the total meat produced comes from intensive farms, with only 6 per cent raised in extensive farms, as shown in figure 5, in the chart on the left.[24] Most of the fresh meat consumed in continental Portugal is imported from the European Union – from Spain, the Netherlands, Poland, Ireland, France and the United Kingdom.[25] Considering that the consumption of beef per capita has been increasing nationally, the regional government of the Azores has identified this as an opportunity to replace fresh meat imports to the Portuguese mainland with Azorean meat.[26]

Financial aid provided by the regional government and the European Union, directed towards production costs, has a significant impact on the net income of each farming activity, being responsible for, on average, 70 per cent of the total gross income.[27] The main portion of expenses is logistics and transport, given that production, investment, and labour costs generally tend to be low, but the need to deliver the products to the major markets on the Portuguese mainland substantially increases prices.[28]

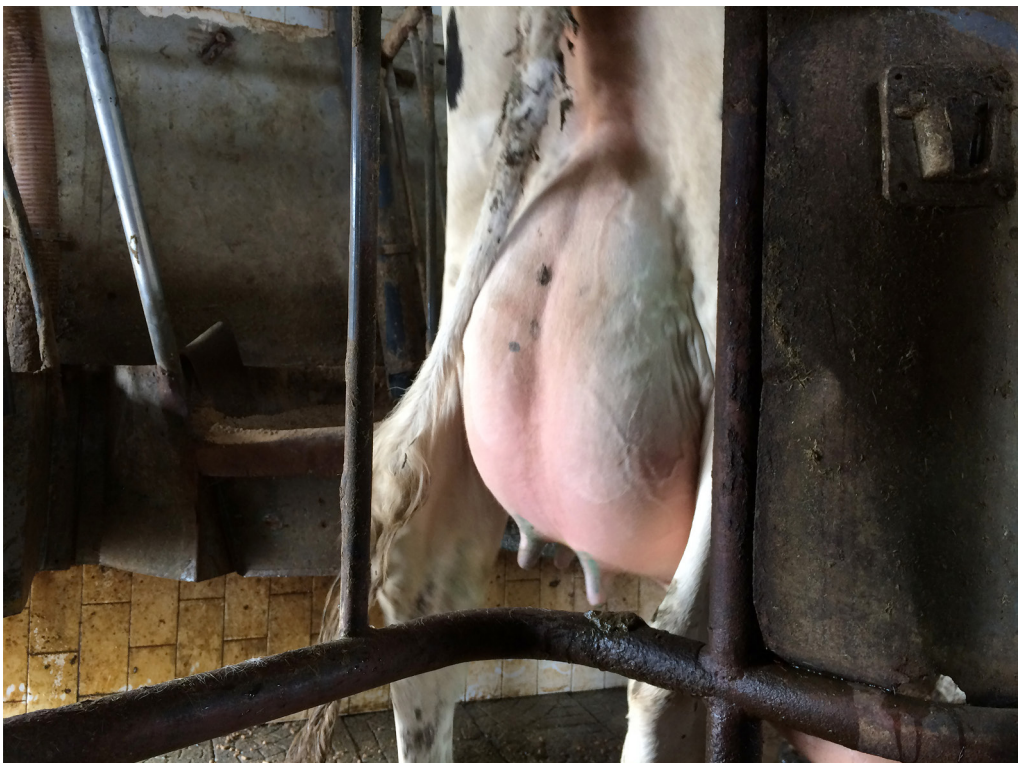
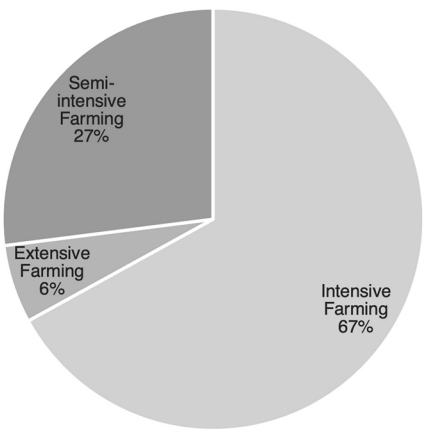


Fig. 1: Dairy cattle, São Miguel Island, 2018. Photo: João Gonçalves.

Fig. 2: Mobile milking system, São Miguel Island, 2022. Photo: Sofia Travassos.

Fig. 3: Mobile milking system, São Miguel Island, 2022. Photo: Sofia Travassos.

Fig. 4: Fixed milking parlour, São Miguel Island, 2018. Photo: João Gonçalves.



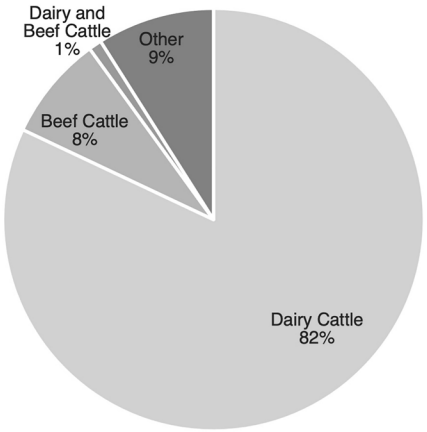


Fig. 5: Left: meat production systems in São Miguel Island. Chart: author. Source: Bisex – Consultoria, Gestão e Execução de Projetos, AgroGes – Estudos e Projetos, 'Plano Estratégico para a Fileira da Carne' (Strategic plan for the meat sector), 2021. Right: animal husbandry on São Miguel Island. Chart: author. Source: Bisex – Consultoria, Gestão e Execução de Projetos, AgroGes– Estudos e Projetos, 'Plano Estratégico para a Fileira da Carne' (Strategic plan for the meat sector), 2021.

Fig. 6: Satellite image of a dairy farm. Source: Google Earth.

According to 2019 data, there are 5 922 dairy and beef producers on the Azores, occupying a total forage area of around 101 900 hectares, corresponding to approximately 44 per cent of Azorean land (231 676 hectares).[29] In figure 5, in the chart on the right, we can clearly see that on the biggest island, dairy cattle accounts for 82 per cent of the breeding, whereas beef exploitation corresponds to 8 per cent.[30] With the aim to understanding objectively what these numbers mean, and impelled by the focus of this issue of *Footprint*, I recently visited two farms on São Miguel: a medium-size dairy farm and an intensive beef farm. Thus, I suggest that we move into these cowscapes.

Metabolic surveillance: pursuing animal performance

I arrived at Eugénio Câmara's facilities on a foggy, windy summer morning. This farm, located in the northern area of Ponta Delgada, in the civil parish of Fajã de Cima, comprises fifty-six hectares and seventy Holstein-Friesian cows, and is a certified producer in the Happy Cows programme. [Fig. 6]. The farmer-manager, who is also an engineer, manages the dairy business started by his grandfather several decades ago. Although it was only a few minutes past seven, all the work related to the first milking period of the day was done. He promptly showed me the facilities, starting with the cowshed, where I noticed a bracelet around each cow's leg. [Fig. 7]. 'That is the best investment I have ever made', Câmara said. 'I implemented this system ten years ago, around 2012, and I do not regret it at all: it is a leg sensor for cow monitoring'.[31] Perhaps he noticed my surprise, so he continued: 'this bracelet is part of a broader programme of detailed monitoring, tracking, among other things, the cows' temperature and the ideal time to inseminate them. It also warns if the cow has been lying down for too long, if it takes too few steps… it is something of an instant cow check tool'. He added: 'You will better understand once we see the milking parlour'.

Indeed, once we entered the fixed milking parlour, he pointed to the floor: 'look at the infrared sensor: it collects information on the amount of milk that is collected, and, through the use of antenna technology, which identifies each cow, registers it on a database'. Câmara continued to elaborate his thoughts on this system, saying: 'it also identifies health problems such as overcrowding, poor bedding, excess group activity, digestion problems… or any other factors that might disturb the animals' comfort and thus can have an impact on their production'. He admitted, 'it completely changed the farm work', because 'the automated system knows exactly what each cow produces, and the parameterised alerts reach us through mobile phone or computer'. [Fig. 8]

In this arrangement, computers and smartphones mediate the relationship between cows and humans, reducing the amount of time needed daily to observe the cows. When I asked Câmara if he thought that automation could ever replace human labour, he said that he does not believe so, and told me that there is a common saying among farmers: 'the cow gets fat with the owner's eye', which means that 'there is always something for the human eye to detect', even if 'dairy farms' work is today so much simpler and easier than some years ago'. And he asserted, 'the problem is to find people who want to work. Off course, when farmers deal with herds of a thousand animals… that individualised attention to cattle is not possible'.

This farm employs two other people besides Câmara. 'We are trying to employ a third, but it is being very difficult to find people nowadays', he said, because 'the schedules are tight, the first milking of the day starts at five o'clock, so two people need to arrive around four in the morning. The second milking of the day is around half past four in the afternoon'. Concerning the type of work performed by each employee, he said, 'one takes care of the cows, the other is responsible for cleaning'. He said, further, that 'each milking takes about one and a half, two hours, and each cow produces thirty to sixty litres per day', and that 'this parlour comprises sixteen milking stations, eight on each side'. Indeed, this so-called herringbone parlour (the name refers to the lay-out) enables the simultaneous milking of sixteen cows, each identified by its bracelet with a unique serial number. Câmara clarified: 'the system retracts when milking stops; it also doses the feed according to each cow. It is essential for optimising production and not wasting feed… But be aware that there are parlours much more advanced than this one! Some of them even have pivoting gates', he stressed, 'so that less time is wasted after milking'.

The bracelet system reminded me of human activity trackers and smart watches. The logic seems the same: calories for humans, calories for other-than-humans. The fitness programmes' approach appears to be extended into the cattle industry, since the well-being imaginary – be it for humans or for cows – entails the notion of efficiency of bodies. The tracking of bodily data attempts to fully operationalise beings. More data leads to more accuracy, and therefore, a greater yield. To manage human and more-than-human metabolisms is to tightly control bodies, considering that 'each body is a porous system.'[32] From this standpoint, cows have an environment related to them, which is behind the 'cowscape' notion: the contingency between the cow and the milieu. In this arrangement between animals and land, nonhumans are forced to perform in service of humans: the cow is a symbol of manipulation, a body to enhance, and a capital emblem. In fact, as Muñoz Sanz elucidates, 'cattle, etymologically, is derived, via Anglo-French, from medieval Latin capitale – property, capital – it was our value and value in exchange.'[33]

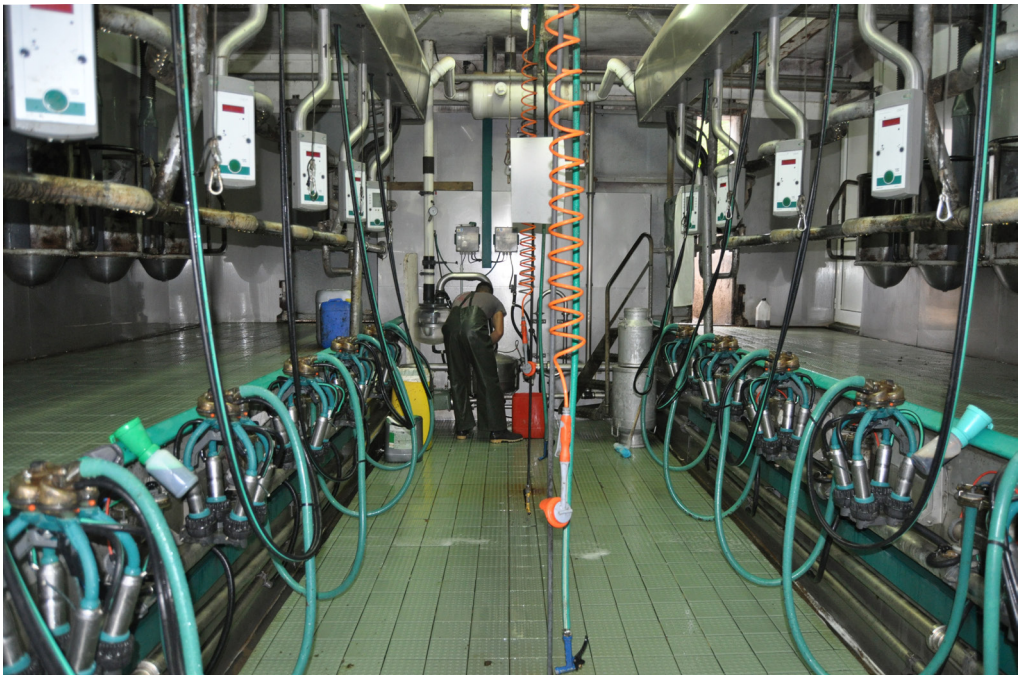


Fig. 7: Cowshed, São Miguel Island, 2022. Photo: author.

Fig. 8: Fixed milking parlour, São Miguel Island, 2022. Photo: author.

Subsequently, we must acknowledge that human beings are also shaped within this system, created by themselves, whose conditions are being reconfigured in a mutual process; mutual, not equal, and certainly not fair.[34] Animal performance and metabolic surveillance are closely linked within a system that profoundly changes human labour, and thus converts the human-animal relation into more-than-human coordinated conduct.

Bacterial symbionts, a more-than-human relation

Before entering the gate, the intense manure smell that could be sensed from some metres away already announced the presence of farm animals. Francisco Lopes, a young veterinarian, welcomed me sympathetically, telling me that he oversees and treats eight hundred animals on this five-hectare beef farm, located in Lagoa municipality, 15 kilometers from Eugénio Câmara's farm which I had visited four days earlier.[35] [Fig. 9] 'The cattle that come here are not pure… they are milk animals inseminated with meat breeds. In this case, 98 per cent of the herd is crossed with Angus, because we have a direct partnership with Pingo Doce', a supermarket franchise leader in Portugal. I then noticed some large, brightly-coloured, plastic balls (more precisely, boat fenders) that 'are included in the animal welfare procedures, for environmental enrichment… the males play with them a lot. We also have brushes, their favourite, but they do not last very long; they easily rip them apart'. [Fig. 10] Pointing to the cattle ear tag earrings, Lopes said: 'the home tag earring is yellow. The white tag was recently added, for the identification of an antibiotic-free animal. It means that after weaning, the animal has not had a millilitre of antibiotics.' He continued, 'you must have seen Pingo Doce's advertising on television... [big on] animal welfare and now antibiotic free'. Lopes further explained that 'the antibiotic protocol states that the animal cannot receive any antibiotics from the moment it stops drinking milk. If the calf gets sick, it is treated, but it is no longer part of the group of antibiotic-free animals'. When I asked if he could expand a little, he continued: 'each farm has a limit on the antibiotics it can use. We cannot exceed ours. This is different from what happens on the Portuguese mainland and even here on the Azores, on Terceira, Santa Maria and Pico islands, where the animals are in extensive farms', because 'our animals are weaned at two and a half months, at a hundred kilograms... their calves suckle until five or six months and weigh double. That means that if calves get sick before that, they are treated and still receive the antibiotic-free label'. He concluded: 'proportionally, very little antibiotics are administered here, but then this does not translate into the number of animals that are distinguished with the white label. Our average is 70 per cent of animals without antibiotics'. These plastic ear tags might be taken for 'a common biopolitical practice for monitoring cattle health'.[36]

I wanted to know more about diseases, and he answered, 'the milk phase is crucial.' As we walked towards some wood structures on the north area of the farm, he added: 'the first thing workers have to do is to give milk to the calves, around eight in the morning… Here, we keep office hours, from eight to five'. Young calves' heads started to appear in each wooden box, and Lopes said, 'they enter here at fifteen days old, and stay for two and a half months, as I said. For a month they get two doses of milk a day, around two and a half litres… then one dose a day… during the last week in the boxes, they already get used to the feed that they are going to eat afterwards'. [Fig. 11] This is a new method: 'without that transition, there were a lot of pneumonia outbreaks once the animals got together with the bigger ones; it is a time when they are under a lot of stress. It changes their routine, and believe it or not, these animals are deeply used to routine'. In these nursery structures, 'the animals must be treated like babies for the first twenty-one days… even more than that, like babies in incubators. If one has diarrhoea, the others will get it too, so they must be isolated'.

Francisco Lopes's enthusiasm was evident. 'I really like what I do and the possibility to introduce better conditions, even if slowly'. And he followed the reflection with a practical example: 'when I arrived, I had the feeling that I was going to drastically reduce pneumonia… I did not. But the introduction of a division in the bucket area, as you see... when the animal first drank water, it then turned its head and went directly to the feed bucket', which 'wet the feed. And when the food is wet it starts to ferment and they do not like it anymore. Just the fact of having the buckets separated, with this wooden division, their average daily gain has increased by five kilos. This is also welfare'.

He continued, 'cows are ruminants, with four stomachs. Milk is supposed to go to one stomach, food and water to another. The oesophageal groove opens when the calf is going to drink milk, and it closes when it drinks water… how is this muscle stimulated to open when you drink milk?' He answered: 'first, the position of the head matters, and second, the temperature of the milk and its concentration… we use powdered milk'. The problem starts when 'the milk is more diluted, and the animal thinks it is drinking water… causing food diarrhoea'. This situation can get more complicated if 'bacteria start to take advantage of it. And then bacteria start to proliferate, and the animal gets weaker… it starts with an alimentary diarrhoea and develops into a bacterial one, so the animal must be given antibiotics, serum… We all have bacteria inside us, as you know'.

A better solution would be 'to make the calves suckle the rubber teats, instead of the buckets. But it is expensive,

each teat costs five euros and it cannot be reused'. He explained that 'the teat causes them to produce saliva, making them drink the milk more slowly. In addition, saliva is an excellent buffer for diarrhoea, due to its sodium bicarbonate content, which helps in the digestion of milk'. This means that 'almost all the milk they drink is digested. It is more effective. Once again, everything that gives health, renders efficiency in productive terms'.

It was obvious to me that on this farm, the first ten weeks of each calf are crucial. 'The easiest way, whether you like it or not, is to use antibiotics. And then public opinion – which is partially right – argues that antibiotic resistance is because of animal production.' He continued, 'on a dairy farm it is easier to implement control and hygiene measures than on an intensive fattening calf farm, like this one.' As an example, 'when an animal is born on a dairy farm, we make sure that it is given the colostrum. It is fundamental, it is the main vaccine.' From then on, 'the calves will remain in the same environment,' in contrast with 'what happens here, receiving calves from one side, from another… one brings a virus, the other bacteria... one drank colostrum, the other did not… there is a mixture that is very difficult to maintain in a park. When one has pneumonia, I know the others will get it too'. Then he said something that resonated with what Câmara had said: 'we need to "go into" our own eye' (we need to trust our own eyes) when observing younger calves.

Questioned about the differences between milk and beef production, he said that 'on this island, there has been a huge conversion from milk to beef, encouraged by the regional government. However, people generally think that whoever produces milk, will easily raise beef'. This assumption is not true: 'beef infrastructure is completely different. In addition, animals are bigger and heavier here'. I had assumed that human labour was more demanding on beef farms. 'Not exactly', he answered, 'as I said, the advantage of any intensive calf farmer is the schedule. This exploitation requires three people to be present permanently, besides my daily visit and that of the engineer (the technician who services the equipment). It is easier to get workers for this kind of work', compared to dairy farms, because 'that is a very conditioned life... milking has to be done each twelve hours, and it involves a lot of procedures'. Nevertheless, he said 'it is still difficult to find reliable workers on São Miguel.'

The visit continues, accompanied by Lopes's reflections: 'animal welfare protocol is very important; however, I believe it should be adapted according to the country and the region... here the animal's bed is made out of cement, but the animals must have a proper bed, and the regulations specify one made out of straw'. He pointed to the manger and said: 'you can see where the straw is. We do not produce straw on the island, so it arrives here at the price of food, which is not viable for us'. According to the farmer, the most apt solution to the island situation is 'just like the park that we developed, on soil... the animals have better conditions, though when it rains, it gets muddy, and people who do not observe the context closely think the animals are suffering'. Moreover, 'they behave like animals on the savannah, they take advantage of water puddles to regulate their body temperature. You can see that those are the cleanest animals'. [Fig. 12]

Lopes said: 'this will change…because they [animal welfare protocols] want pasture, that is it', declaring: 'it is a fantasy. Even if it is very easy for us to open the gate and put the animals in the pasture, it only lasts two days: they eat a bit, but they waste the rest of it. Instead, with the ploughed land, it is possible to produce the equivalent of a week's food for fifty animals'. When it comes to manure management, they reuse it in the farm. 'There are rocks under that plot, look! Still, the grass grows by simply using manure… this is a rich material, we use it as fertiliser, it is part of the ecosystem'. He added that 'the price of fertiliser has doubled, as you know… and since then people have not stopped coming here to get manure.'

As my visit was approaching its end, Lopes pointed out: 'unfortunately, farming is seen as a subsidy-dependent activity... If the producers were paid what is owed to them in a fair system, subsidies would no longer be necessary'. The only way 'to compete with products from other countries is to create products with added value. Agrofood tourism, something like that... It is important to open people's eyes, they need to see if the animals are really dirty or not'. I asked him about his thoughts on the quality of the meat, and he asserted: 'there is a very strong control of quality and hygiene, the European Union does really well in that regard'. However, 'almost all of our meat is exported; we consume cheaper meat from Argentina and Brazil'.

As observed, for the purpose of complying with European regulations concerning animal welfare, labour is required to conform to increasingly stringent hygiene routines. Particularly, in dairy farms, the human workforce is increasingly required to submit to a regime of hygienisation, along with the ability to use computers or smartphones, subsequently requiring more time spent indoors. The path traced seems to rely progressively on technological systems, even if human discernment cannot be neglected.

Cattle 'cyborgisation'

On both farms, and through a proliferation of ancillary systems, disturbances to the animal's development are minimised. In this symbiotic relation, there appears to be a

Fig. 9: Satellite image of a beef farm. Source: Google Earth.

Fig. 10: Beef cattle, São Miguel Island, 2022. Photo: author.

Fig. 11: Young calves in wooden boxes, São Miguel Island, 2022. Photo: author.

Fig. 12: Cattle park, São Miguel Island, 2022. Photo: author.

more-than-human coordinated performance, which is set to restore the conditions for production. According to Scott F. Gilbert, 'the cow is an obvious example of what is called a holobiont, an organism plus its persistent communities of symbionts', consequently, what 'makes the cow possible' is the 'symbiotic community of microorganisms in her gut', which allows it to digest the grass.[37] This theory defies the established understanding of animal distinctiveness, given that 'animal-focused biologists may have struggled to see organisms as holobionts because the holobiont concept undermines the classic definitions of animal individuality', in the sense that 'animals are not monogenomic organisms.'[38] Gilbert goes further:

> We talk about the Anthropocene. We talk about the age of fishes, and we talk about the age of reptiles, and the age of mammals. No. It is the age of bacteria, always was, and always will be. We evolve as teams, as consortia – and we likely always have. It appears that there is no individuality in the classical biological sense.[39]

The evolution of organisms as consortia seems to be at the base of cattle exploitation. Both types of farms (dairy and beef production) survey the rumination or, rather, the foundational symbiotic operation of cows: in the case of the dairy farm, mainly the digital, automated system; on the beef farm, human cognition. The more-than-human arrangement is, thus, manifold, yet it converges in the same aspiration: to control and to intervene on the most profound dimension of the exploited being, its bacterial symbiosis.

One of the biggest contemporary challenges of farming is to reduce greenhouse gas emissions through the digestive process of livestock, and there is an assumption that 'the type of food given to animals can, in fact, mitigate methane emissions.'[40] Alfredo Borba, former director of the Institute for Research and Agrarian and Environmental Technologies (IITAA), says that the production of methane is a process of 'inefficiency of use', more precisely 'an inefficient digestive use'.[41] Borba adds that an improvement can be achieved through food manipulation, by means of 'treatments that increase its digestibility, or through mechanical cuts', which render smaller pieces of food.[42] In addition, there are other technical resources such as precision feeding, which consists of 'knowing the needs of an animal in any given physiological state and trying to ensure that the food covers those needs without excess', as Câmara's system already does.[43] Furthermore, IITAA researchers have been studying a method to decrease methane production through the use of chemical elements that inhibit it, such as the introduction of the incense plant (*Pittosporum undulatum*) and container plant (*Hedychium gardnerianum*) to the feed. These plants are invasive species in the Azores and they 'could be used as an alternative to fodder, such as straw'.[44] In fact, 'we are learning more and more about how microbes can be critically important in development', particularly, 'in fields such as medicine and in agriculture'.[45]

These more-than-human arrangements are in line with insights on the developmental roles of bacterial symbionts. From perspective, some cattle 'cyborgisation' is necessary for them to continue 'to operate' and 'to function' in the regional economy; their modification aims at accomplishing their 'indispensable enhancement'. Drawing upon Donna Haraway's thesis, 'cyborgs are not machines in just any sense, nor are they machine-organism hybrids. In fact, they are not hybrids at all. They are, rather, imploded entities, dense material semiotic "things"', additionally, 'cyborgs matter in terran worlding'.[46] Cattle 'become with', as 'worlding' accounts for the intertwinement between humans and nonhumans; it withdraws the barriers between environment and animals. In this enmeshed relation, cattle 'cyborgisation' matters in the archipelagic terraforming.

Modernisation as synchronisation

After these visits, it was obvious to me that some of the major problems acknowledged by the farmers derive from the island situation: the principal markets are too far, at around 1 500 km away; the same is true for feed and straw. [Fig. 13] With the aim of overcoming the geographical constraints, the Secretary of Agriculture and Rural Development of the Government of the Azores, António Ventura, recently declared: 'we have to assert ourselves as an exporting region of genetic improvement'.[47] One of the proposed methods is to 'support the use of genotyping for the selection of females with the greatest genetic potential, associated with milk or meat production objectives… as well as the use of sexed semen'.[48]

The prospect of a genetic improvement is in tandem with a project that aims at arranging the islands in a single territorial pace, the 'Azorean Agriculture Innovation and Digitalisation Programme'. It is included in the European recovery plan (The Recovery and Resilience Facility) conceived after the beginning of the Covid-19 pandemic. The report states: 'in an Ultraperipheral Region with nine realities, digital connection is essential for the empowerment strategy of farmers, regardless of the island where they live, therefore, generating territorial cohesion'.[49] It envisions each island as a monitored portion of land, where the installation of new infrastructures such as automatic weather stations and biological observation posts will enable the analysis of the water content in the soil; this information will be made available to technicians and producers.[50] In essence, the current effort might be the synchronisation of

the farming activities. Agricultural environments increasingly rely on modern technologies, and this political move goes even further in imagining the coincidence of materials, technologies, bodies, and land. The expectation arises as the fulfilment of modernisation as synchronisation, in which the global economic dimension absorbs the local or, to put it another way, the planet has priority over the island.[51]

Apart from creating new infrastructures and connected digital platforms, it seems that the prospect focuses predominantly on the 'improvement' of cattle, through the control of and interference with bacterial symbioses, rather than on the alternatives to the use of land and water. In this light, the island emerges as a mere support of the activity, even though envisioned as unified, connected, syncopated. Nevertheless, this modernisation project appears to be grounded in the very principles identified as problematic, that is, the logistics of import and export. The 'modern' is presented full of apparatuses and digital systems, although the model that sustains it does not change; the 'modern' concept is, thus, exhausted. In accordance with Yuk Hui's theory:

> If we want to surpass modernity, there is no way to simply reset it as if it were a computer or a smartphone. We must instead escape its global time-axis, escape a (trans)humanism that subordinates other beings to the terms of its own destiny, and propose a new agenda and imagination of technology that open up new forms of social, political, and aesthetic life and new relations with nonhumans, the earth, and the cosmos.[52]

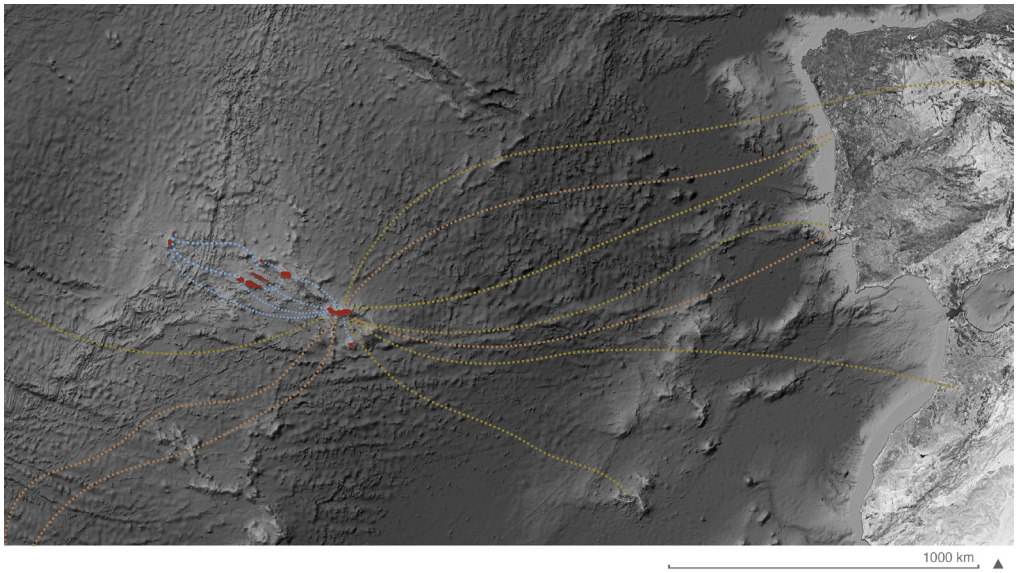
Consequently, a distinct vision of the island and the archipelago is needed. As it stands at the moment, the broader purpose seems to be to accelerate into full automation, even though we know 'that humans are now being used as a connective tissue to make those systems work.'[53] Let us recall that both Eugénio Câmara and Francisco Lopes underlined the need for human attention: the gaze, in particular, as an example of the importance of human intervention to guarantee animal welfare and production yield; it demonstrates that, in practice, 'the race toward a frictionless productive process is not without challenges or conflicts with efficiency.'[54]

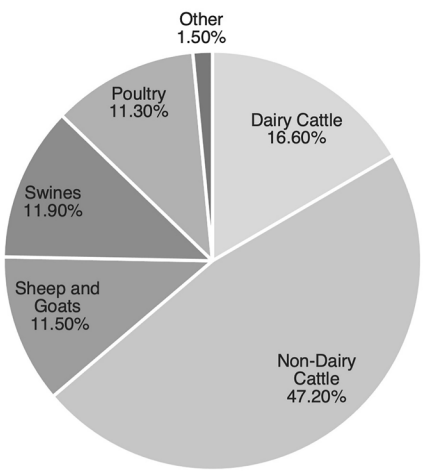
The work of pretending to be profoundly automated and digital would be extremely time-consuming, and more significantly, it would constitute a missed opportunity. In line with Holly Jean Buck's theory, it could be just another 'business as usual' case if it lacks an alternative social – and, I might add, an ecological, economic, and territorial – vision, ending up as a mere 'discursive way out for a couple of years', until its uselessness becomes evident.[55] Eventually, the expectation for change relies upon a bundle of 'sociotechnical "fixes"', which seem incapable of altering the current ecological and economic quest, since they operate 'through compensatory efforts to intensify techno-extractive logics'.[56] In this scenario, it is very hard to conceive a political shift.

The cow in the room

In recent reports on energy policy in the Azores issued by the regional government, the methane emissions originating in the digestive process of animals are scarcely discussed in the greenhouse gas emissions section, in spite of the increase of 48 per cent in methane emissions from cattle, in Portugal, between 1990 and 2017.[57] Nonetheless, there are a few instances where the reality is recognised, for example in a programme outline by the Regional Government of the Azores: 'the positive image gained by the Azores with regard to its dairy products can quickly deteriorate if Azorean producers do not take timely precautions regarding the climate impact of their production activity.'[58] In fact, according to recent data, agriculture is one of the biggest pollutants in terms of greenhouse gas emissions.[59] Furthermore, 'the major contributors to total nitrogen from livestock manure in Portugal in 2019 were non-dairy cattle and dairy cattle', which comprised 63.8 per cent of the total national emissions from manure management.[60] Likewise, in 2019, cattle contributed with about 81.3 per cent of total national methane emissions from enteric fermentation.[61] [Fig. 14] In parallel, there seems to be even less awareness of the overexploitation of water on farms, another enormous issue, while new agricultural developments are being built with the anticipation of sufficient water. In line with the current national tendency for cattle exploitation, the government of the Azores announced a major investment in slaughterhouses for 2022.[62] In the face of the climate catastrophe, the archipelago is envisioned as a strengthened livestock territory. 'The cow in the room' emerges as the cow itself. [Fig. 15]

Accordingly, the anthropogenic activities resulting from cattle exploitation seem to be in direct opposition to the perception of the Azorean 'good way of life'. Some farmland owners, producers and politicians, appear to dismiss the consequences of such practices; others recognise the need for change within the cattle industry. However, both perspectives seem to coincide in one fundamental premise – which is also problematic, as I have argued in this article: the need to continue the same economic model, simply altering the ecologies that sustain it. Cattle farming on the Azores appears as a paramount example of Erik Swyngedouw's diagnosis that 'under the banner of radical techno-managerial restructuring, the focus is squarely on how to sustain capitalist urbanity so that nothing really has to change'.[63] Or, as the French say, *plus ça change, plus c'est la même chose*.





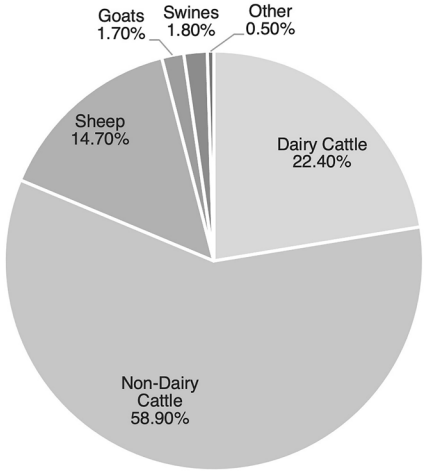


Fig. 13: Exports from São Miguel Island (yellow dots), imports to São Miguel Island (orange dots), and exports from one island to another (blue dots), in the Azores (in red). Source: Google Earth.

Fig. 14: Left: the origin of nitrogen emissions in manure produced per animal type in Portugal in 2019. Chart: author. Source: Portuguese Environment Agency. Right: methane emissions from enteric fermentation per animal species in Portugal in 2019. Chart: author. Source: Portuguese Environment Agency.

Fig. 15: The cow in the room, São Miguel Island, 2022. Photo: author.

In fact, 'ecology' was and has been an agent of the capitalisation of nature. 'Ecology' and 'economy' share the same prefix, and Emanuele Coccia reminds us that it is one of the reasons why it is impossible to think of the two concepts together; after all, it entails an epistemological contradiction.[64] As Rania Ghosn and El Hadi Jazairy put it:

> Whereas the word ecology evokes associations with environmentalism and green politics, it is also tightly entangled in a capitalist imaginary of Earth, or what we refer to as natural resources… As far as the process of resource extraction is concerned, economy and ecology are two sides of the same coin.[65]

Given this context, as already mentioned, some 'mitigation technologies' are being envisioned to pursue the model of economic achievement and, concomitantly, to abide by the environmental goals stated in international agendas.[66] From milking techniques to grazing systems to food supplements, and even to an 'agricultural digitisation', the improvement of livestock production conditions is contingent upon political will.

Meanwhile, these contemporary technologies of ecological restoration must continue to fit the 'cowscape idea' as part of the Azorean Arcadia. Both advertising companies and funding institutions work on a prospect built upon the continuous need for pastureland. Nonetheless, to rest upon this 'good cattle farming' axiom seems counterproductive if the goal is to address environmental issues, as argued by George Monbiot.[67] Throughout his splendid book, *Regenesis*, he discusses the 'efficiency paradox' according to which 'improving the efficiency of farming can cause a greater use of land'.[68] Eventually, 'we appear to be trapped between two dangerous forces: efficiency and sprawl'.[69] The aim to perform more efficiently, and throughout an increasing area, contributes to a lack of adaptability and robustness in these landscapes of primary production activities. Consequently, 'efficiency threatens resilience'.[70]

Ultimately, we seem stranded in a condition of consuming apathy that appears to accommodate a somewhat apocalyptic environment: 'This is the way the world ends / Not with a bang but with a whimper', in the words of T. S. Elliot.[71] The discrepancy can be found 'between knowledge and belief: we *know* the (ecological) catastrophe is possible, probable even, yet we do not *believe* it will really happen'.[72]

Conclusion: between efficiency and sprawl

My aim with this article has been to explore beyond the evident layers of the Azorean cowscapes. After the profound terraforming of the islands established less than two hundred years ago, motivated by agriculture, and deploying an active management of fauna and flora, the awareness of living in the Anthropocene – or perhaps in the age of bacteria, as defended by Scott F. Gilbert – compels the pursuit of alternative forms of social, spatial, and climate justice.

The association of governance and infrastructure seems to perpetuate and to accelerate the climate crisis, and there is a clear contradiction between the image of the arcadian archipelago and its operational landscape. In this sense, the pursuit of the optimisation of human labour is concomitant with cattle fertility and feed digestibility efficiency, all converging in land specialisation. The triad efficiency-optimisation-specialisation might be symptomatic of the archipelago's current course, where extensive farming translates into an increased farmland footprint. Ultimately, more efficiency requires more pastureland. The pressure on land is what makes extensive farming even more damaging than intensive farming, given that land is the crucial metric.[73]

As more is revealed about these food systems, we see that this intricate mechanism vastly exceeds the island: a major part of the meat and dairy produced is exported to the Portuguese mainland, the meat consumed on the archipelago comes mainly from South America, straw and feed are imported, and live animals are exported to other islands, or even to North Africa. It turns out to be an inefficient food production system.

I would like to advance an alternative scenario, in line with Monbiot's proposal: to refuse the current expansion within the food network, by setting up 'circuit breakers' in the arrangement.[74] The scaling up prospect of farming activities arises because, I understand, there is no imagination of a post-pastureland archipelago. On the contrary, as intended to be demonstrated throughout this article, the investment in the livestock sector has been growing. In this light, the current technologies of ecological restoration are redundant: an instrument operating within a tautological procedure. After all, things seem to change so that nothing changes: the contemporary cowscapes perpetuate the loss of resilience in global food systems, and the island is only the start of the evidentiary trail.

Notes

This research was funded by the Portuguese Foundation for Science and Technology (FCT-MCTES) through national and European funds (European Social Fund), under the scope of the PhD grant 2020.05223.BD. I would like to thank Eugénio Câmara and Francisco Lopes for their time and cooperation.

1. Pedro Maurício Borges, 'O Desenho do Território e a Construção da Paisagem na Ilha de São Miguel, Açores, na segunda metade do século XIX, através de um dos seus protagonistas' (The design of the territory and the construction of the landscape on São Miguel Island, Azores, in the second half of the nineteenth century, through one of its protagonists) (PhD diss., University of Coimbra, 2007).
2. Ibid.; Fátima Sequeira Dias, 'A importância da 'economia da laranja' no arquipélago dos Açores durante o século XIX' (The importance of the 'orange economy' in the Azorean archipelago during the nineteenth century), *Arquipélago. História* 1, no. 2 (1995): 189–240.
3. André M. Almeida, Paula Alvarenga and David Fangueiro, 'The Dairy Sector in the Azores Islands: possibilities and main constraints towards increased added value', *Tropical Animal Health and Production* 53, no. 40 (2021): 2, https://doi.org/10.1007/s11250-020-02442-z.
4. Borges, 'O Desenho do Território'.
5. Ibid.; Almeida, Alvarenga, and Fangueiro, 'The Dairy Sector'.
6. Daniel Daou and Pablo Pérez-Ramos, 'Island', *New Geographies* no. 8 (2016): 9.
7. Víctor Muñoz Sanz, 'Genes, Robots, and Toxicity: the Haunted Landscapes of Milk Production', *Solitude Journal* 1 (2020): 66, https://research.tudelft.nl/en/publications/genes-robots-and-toxicity-the-haunted-landscapes-of-milk-producti.
8. Regional Government of the Azores, 'Agricultura e Recursos Florestais, Produção Pecuária' (Agriculture and forestry, livestock production), 31 May 2017, regional government website, http://rea.azores.gov.pt/reaa/36/agricultura-e-recursos-florestais/241/producao-pecuaria; Regional Statistical Service of the Azores (SREA), 'Estimativas da População Média', (Estimated average population), SREA website, accessed 11 August 2022, https://srea.azores.gov.pt/ReportServer/Pages/ReportViewer.aspx?%2FDemografia%2FEstimativas+da+População+Média&rs:Command=Render.
9. Regional Government of the Azores, 'Agricultura e Recursos Florestais'.
10. Bisex – Consultoria, Gestão e Execução de Projetos, AgroGes – Estudos e Projetos, 'Plano Estratégico para a Fileira da Carne' (Strategic plan for the meat sector), report commissioned by the Regional Government of the Azores to the Bisex company, in partnership with Agro.Ges (2021), 13; Almeida, Alvarenga, and Fangueiro, 'The Dairy sector', 1–2, 6.
11. Almeida, Alvarenga, and Fangueiro, 'The Dairy Sector', 2.
12. Bisex and AgroGes, 'Plano Estratégico', 13.
13. Almeida, Alvarenga, and Fangueiro, 'The Dairy Sector', 8.
14. Eurostat, 'Archive: Milk and milk products – 30 years of quotas', Eurostat, Statistics Explained website, 2015, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Milk_and_milk_products_-_30_years_of_quotas; Ivo Medeiros et al., 'Production and Health Management from Grazing to Confinement Systems of Largest Dairy Bovine Farms in Azores: A Farmers' Perspective', *Animals* 11, no. 3394 (2021): 1–16, https://doi.org/10.3390/ani11123394.
15. BEL, the company that owns Terra Nostra and Limiano brands, runs and finances the Happy Cows programme. It promotes the differentiation of the Azorean milk, in which the farmers must comply with a manual of practices and requirements to obtain certification.
16. Lact Açores, 'Nova Açores "Pastagem" free grazing milk comes from cows that graze freely', Lact Açores website, accessed 14 July 2022, https://www.lactacores.pt/en/brands/nova-acores/45/.
17. Almeida, Alvarenga, and Fangueiro, 'The Dairy sector', 3.
18. Ibid.
19. Ibid.; Medeiros, Fernandez-Novo, Astiz and Simões, 'Production and Health Management'.
20. Almeida, Alvarenga, and Fangueiro, 'The Dairy sector', 3.
21. Medeiros et al., 'Production and Health Management'.
22. Bisex and AgroGes, 'Plano Estratégico'.
23. Ibid., 41.
24. Ibid.
25. Ibid., 95.
26. Ibid., 96.
27. Ibid., 76.
28. Almeida, Alvarenga and Fangueiro, 'The Dairy Sector', 6.
29. Bisex and AgroGes, 'Plano Estratégico', 15.
30. Ibid., 13.
31. Eugénio Câmara, interview by Inês Vieira Rodrigues, Fajã de Cima, Ponta Delgada, São Miguel, 11 August 2022.
32. Beatriz Colomina and Mark Wigley, *Are We Human? Notes on an Archaeology of Design* (Zurich: Lars Müller Publishers, 2018), 223.
33. Muñoz Sanz, 'Genes, Robots, and Toxicity', 60.
34. Marisol de la Cadena and Santiago Martínez Medina, 'In Colombia some cows have *raza*, others also have breed: Maintaining the presence of the translation offers analytical possibilities', *The Sociological Review Monographs* 68, no. 2 (April 2020): 369–384, https://doi.org/10.1177/0038026120905477; Anna L. Tsing, 'When the Things We Study Respond to Each Other: Tools for Unpacking "the Material"', in *More-than-Human*, ed. Andrés Jaque et al. (Rotterdam: Het Nieuwe Instituut, 2020), 16–26; Muñoz Sanz, 'Genes, Robots, and Toxicity', 58–67.
35. Francisco Lopes, interview by Inês Vieira Rodrigues, Cabouco, Lagoa, São Miguel, 15 August 2022.
36. De la Cadena and Martínez Medina, 'In Colombia', 372.

37. Scott F. Gilbert, ‘Holobiont By Birth: Multilineage Individuals As The Concretion Of Cooperative Processes’, in *More-than-Human*, ed. Jaque et al., 27.
38. Ibid., 27, 29.
39. Ibid., 34.
40. ‘Controlo de emissões de gases na agricultura açoriana faz-se evitando excessos’ (Gas emissions control in Azorean agriculture is done by avoiding excesses), *Açoriano Oriental* online, 19 October 2019, https://www.acorianooriental.pt/noticia/controlo-de-emissoes-de-gases-na-agricultura-acoriana-faz-se-evitando-excessos-303673.
41. Ibid.
42. Ibid.
43. Ibid.
44. Ibid.
45. Gilbert, ‘Holobiont By Birth’, 31.
46. Donna Haraway, ‘Awash in Urine: DES and Premarin in *Multispecies* Response-ability’, in *More-than-Human*, ed. Jaque et al., 36.
47. ‘Exportação de animais vivos “nunca” vai acabar nos Açores, diz Governo Regional’ (Live animal exports will ‘never’ end in the Azores, says the Regional Government), Lusa (Portuguese news agency), 26 May 2021, https://rr.sapo.pt/noticia/pais/2021/05/26/exportacao-de-animais-vivos-nunca-vai-acabar-nos-acores-diz-governo-regional/240222/.
48. Bisex and AgroGes, ‘Plano Estratégico’, 108.
49. Regional Government of the Azores, ‘Programa de Inovação e Digitalização da Agricultura dos Açores’ (Innovation and digitalization programme for agriculture in the Azores), July 2022, 27.
50. Ibid., 20–21.
51. ‘Modernisation as synchronisation’ is a notion derived from Yuk Hui’s theory, ‘What Begins after the End of the Enlightenment?’, *e-flux journal* 96 (January 2019), https://www.e-flux.com/journal/96/245507/what-begins-after-the-end-of-the-enlightenment/.
52. Hui, ‘What Begins’.
53. Kate Crawford, ‘Better Machines for Better Humans’, in (*Re) programming: Strategies for Self-renewal,* ed. Marko Bauer and Janez Fakin Janša (Ljubljana: Aksioma, Vlenje Mladinski Center, 2022), 113.
54. Víctor Muñoz Sanz, Marten Kuijpers and Grace Abou Jaoude, ‘Agricultural Platforms’, *Harvard Design Magazine* no. 46 (Fall/Winter 2018): 128, https://research.tudelft.nl/en/publications/agricultural-platforms.
55. Holly Jean Buck, ‘Can We Repair the Climate?’, in (*Re)programming,* ed. Bauer and Janša, 85–86.
56. Neil Brenner and Nikos Katsikis, ‘Operational Landscapes: Hinterlands of the Capitalocene’, *The Landscapists: Redefining Landscape Relations* 90, no. 1 (January 2020): 28, https://doi.org/10.1002/ad.2521.
57. Regional Government of the Azores, ‘Estratégia Açoriana para a Energia 2030’ (Azorean energy strategy for 2030), Regional Energy Directorate, July 2020, 29; Nuno Guedes, ‘Vacas lideram aumento das emissões de metano em Portugal’ (Cows lead the increase in methane emissions in Portugal), TSF (Portuguese radio station), 9 October 2019, https://www.tsf.pt/portugal/sociedade/vacas-lideram-aumento-das-emissoes-de-metano-em-portugal-11386638.html.
58. Regional Government of the Azores, ‘Programa de Inovação’, 33.
59. Guedes, ‘Vacas lideram aumento das emissões’.
60. Portuguese Environment Agency, ‘Portuguese National Inventory Report on Greenhouse Gases, 1990–2019’, 15 April 2021, ‘Agriculture’ chapter, 5–46.
61. Ibid., 5–15.
62. Bisex and AgroGes, ‘Plano Estratégico’.
63. Erik Swyngedouw, ‘More-than-Human Constellations as Immuno-Biopolitical Fantasy in the Urbicene’, *New Geographies* 9 (2017): 21.
64. Emanuele Coccia, ‘Sensitive Space’, lecture at AA School of Architecture in the Sensitive Observation Seminar Series, organised by Ila Bêka, Louise Lemoine and Gili Merin, 11 December 2020, https://www.youtube.com/watch?v=zvOT9y2_63k.
65. Rania Ghosn and El Hadi Jazairy, ‘Airpocalypse: A Short Geostory’, *San Rocco, Ecology* 10 (2014): 147.
66. ‘Controlo de emissões’.
67. George Monbiot, *Regenesis: Feeding the World Without Devouring the Planet* (London: Penguin, 2022).
68. Ibid., 92.
69. Ibid.
70. Ibid., 92.
71. T. S. Eliot, ‘The Hollow Men’, in *Selected Poems* (London: Faber & Faber, 2015 [1948]), 70. Emphasis in the original.
72. Slavoj Žižek, *Living in the End Times* (London: Verso Books, 2011, interlude 4, e-book), original emphasis.
73. Monbiot, *Regenesis*.
74. Ibid., 54–55.

Biography

Inês Vieira Rodrigues is an architect, an integrated researcher at the Centre for Studies in Architecture and Urbanism, and a PhD candidate at the Faculty of Architecture of the University of Porto (FAUP, Portugal). As a grantee of the Portuguese Foundation for Science and Technology (FCT-MCTES), she is working on a study of the territory of the Azores. She has previously worked as an architect in Portugal and France. Her master’s dissertation, titled *Rabo de Peixe: Society and Urban Form,* was published as a book (Caleidoscópio Editor, 2016). She was recently awarded the Fernando Távora Prise (2022).