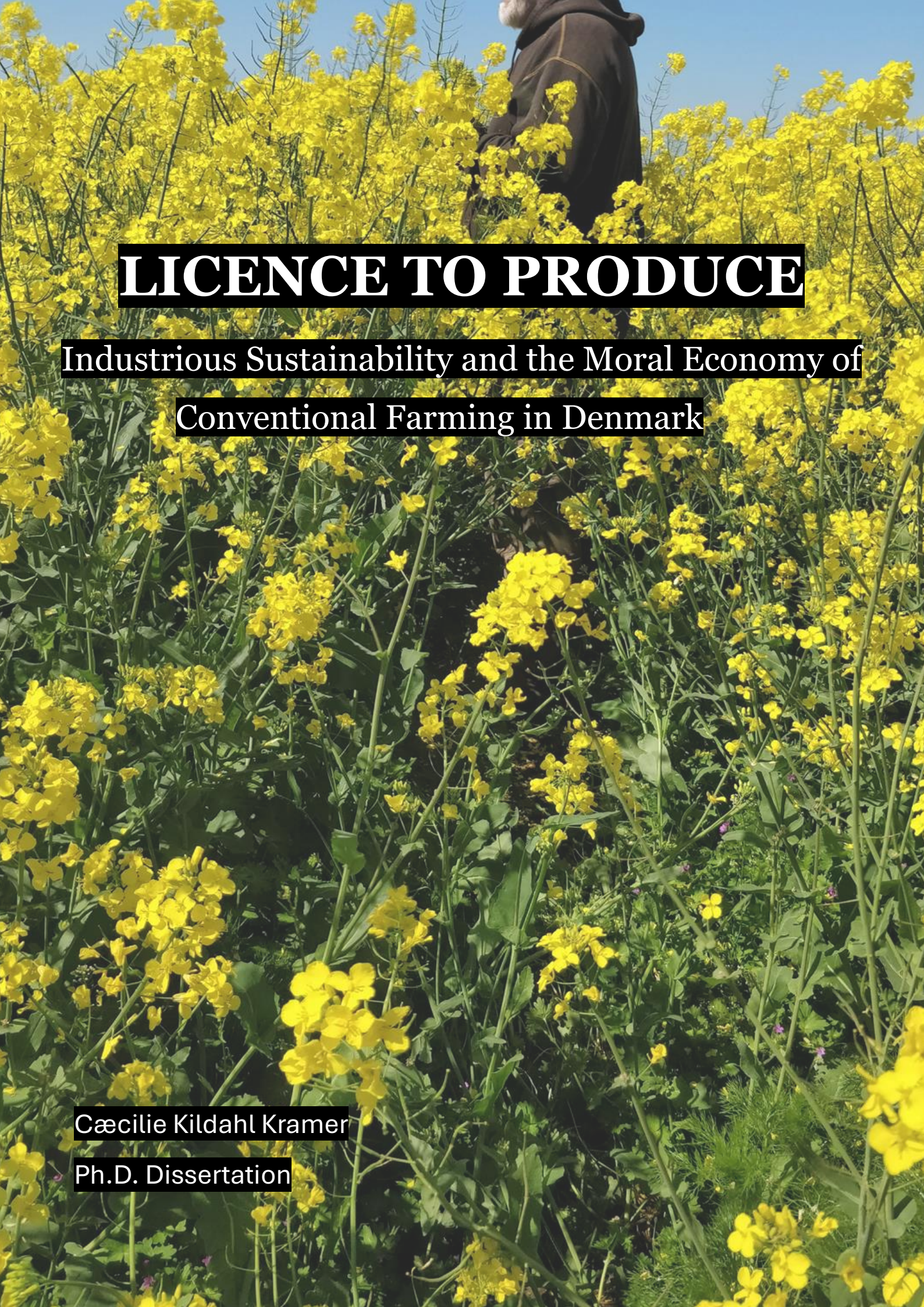


LICENCE TO PRODUCE

Industrious Sustainability and the Moral Economy of Conventional Farming in Denmark

Cæcilie Kildahl Kramer

Ph.D. Dissertation

LICENCE TO PRODUCE

Industrious Sustainability and the Moral Economy of Conventional Agriculture in Denmark

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PhD Dissertation

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Afhandlingen. Et Word-dokument, som har været under omformning siden før jeg fødte min datter, blev for alvor til i tiden efter, jeg var blevet mor. Det er ikke nogen større pointe i sig selv, men det er alligevel en uomtvistelig præmis for tilblivelsen af de ord, som nu er nedfældet for bestandigt. Det er også en uomtvistelig præmis, at ordene er nedfældet i Thy: delvist i et kontorfællesskab i Nørre Vorupør, og delvist i et meget lyst rum med et meget stort vægmaleri, som min kære bonusfar og kunstner, Henrik Kramer Westergaard, har skabt.

Maleriet er blevet til med store, kraftfulde penselstrøg hvor oliemaling i nuancer af gråblå, hvid, og sommetider endda grøn smelter sammen. Når lyset falder på en helt bestemt måde, træder særlige nuancer frem: mørkeblå toner, der insisterer på deres tilstedeværelse. Andre dage opløses baggrunden næsten helt, og kun de grøn-blå klumper står tilbage. Jeg har altid tænkt, at maleriet forestillede Thy. Havet måske, eller marehalmen i vinterfrosne klitter. Det er et vintermaleri, uden tvivl. Efterhånden som afhandlingen skred frem med maleriet som mit baggrundstæppe, tænkte jeg i stigende grad på maleriet som en analogi for min skriveproces. Nogle dage, når sindet var klart og veludhvilet, stod argumentet lynene klart, som den mørkeblå farve. Andre dage, oftest efter lange nætter med min datter i armhulen, gik ordene i opløsning. Pointer faldt i baggrunden og forsvandt bag alt for mange ord, tanker, spekulationer, bekymringer og vinterfølelser.

Modsat skriveriet, som på visse måder føltes som én lang vinter oplyst af øjeblikkes begejstring, føltes mit feltarbejde som ét langt forår, drevet af en endeløs og spirende nysgerrighed. Det har samtidig føltes som en endeløs læringskurve med utallige løse ender, spørgsmål og undren. Det er derfor også et uomtvisteligt faktum, at jeg aldrig var nået hertil uden de landmænd, der generøst har delt deres tid, erfaringer og tanker med mig.

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deres historier har jeg forstået (tror jeg), at landbrug ikke kun handler om produktion og såkaldte "rammevilkår", men også om identitet, historie, professionalisme og ikke mindst "ordentlighed".

Bestræbelserne efter det gode liv og at være den gode landmand kan tage sig ud på vidt forskellige måder. Der findes ikke én landbruger. Der findes derimod mennesker, som på forskellig vis navigerer i sameksisterende krav og – uden undtagelse – stræber efter en tilværelse, hvor de kan se sig selv i øjnene. Som balancerer risici, forventninger og stigende samfundskrav til, hvad landdistrikterne skal rumme og levere.

Det har ikke altid været let at skrive om deres virke, især i en tid præget af politiske spændinger omkring grøn omstilling og bæredygtighed. Jeg har bestræbt mig på at fastholde jeres stemmer, så I kan genkende jer selv i denne afhandling, men jeg har også oplevet udfordringen i at balancere forskellige perspektiver og komplekse realiteter. Jeg håber, at afhandlingen på sin egen måde kan være med til at skabe forståelse for jeres verden og de valg, I står overfor. Og så håber jeg, at denne afhandling på en eller anden måde kan give noget tilbage – ikke i nødvendigvis i form af entydige svar eller løsninger, men som en anerkendelse af den lagdelte kompleksitet, der præger jeres virke. Tak for jeres tålmodighed, jeres ærlighed og for at have åbnet jeres verdener for mig. Der skal også lyde tak til de landbrugskonsulenter, som har taget mig i hånden og oversat fagtermer og hverdagssprog til noget, selv en antropolog kan forstå.

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Nu er ordene der. De føles fastfrosne. Ord kan synes endimensionelle, når de sådan står der på den hvide baggrund i al deres enkelthed. En afhandling fremstår som noget endegyldigt; eller, som ”en færdig og udtømmende redegørelse” som Wikipedia skriver. Der er ingen adgang til det bagved, til alle de lag af mening og betydning, som under skriveprocessen blev udvisket og omskrevet, og ikke engang det helt særlige lysindfald i Thy kan bringe det frem. Men afhandlingens liv og tilblivelse findes stadig. Ikke kun i mit eget sind, men også i dem, der har været med: min partner, min familie, mine kolleger og venner. I dem, der har lyttet, læst og kommenteret på tidligere versioner. Til dem – for jeres tid, jeres ord og jeres blik – tak.

Cæcilie Kildahl Kramer, september 2025

Abbreviations and names used in this dissertation

- **BL:** Landsorganisationen for Bæredygtigt Landbrug. 'The National Association for Sustainable Agriculture' is a protest organisation founded in 2010, representing plant producers, known for their lawsuits against the state for environmental constraints.
- **CA:** Conservation Agriculture, a branch of agriculture focused on improving soil structure.
- **CAP**: The EU Common Agricultural Policy. Launched in 1962 to ensure food safety and sovereignty post-World War II. Today, its main areas are agricultural subsidies and rural development.
- **DN:** *Danmarks Naturfredningsforening*. The Danish Society for Nature Conservation is the most significant nature conservation and environmental organisation in Denmark.
- **DR:** Formerly *Danmarks Radio*, is Denmark's national public service company.
- **DST:** *Danmarks Statistik*. Statistics Denmark is the central authority on Danish statistics.
- **DTU:** *Danmarks Tekniske Universitet*. The Technical University of Denmark is an independent self-governing university in the area of the technical and natural sciences.
- **EPA:** *Miljøstyrelsen*, the Danish Environmental Protection Agency. Part of the Ministry of Environment of Denmark. The Danish EPA is a national agency, covering the authority of the Danish environment and nature.
- **ERFA**-groups: Groups where farmers meet, often with a farming consultant, to discuss their strategies. *ERFA* stands for the Danish word *erfaring*, meaning 'experience'.
- **FRDK:** *Foreningen for Reduceret Jordbearbejdning Danmark*. A Danish association for reduced tillage.
- **FAO:** Food and Agriculture Organization of the United Nations
- **IPM:** Integrated Pest Management
- **L&F:** Landbrug & Fødevarer. 'The Danish Agriculture & Food Council' represents the farming and food industries of Denmark, including companies,

trade, and farmers' associations. It is a strong lobby for the political influence of the agricultural and food sector.

- **PA:** Præcisionslandbrug, Precision Agriculture
- **SDGs:** The UN Sustainable Development Goals
- **SEGES:** Until 2022, SEGES was a research and development organisation connected to the industry organisation *Landbrug & Fødevarer*. In January 2022, *SEGES* changed its name to SEGES Innovation, and now it is a private, independent, non-profit research and development organisation working in the agri-food sector.
- **UN:** United Nations
- **ØL:** Økologisk Landsforening, Organic Denmark

Statements

Anonymisation

All interlocutors are pseudonymised in accordance with good research conduct.

Illustrations, photos, and figures

All illustrations, photos, and figures are by the author unless otherwise stated.

Translations

All translations from Danish to English from articles, newspapers, journals, quotes, or other sources are by the author unless otherwise stated.

Introduction
Questions and Directions



Figure 1: Maize field on Salling

It was day one—the very *ground zero*—of fieldwork, and I was driving through the Danish countryside from Aarhus to the peninsula of Salling, surrounded by the Limfjord in the mid-western part of Jutland. Having left the highway some time ago, I now navigated a network of indistinguishable roads, occasionally passing small clusters of houses and sporadic town signs that briefly required me to reduce my speed to 50 km/h. My attention drifted towards the numerous farms dotting the landscape and the increasingly flat terrain, with fields increasingly taking over and forests becoming scarcer as I neared my destination. It was spring, and anyone familiar with the Danish spring knows that this season is characterised by tricky weather, and I was guarded, in more than one way, with a green windproof camouflage coat. The Danish farmland was still predominantly characterised by nuances of brown and grey, but small green sprouts daringly began to unfold on fields, bushes, and trees.

I was on my way to meet Karsten, the farmer who owns the property where I would be based during my first round of fieldwork. It was a bright April morning in 2020, and as I turned down the long, tree-lined gravel road leading to the farm, the clock read 9:45. Parking my car, I approached Karsten, who was standing near a farm building, giving instructions to two of his employees. A massive field sprayer named "Amazone" stood nearby. Later that day, when I got to look inside the shiny cabin of Amazone, I got a glance at what modern agriculture looked like from the inside. Two iPad-sized screens occupied the right side of the cabin, and beneath them, right next to the driver's seat, an advanced controller with several buttons took up the space where one would perhaps have imagined a regular gear stick. I was told that screens like this were used for several purposes, not just inside the field sprayer, but also in the tractors used to till and in the sowing and threshing machines. In fact, it was challenging to find a tractor without a screen—or several screens—like this inside them, especially on large farms like Karsten's.

COVID-19 had just caused lockdowns worldwide, including in Denmark, and everyone had been confined to their homes, which for most meant work now happening in front of a screen. No personal contact with people outside the homes, no hands touching, and no public coughing, God forbid. This was a top-level political decision based on directives from health authorities, and the vast majority of citizens in Denmark adapted to it smoothly. I had worried endlessly about the restrictions and what they would mean for my fieldwork. But here I was, looking at three people standing very close, definitely working, definitely not in front of a screen (except for

the ones in the tractors). Before I knew it, I was shaking hands with three strangers like no pandemic had ever existed. Or, I had met Karsten before, but this was our first meeting on his farm, and the first time in a research context. COVID-19 seemingly did not really exist in the countryside. Or, of course, COVID-19 existed, but as a result of political prioritisation, vital societal functions like food production were exempt from the strict regulations. Workers from Eastern Europe—another crucial societal function—were still allowed access across the otherwise strictly surveyed national border. As Karsten said, "People still need to eat, and the plants won't stop growing." I greeted him and the employees, aware of my attempt to blend in with my green jacket, rubber boots, and jeans. "So, I see you're dressed for the occasion," Karsten said, prompting laughter from the others.

Karsten asked me to introduce myself and explain my project briefly in front of the others. I attempted to outline my interest in sustainable development, and the farmers' response to what could perhaps at the time best be described as a luring sense of planetary crisis—what some scholars had more frequently begun to approach within the framework of *the Anthropocene* (Crutzen 2006, Hoag, Bertoni, and Bubandt 2018, Stein and Luna 2021, Tsing, Mathews, and Bubandt 2019, Hetherington 2020b, Malm and Hornborg 2014, Tsing et al. 2020, Brichet and Hastrup 2019, Tsing 2017a, Latour 2017, Haraway 2015, Reisman and Fairbairn 2020). A new geological era, characterised by the human species, Anthropos, being a primary driver of climate change and environmental degradation, altering the very geological composition of the Earth. Here, the introduction of fossil fuels, industrial agriculture, chemistry, and mass production is sometimes identified as events marking the beginning of the Anthropocene. I wondered about Karsten's understanding of his own role in all this, being a conventional large-scale producer using agrochemicals, fossil fuels, and draining the soil for the purpose of growing crops.

From my own academic training in anthropology, I had learned to understand the Anthropocene in a very Latourian sense (Latour 2005, 2012): as a cultural and social concern intrinsically bound to modern scientific narratives that falsely allow humans to think about themselves as external to and above nature, ultimately a flaw from dualist Enlightenment thinking, manifesting in the categories of science. From this perspective, the Anthropocene was also to be understood as a cultural and social problem—or, one might say, as a *relational* problem, understood as an increasing inability in humans to grasp, even conceptually, their own dependence on nature.

Framed also as a moral issue in matters of care and responsibility, this relational issue has been sought to be relieved ever since through formulating new forms of kin-making (Haraway 2007, 2016) and interspecies relatedness (Govindrajan 2018), by crafting new ways of noticing (Tsing, Mathews, and Bubandt 2019, Tsing 2015) and attending to more than human interrelatedness (Van Dooren, Kirksey, and Münster 2016, Krzywoszynska 2019a), and a whole new toolkit for engaging with more than human and material worlds (Cypher, Bubandt, and Andersen 2022, Tsing, Mathews, and Bubandt 2019, Swanson 2017, Kirksey and Helmreich 2010, Smart 2014). I had learned that environmental challenges, such as species extinction, climate change, and pollution, were a result of these false divisions, and consequently, achieving sustainability had to be a relational and moral problem as well. A problem of farmers no longer truly understanding their own embeddedness and relation with nature. Did Karsten appreciate his own embeddedness? Did environmental challenges also manifest as social, cultural, and moral concerns in the conventional farming world of Karsten?

In the Danish political and societal context of my fieldwork period, the agrifood industry was often framed as one of the main antagonists of climate change and environmental issues (DN 2018, Hansen 2019). Yet somehow—paradoxically—also usually the protagonist (Finansministeriet and Ministeriet for Fødevarer 2021, Bang 2019, Landbrug and Fødevarer 2019). The problem *and* the solution all at once. The "problem" framing was neither new nor surprising. In 2020, a sense of urgency had begun to creep into the public and political perception as the ecological condition of Danish fjords deteriorated drastically (Ritzau 2020a), and as unpredictable weather events were becoming increasingly common, even in the Northern Hemisphere (Bahn 2020). 2018, the year when I started my master's degree, was also the year Greta Thunberg initiated the first school strike in front of the Swedish Rigsdagen to alert politicians about climate change and demand real action. Climate change demanded action.

At the time, politicians and the public were calling for a so-called "grøn omstilling" (green transition) of the agricultural sector—one of the country's largest emitters of greenhouse gases and environmental polluters, such as nitrogen and pesticide residues (Nielsen, Mikkelsen, and Hoffmann 2012, DN 2018). The pertinent question in such a green transition was how, and through what means. What I realised shortly into my fieldwork was that conventional farmers, and their organisations, as

well as the farming industry, were surprisingly optimistic about the so-called green transition, epitomised in the saying that "Danish farmers are part of the solution" (Haubjerg, Bendtsen, and Bitsch 2021).

To understand how the agricultural sector can be seen as both a solution and a problem to climate change, environmental degradation, and biodiversity loss, it can be helpful to take a glance at how responses to climate change and ecological degradation have been understood. In the literature, approaches to climate change have been framed in terms of "catastrophism" and doomsday rhetoric on the one hand (often premised on the decommissioning of the neoliberal market economy), and an optimist "eco-modernism" on the other (often premised on a belief in technological and scientific solutions) (Ejsing 2023, Fritzbøger 2022). As historian Bo Fritzbøger writes, the latter dominates political life in Denmark, exemplified in former prime minister, Anders Fogh Rasmussen, who in 1993 rejected the catastrophist political attitude and instead claimed that "[w]e are able to develop a green market economy that unites environmental concerns with man's freedom to make his own choices" (Rasmussen, 1993, p. 186, in Fritzbøger 2022, 49). In this understanding, sustainable development must happen alongside economic growth fuelled by technological advancements. The 2021 political deal for a "grøn omstilling" of the agricultural sector epitomises this view (Finansministeriet and Ministeriet for Fødevarer 2021), as it rests on a strategy of making the sector sustainable by enhancing resource efficiency while supporting economic growth and technological development. One could indeed say that this "ecomodernist" attitude is what allows Danish farmers to be the problem and the solution simultaneously.

What seemed to me like a radical break with business-as-usual, understood as large-scale, chemically supported production, was less so. In fact, Karsten did not seem to worry much about his own or his sector's ability to become "sustainable"—yet it had to happen on the right terms. Producing sustainably was doable, and Karsten firmly believed in the strong scientific tradition of the agricultural sector to lead the way. It was challenging, indeed, but as he said, "a challenge with many potentials." Taking seriously the statement that Danish farmers are "part of the solution," I was curious in what way.

Returning to Karsten's question about my research topic, I remember saying that I was interested in farmers' own resistance to sustainable development. However, this research question presupposes that sustainability is a fixed category, and if I learned

one thing during fieldwork, it is that this is not the case. The conventional farmers we will meet largely managed to position their role not as opposed to, but aligned with, sustainable development. Thus, I was led onto a different path: exploring what sustainability meant to the farmers, what notions of good it entailed, and with what social, moral, and professional implications. This led me to rephrase the driving question to:

> **How is sustainability assembled in Danish conventional agriculture, and with what social, ecological, and professional implications?**

Answering the main question and the many additional questions prompted by such inquiry had me returning again and again to the relationship between farmers and their crops. Circling back to Karsten's courtyard, I will now introduce some of the scales of attention that emerged in understanding Karsten's notion of sustainability.

Karsten took me on a drive that day to see his farm. We did not walk through his farm buildings, but drove through the 1,100 hectares that constitute the property as Karsten narrated the history of his land and the many houses on it. I realised that Karsten's land was a large patchwork of previous lives and farms that had now merged into one single property. The fields had been merged too, and fields that had previously been home to different crops now only hosted a single crop variety. Wheat, barley, rapeseed, grass seed, spinach seeds, and seed potatoes were dominant. Buildings that had belonged to previous owners of the land, both houses and farm buildings, had now been repurposed for grain storage or housing for seasonal workers from Eastern Europe. Others had been demolished. Karsten had aimed to keep and maintain those in good shape, but as he said, he didn't want to be held responsible for decaying houses negatively affecting the local area—then he would rather tear them down. He liked to keep things tidy. I could sense the tidiness, not only in the material buildings but also in the fields.

The fields began to blend as Karsten described each crop in detail, discussing when they were sown and what kind of yield they might produce. Karsten proudly told me about his seeds, his so-called "højværdiafgrøder" (high-value crops) or specialty crops. Commonly defined as non-stable crops that generate more revenue per unit ground area than grain or basic staple crops, these "højværdiafgrøder" caught my attention as their seemingly exceptional qualities made them more worthy, or needy,

of farmers' attention. It was a high-stakes kind of crop, where great investments held the potential for significant returns. It was April, early in the season, and Karsten did everything he could to make sure his investments would pay off.

Karsten pointed to a potato field. "Look," he said, "as you see, the gaps are not yet closed." The gaps referred to the space in between the straight lines of potatoes where sunlight, coming from the right angle, could still get in. He explained that it was essential to give the potato plants the best "vækstforudsætninger" (the best conditions for growth), to prevent the sun from nourishing the weeds that would spring from the ground and compete with the main crop for energy and sunlight. I imagined a race between weed and potato, how the weed would desperately try to overreach the potato plant, reaching the sunlight and immediately expanding its roots underground, stealing water, nutrients, and space. "We are struggling a lot with grass weeds this season, especially the winter crops," he said.

Due to the mild winter, the weeds had been given the ideal conditions to germinate. To me, the weeds sounded really annoying, and Karsten found them annoying too. But as such, it was not a problem he could not solve. The majestic Amazone sprayer from the courtyard was the solution. And that was how I learned: spring is not only the season of sowing and growing but also the season of spraying. Karsten was a conventional farmer, and agrochemicals made up a fundamental component in his daily work, especially during spring. Keeping his fields clean was an "unnegotiable responsibility", he said.

As we reached the top of a slight slope on the road, Karsten stopped the car, rolling the windows down. This time, we looked out towards a rapeseed field. The rapeseed plants were not entirely alone in the field, and I remember thinking it looked pretty with the white flowers amongst the not-yet-fully-yellow rapeseed plants. I am not saying that I was wrong in my immediate assessment, but I was not right either. Looking at the field, Karsten made it *very* clear that "fields like that should be the real reason people are upset about agriculture." Karsten referred to the fact that conventional farming was subject to many wrongs: using pesticides, nitrogenous fertilisers, and producing too many pigs. Yet, according to Karsten, recourse waste like that exemplified above was way worse. As Karsten put it, "In my eyes, *that* is a waste of resources."

Karsten exemplified his position with a story about an organic farmer who had indignantly told Karsten about *another* organic farmer who had spent DKK 200,000

to remove thistles and root weeds. “The person telling me this thought it was senseless to spend that much money,” he explained, but in Karsten’s opinion, that was “part of the cake,” as he expressed it. He told me how seeds from thistles and various kinds of weeds would proliferate in the blink of an eye and spread to neighbouring fields. “If you can spray yourself out of the problem, then it is easy enough, but organic farmers will be in trouble,” he explained, referring to how root weeds required what he called “in-depth” agrochemical management.

In Karsten’s high-value crops, cleanliness was non-negotiable, particularly getting a hold of the stubborn root weeds. Compared to other weed types whose growth mainly happened above ground, root weeds had roots “where the lifeforce is located”, as he explained, which meant that even with mechanical removal, they would keep growing, allowing the roots to steal valuable resources from the soil. Karsten ended the conversation by saying, “So, *godt landmandsskab* [good farming conduct], that is also keeping one’s fields clean.”

The weeds caught my attention, but so too did the crops, the agrochemicals, and the machines: the broad host of practices and things making sure that no resources are wasted by keeping the field “clean.” Something was puzzling about how Karsten, in the most trivial way, described agrichemicals as crucial to practising good farming conduct and how this seemed to be intrinsically related to resource efficiency.

Anthropologists Nils Bubandt and Anna Tsing describe Denmark as “a place of moderation rather than excess, a site of diminutives rather than superlatives—whether in cultural, economic, ecological, or demographic terms” (Bubandt and Tsing 2018, 6). Their description resonates deeply with my fieldwork experiences. Despite the comprehensive human management of agricultural fields in Denmark and how drastically this management has reshaped (and continues to reshape) rural environments, both the fields and their management seemed characterised by an almost mundane uniformity. The *real* drama, it seems, happens outside the fields: in coastal waters, animal and human bodies, or microbial life worlds affected by nitrogen and pesticide residues (Burchardt 2021, Jørgensen and Richardson 1996), or in hospitals where fungicide resistance proliferates with direct links to the use of fungicides in agriculture (Arendrup et al. 2024). Despite this, farmland is likely—in both spatial scale and historical drama—pretty unremarkable to the average Dane.

The reason may be that Denmark is one of the most cultivated countries in the world, with farmland comprising the majority (60%) of the Danish landscape (DN

2022, 8). It is, in a sense, the backdrop to everyday life. In many places, such as Salling and Mors, fields essentially make up the environment, occupying 70-90% of the area. The risk of something being so incredibly normal is that we stop asking questions about it—we place ourselves in the middle of a rapeseed field appreciating its bright yellow colour as part of the "natural" environment. However, being in the middle of fields and farmland, as I was during fieldwork—during ERFA meetings, tractor drives, and walks—farmland turned out to be quite a spectacle, significantly shaped by collaborative efforts between industry, neoliberal economics, the state, and the professional ideals of what the good Danish farmer is. I wondered how sustainability could emerge from here—what it was and what it could be—in the context of the large-scale, conventional farm, where agrochemicals, bulk produce, nitrogenous fertilisers, and GPS sprayers play a central role? As the term "Industrious Sustainability" in the subtitle alludes to, it is not only statecraft and governing that are at play in assembling sustainability: industry interests, corporate discourse, and market demands similarly shape what sustainability is, such that, for instance, pesticides can be included in its definition and practices. How this unfolds in the moral world of farmers, and with what implications, is what the dissertation explores.

Assembling Sustainability

This dissertation examines how sustainability is understood, moralised, enacted, and ultimately made real in the context of conventional agriculture in Denmark. Sustainability is engaged not as a descriptive term but as a normative concept deriving its sense from the context of human social activity (Winch 2008[1958], Ramsey 2015).

Despite discontent in many disciplines that the term *sustainability* lacks a solid meaning and has several inbuilt paradoxes (Brightman and Lewis 2017, Escobar 2015, Howell 2017, Hebert 2010, Cusworth, Garnett, and Lorimer 2021), it is nevertheless assiduously used in policy frameworks, everyday speech, and research. Yet, few empirical studies explore in detail how these various and often divergent notions of sustainability gain ground—that is, the connection between human social activities and conceptual sensemaking. This is necessary in a world where policy experts, scholars, and industry specialists struggle to define a terrain for sustainable models and policies. In this context, there is a continuous need to "speak between fields of experience and domains of knowledge." (Murphy and McDonagh 2016, xvii). Murphy

and McDonagh (2016) suggest that sustainability has become "the connective tissue between ideas of responsibility, rationality, value, and ethics, all embedded in broader concerns for the future of the world in which we live." (xvii) This, they argue, should prompt anthropological explorations of sustainability that enable conversations across scales of knowledge. Ethnography is well equipped to do precisely this: to explore and make visible different scales of experience (Tsing 2005, 58).

Seefried (2015), drawing on Foucault, suggests that sustainability should not be understood as a clear-cut concept but rather "as a discourse activated in specific communication situations" shaped by "societal and political power" (378). This echoes a classic argument by Peter Winch in 1958, namely that "Principles, precepts, definitions, formulae—all derive their sense from the context of human social activity in which they are applied" (Winch 2008, 54). In a Danish context, historian Bo Fritzbøger (2022) demonstrates how shifting historical contexts have shifted Danish notions of sustainability—from forest conservation to carbon accounting—reflecting changing societal perceptions of what it means to live responsibly within planetary limits (17). In the context of Danish agriculture specifically, Frida Hastrup and colleagues (2022) call for an exploration of sustainability that does not seek "to arrive at a more precise characterisation or critique of any concept of sustainability" (2) but instead explores the work that the concept does. Instead of asking whether conventional agriculture is sustainable, I too seek to explore how sustainability is made to appear sensible, desirable, and even good within industrial farming worlds. I add another layer to the discussion by exploring how sustainability is assembled (Latour 2005), through practice, market incentives, and the material and moral ecology of farmland.

This stance implies that I also do not think that it makes sense to speak of "wrong" uses of the term. Tsing (2017b) notes that "'Sustainability' is the dream of passing a livable earth to future generations, human and nonhuman. The term is also used to cover up destructive practices, and this use has become so prevalent that the word most often makes me laugh and cry." (51). Instead of using the term "sustainability," Tsing suggests an entirely different concept: Holocene Resurgence. While I recognise and appreciate how crafting new concepts can allow us to imagine and practice new forms of living and surviving together, sustainability so far persists and makes realities—in sustainability assessments, advertisements, official documents and policies (Basso and Antle 2020, Sridhar et al. 2023, Kanter et al. 2018,

Hauschild, Rosenbaum, and Olsen 2018, El Chami 2020). These ubiquitous uses should not be taken as too diluted or self-evident to explore. I follow here philosopher Isabelle Stengers (2018) who argues that "in ignoring messiness, and dreaming of its eradication, we discover that we have messed up our world" (93). Instead of crafting more "clean" concepts, this dissertation recognises the inevitable messiness inherent to concept-reality encounters and attends to this messiness through ethnographic attention.

Some uses of the term "sustainability" are indeed questionable, as shown, for instance, by Benson and Kirsch (2010) in the case of corporate discourse. Yet, judging is not the purpose here. Instead, it is to ask questions such as: What are the political, social, biological, and economic conditions that allow some interpretations to take root and not others? What is it about this concept that makes it so prone to all these niche adaptations? What does the application of the idea tell us about the nature of farming today? And what does it reveal about the interests of people, their visions of the good life, their values, and their moral worlds? While I will not pursue all these questions in this dissertation, I find them essential to ask (and a good idea would be to keep them in mind as we read through). At the heart of this inquiry lies the concept of *industrious sustainability*, which I develop throughout the dissertation.

On Defining Industrious and the Good Farmer

"Well, farming is a lot like… A lot of weight is placed on whether you are *hårdtarbejdende* (hardworking). That's something you hear over and over again: "Oh, he is *dygtig* (skilled) and he is *hårdtarbejdende*." That's something agriculture is very much subject to, and obviously we still are" (Chresten, conventional farmer, 2020).

By *industrious sustainability,* I refer to a particular form of sustainable practice and reasoning that emerges within the logics of industrial farming, characterised by efficiency, productivity, and technological innovation. Drawing on the above, *industrious sustainability* is less a concept to be applied to explain the "real" world or imagine a better one than it is an analytical tool that allows me to attend to sustainability as it is crafted and contested within farming worlds and through notions of good farming. As I utilise it, the concept of *industriousness* has two dimensions.

First, it refers to being industrious in the sense of being "arbejdsom" (hardworking) and "flittig" (diligent), as expressed in the quote above. From here, it

can be understood as a moral order reflecting what it means to be a responsible, *ordentlig*, modern, and "good" farmer. Secondly, it refers to how agricultural industry actors (agrochemical companies, tech developers, advisory companies, and research institutions) influence the means by which sustainability can be achieved and how it is assessed. In line with Danish historical sustainability discourses emphasising resource efficiency and growth (Fritzbøger 2022, Brieghel 2019), industrious sustainability does not oppose industrial farming but aligns with discourses of 'sustainable intensification' (Pretty and Bharucha 2018). Here, sustainability is inseparable from industrious productivity and growth.

Taken together, "industrious" highlights how sustainability emerges through farmers' everyday negotiations of good farming, while asking how these are informed by political-historical contingencies and economic industry needs (Vries 2008). In this sense, it enables us to see sustainability among conventional farmers not as a clear ideology, but as assembled through technologies, materiality, practices, rumours, discourses, and social relationships.

A central figure in this assemblage is *the good farmer*. I engage the good farmer as a site for studying sustainability to show that sustainable development is not simply a technical feat, but one that involves reconfiguring the moral and social fabric of professionalism and the good life. In other words, the good farmer allows me to study sustainability as a moral economy—that is, how farmers' agronomic decisions when it comes to sustainability are guided not simply by market forces but also by professional ideals and moral concerns. Following Burton (2004, 2021, 2008), the good farmer is not a matter of personal virtue alone but is socially and politically mediated. The good farmer takes shape in relation to community norms (Chapter 1), cultural history (Chapter 2), market expectations (Chapter 3), agronomic risks (Chapters 4 and 5), and technological infrastructures (Chapter 6), essentially showing that "cultural definitions of farming reflect a history of power relations where a multitude of actors intervene and interact—not only the farmers" (Burton 2021, 10). Central to the moral economy of conventional farming, I suggest, is the ideal of resource efficiency. So, what does it mean to study sustainability as a moral economy? The concept has been engaged in a myriad of ways that I will not attempt to list here, yet I will briefly mention a few key texts. Building on E.P. Thompson's work (1971), James Scott (1976) extended the exploration of a moral economy to Southeast Asian peasants, highlighting a *subsistence ethic*: farmers tolerated exploitation to a point, but revolt emerged when

elites undermined their ability to survive. The point to draw from this is how moral expectations legitimise or contest certain economic practices. Sustainable development, being indeed a politico-economic matter, is shaped by these moral evaluations and expectations.

The good farmer is the entry to this moral economy. To explore this, I draw on a wide variety of scholarship to explore the social and moral dimensions of farming today and how they shape notions of sustainability. Drawing on Mattingly (2014), morality is treated not as prescriptive, but as "ordinary." In this understanding, there is no clear-cut distinction between morality as "the everyday" and ethics as the higher state of moral achievements (Zigon 2014). Instead, this dissertation treats ideas of right and wrong as shaped through interpersonal engagements, experiments, and normative circumstances associated with farmers' roles, associations, and commitments (Steinmüller 2013, Paine 1967, Gluckman 1963, Besnier 2009). The good farmer is explored as a moral person-figure through which sustainability as a moral matter is enacted and stabilised in discourse and in practice—in field-inspections, ERFA-meetings, and everyday agronomic risk management. As such, the good farmer is not a separate category from sustainability but a central articulation of its moral economy in everyday practice. Exploring the intersection of sustainability and what it means to be a good farmer in the context of Danish conventional agriculture is the central contribution of this dissertation.

Risk: Legitimacy and Legibility in Agronomic Worlds

Agronomic risk management is a central site to study good farming as it is articulated through emic notions of *ordentlighed* (properness, decency), *faglighed* (professionalism), and *godt landmandsskab* (good farming conduct). My research suggests that agricultural sustainability is structured around different articulations of what constitutes risk and the divergent temporalities inherent to these articulations. Risk dictates what needs to be acted upon here and now to secure the present, often compromising longer-term concerns. In other words, so-called "trade-offs" are an inevitable part of sustainability politics (Kanter et al. 2018). How much toxicity is acceptable to maintain an efficient production, or how much nitrogenous fertiliser is permissible to feed the world? In this context, what counts as valid risk, how it should be managed, and through what means are central concerns.

Within the logic of resource efficiency, weeds, pests, and diseases figure as crucial and particularly 'risky' problems to be managed. I explore how such risks are construed in various conferences, scientific seminars, and professional events, as well as in farmers' magazines, media, and professional news outlets. Thinking about risk as tied to specific epistemic and moral arrangements offers a productive way to see how particular visions of sustainability—those tied to order, tidiness, and techno-efficiency—are rendered *sensible*. At the same time, other environmental and social relations (toxicity, more-than-human care, alternative temporalities) remain obscured, inaudible, or illegible. In this light, risk does not only emerge from the subjective experience of something potentially damaging; rather, it is a relational product made and distributed discursively, politically, and materially (Adam, Beck, and Van Loon 2000). I explore the underpinnings of such negotiations by drawing on STS studies (Latour 2005, Fortun 2014), suggesting that material arrangements reveal *and* produce epistemic and ontological arrangements (Larkin 2013, Law and Lien 2013). Drawing on the above allows me to explore conventional sustainability as an epistemic arrangement in which human and non-human actors—including machines, weeds, pests, sensors, and policies—co-produce what is visible, knowable, and actionable as matters of sustainability concern. It also helps explain how fields can appear simultaneously as sites of sustainability and of ecological degradation—because what is made visible or invisible is politically and aesthetically ordered.

Finally, I draw attention to moments where this order is unsettled—not through radical rupture, but through disturbance or unease, or what Anna Tsing (2005) may call friction. In these moments, alternative temporalities, care practices, and ecological priorities briefly surface, not as fully formed alternatives, but as *frictions* within dominant sensible orders.

Anthropology of Toxicity

In dominant frameworks for understanding toxicity, pollution, and toxic exposure in social scientific research, toxicity is most often approached as harm or violence (Brown 2013, Petryna 2013, Liboiron 2021, Fortun 2001). However, in my field site, agrochemical crop management is hardly reducible to either a distinct form of environmental harm or the neoliberal pursuit of capital accumulation. Here, agrochemicals were often framed not only as necessary but even as perfectly compatible with sustainable agriculture. Lay perceptions of toxicity and toxic risks as

other than harm have been explored by some scholars who have pointed to examples where toxicity enters livelihoods through acts of care: for instance, through medicine (Persson 2004), plastic toys (Chen 2011), or serving trays (Pérez, Handley, and Grieshop 2010). Here, preferences such as taste and aesthetic, as well as health concerns, are central to perceptions of toxic risk.

However, to better understand the role of pesticides for achieving sustainability in conventional farming, I suggest engaging the toxic through the lens of moral economy. Much work on toxic risk perception assumes a kind of epistemic vulnerability, often stemming from a victim position of being exposed to pollution from an external source (Lou 2022, Ahmann and Kenner 2020, Ahmann 2018, Shotwell 2016, Auyero and Swistun 2008, Hendlin 2021, Davies 2018, Shattuck 2021c, Perczel 2021, Bond 2021). However, the farmers I explore are clearly not victims in the same sense. Instead, they are agents *within* the polluting system, often defending and reproducing the very practices that generate risk. I take inspiration from three concepts: *labour of confusion* (Auyero and Swistun 2008), *communities of complicity* (Steinmüller 2013), and *industrial language ideology* (Fortun 2014). I suggest that in the case of conventional agriculture, it is not so much confusion and epistemic vulnerability that define farmers' pesticide narratives and risk perception, but certainty, containment, and safety. Identifying how these narratives are shaped and sustained, I develop the concept *labour of certainty* to draw attention to the discursive work by agrochemical industries, regulatory frameworks and farmers themselves to maintain a narrative about pesticides as necessary and safe. I extend Steinmüller's (2013) concept of *communities of complicity* to not only account for farmers' own perceptions but also the complicities of the agrochemical industry. As such, communities of complicity in this context encompass both farmers and regulators, serving to protect economic interests and moral worlds. I argue that conventional farmers' relationship to agrochemicals is not characterised by either violence or epistemic vulnerability, but by negotiations of knowledge, professional legitimacy, and moral survival.

The aim of this dissertation is thus not to uncover the immediate harms of toxic exposure in cropping systems, although this is important too. It is to direct attention to the less eventful, less striking, and more mundane industrious chemical relations that shape visions of sustainability and good farming in Denmark today.

Weediness

In social science, crop pests, including weeds and pathogenic fungi, have been examined through both political ecology and multispecies and Anthropocene frameworks. In anthropology, scholars have approached "weediness" as a generative concept—one that highlights unexpected forms of flourishing amid the ruins of neoliberal capitalism (Bubandt and Tsing 2018, Stoetzer 2022). Tsing (2017a) describes weeds as opportunistic creatures of the Anthropocene. They "make use of opportunities, climb over others," and form collaborations with those who allow them to proliferate in environments of human disturbance (17). The framing of weediness as generative closely aligns with studies of dumping grounds, forms of waste, and other "feral" and undesired "abjects" of neoliberal capitalism, positioned in the peripheries of accumulation (Reno 2016, Hoag, Bertoni, and Bubandt 2018). Here, waste and weediness offer conceptual pathways through contemporary crises. Thinking *with* weeds has prompted critical inquiry into which non-human species are valued, and how ideas of belonging often reflect economic interests.

Mardi Reardon-Smith (2025) describes this framing as metaphorical and suggests looking instead to how weeds and weed control shape landscapes and bodies, "outside of their function as a useful metaphor" (2). Reardon-Smith suggests exploring "what weeds, and, importantly, the human efforts to control them do in the material world, and how the impacts of weeds and weed control sit in landscapes and bodies in ways that are uneven", aligning with political ecological approaches to weeds that traces how herbicides and pesticides affect farm workers, landowners, neighbours, and consumers (Guthman 2019, Hetherington 2020a).

Yet, as already mentioned, I am less concerned with the harmful effects of agrochemicals on workers' bodies than I am with how weediness becomes a social and moral force—simply because this is how weeds appeared to me through the world of farmers. Thus, weeds and weediness more broadly (pests, diseases, fungi, etc.) serve less as metaphorical opportunities for thinking otherwise, than as potentials to scrutinise further the system and subject in question—the Danish conventional agrarian production system and the Danish conventional farmer. I follow scholars like Argüelles and March (2022), Reardon-Smith (2025), and Robbins (2007) to approach weediness not as an external threat or celebratory disturbance to the conventional agronomic system but also as that through which agricultural order is defined,

maintained, and justified. Thus, weediness becomes a central entry to explore what sustainability can be within the efficient large-scale farm.

Returning to Karsten once again, this dissertation suggests the need to understand the role of weeds in constituting conventional farming worlds through their reinforcement of certain forms of human and chemical control, human and technological surveillance, agrarian decisions, and moral repercussions. We see this reinforcement precisely through farmers' moral judgment of weedy fields (Chapter Four). I suggest, following John Law and Marienne Lien (2013, 365), that crop threats such as grasses, viruses, and fungi "come to *be* in a relational, multiple, fluid, and more or less unordered and indeterminate (set of) specific and provisional practices." Practices where risk assessments are negotiated in real time, and where competing epistemologies—personal experience, chemical guidelines, corporate messaging, and plant performance—are held up against each other. In this context, what an agronomic risk *is*—that is, its ontological status—depends as much on social relations and local ethics as it does on agronomic facts.

Situating History

Occupying the passenger seat on drives across the farmland of Salling revealed how different historical layers are folded into the farmland. Listening to stories and local narratives, I realised that farmland is not only a production space but also places composed of multiple mergers of land, multiple previous owners, and multiple histories of survival and decay. Most farmland shares the same story—a story of inevitable change caused by agricultural structural adjustment and societal change, coined in Danish as *strukturforandringer*. As mentioned, the relationship between Karsten and his fields is not only informed by neoliberal ideology but also involves an aesthetic experience. I was drawn by this aesthetic dimension, which led me to pay attention to the aesthetic order of farmland and how it affected farmers emotionally. I refer to this as *affective aesthetics,* denoting how farmland is not only shaped by but also the bearer of specific histories, discourses, and technologies expressed and negotiated through the ordering of farmland. Gastón Gordillo (2014, 2011), Navaro-Yashin (2012), and Dace Dzenovska (2018, 2020, 2011), although in different ways, focus on the affective dimension of ruinated, empty, and destroyed landscapes. In *Chapter One,* I engage the concept of affect to show how visions of the good sustainable farmer emerge not only from material-discursive practices, but also from socio-

political histories tied to landscape. I will now turn to the methodological and positional considerations guiding my research.

Methodological Considerations

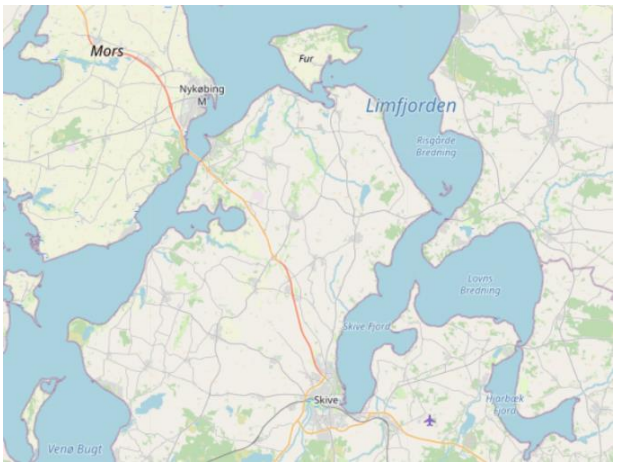


Figure 3 (left): Map of Mors and Salling peninsula surrounded by Limfjorden. Copyright: www.openstreetmap.org

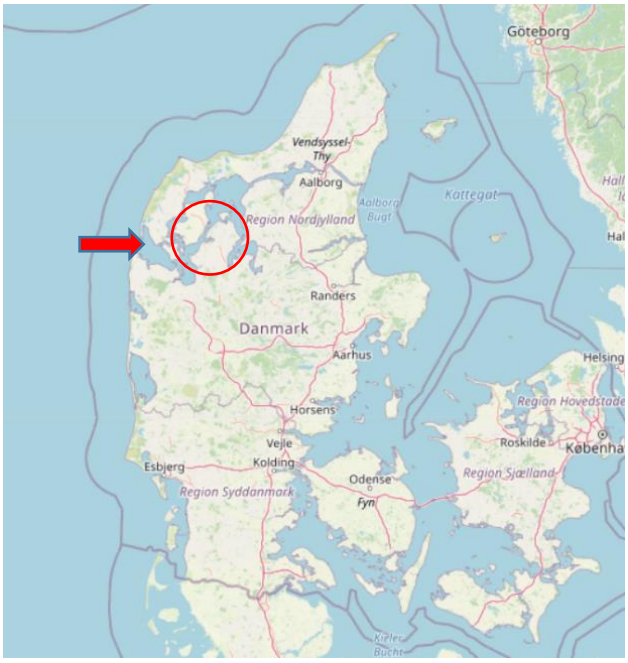


Figure 2 (right): Map of Denmark showing the location of Salling and Mors. Copyright: www.openstreetmap.org

Learning to Pay Attention: Farmland as an Analytical Object

Salling is a peninsula (left map) on the west coast of Jutland, bordered by Limfjorden to the west, east, and north, and connected to the remaining part of Jutland in the south (red arrow, right map). Mors is right above Salling, an island surrounded by Limfjorden. Salling, where I conducted the significant parts of my fieldwork, lies within Skive municipality, covering around 500 km². The area has been heavily cultivated for decades, and today, 69% of the land is classified as farmland, with only 7.5% designated for organic farming (the national average is 20%), and approximately 9% is covered with trees (Møller and Dalgaard 2019). Compared to the early 1970s, when the average farm on Salling was about 20 hectares, today's average farm size has tripled. Structural adjustments and municipal reforms have led many residents to relocate to cities for work, leaving a growing number of houses and farm buildings abandoned. Approximately 5,000 farm buildings are unutilised and deteriorating. Combined, these buildings span approximately 1.2 million square meters, the ninth-largest number among all Danish municipalities (Møller and Dalgaard 2019,

Gottschalk, Ærø, and Rasmussen 2007). Salling's agricultural modernisation mirrors national tendencies, with structural changes happening as quickly as in the rest of Denmark.

The primary field site for this research consists of agricultural farmland—tracts of arable land cultivated for crops intended for bulk production (livestock feed), high-value exports (certified seed production), or energy (grass, rapeseed, or maize). While fields are material sites characterised by biophysical properties such as soil and crops, they are equally shaped by the social relations surrounding their use. I have lost count of how many times I have heard, "Salling has some of the best soils in Denmark," only perhaps exceeded by the nutrient-rich moorland on Mors, depending on who you ask. The exceptional fertility of soils on Mors and Salling is reflected among the farmers not only as a condition of production, but simultaneously as a material condition for the distribution of moral responsibility. As such, land as a material condition is essential in understanding land as a social relation.

In describing the different characteristics of geography, human geographer Tim Cresswell differentiates between *space* and *place*. Space, he says, is abstract; "it has areas and volumes," whereas "places have space between them" (Cresswell 2004, 8). *Place* is what he calls a "meaningful location". Cresswell goes on to distinguish place from landscapes, arguing that landscapes are what he calls "an intensely visual idea" (10), something that we do not live inside of, but look at. Farmland, I will argue, is not so easily delimited to neat epistemological categorisation like space, place, or landscape. Instead, I will suggest that farmland is best understood as assembled through "multiple and disparate objects, bodies, and forces that together produce phenomena" (Guthman 2019, 17). Thinking about farmland as assembled also means acknowledging that "land as property, a social relation, operates differently than land as soil, a material condition of production" (Ibid. 18).

One of the crucial lessons the conventional farmers taught me was to pay attention to specificity: a practice central to anthropology that yet often slips away in broad (and necessary) generalisations about "industrial farming". While I have not entirely avoided such generalisations, it is my hope and aim that the specific contexts in which farmers operate are clearly presented for the reader. It is crucial to recognise that farms vary greatly, and different crops require distinct forms of care and attention, allowing *faglighed*, *godt landmandsskab*, and sustainability to gain ground under very different material conditions. Assemblages are about acknowledging the

"situated" nature of knowledge—that sustainability is not a one-size-fits-all but emerges from different concerns of my interlocutors and how they understand and know farmland. In other words, sustainability reflects and is shaped by matters of concern (Latour 2004).

"Concern," Stengers (2018) writes, "[…] incorporates the idea that there are situations that concern us before they become objects of preoccupation or choice, situations which, in order to be appropriately characterised, demand that 'we feel concerned'" (2018, 9). As the following chapters demonstrate, various concerns have the potential to challenge and reframe conventional notions of sustainability. Like, as we shall see, when earthworms become matters of concern despite being hardly translatable to quantitative matters of fact in sustainability assessments. Or when one of my interlocutors expressed concern about the effects of agrochemicals on his own health, despite it falling outside the conventional understanding of what poses a "risk." Thus, what is considered a "matter of concern" is consequential for sustainability.

In the following chapters, I draw attention to the farmer-farmland relationship through various field management practices that, although in different ways, express how different matters of concern shape sustainability. These practices include precision agriculture, agrochemical management, and reduced tillage. I attend to these management practices through critical phenomenology to explore sustainability as not only a subjective or moral impulse, but something industriously situated in an agrarian world.

Subjectivity, Sustainability, and Critique

This dissertation draws on critical phenomenology to explore how conventional farmers in Denmark experience, interpret, and negotiate sustainability. Critical phenomenology builds upon classical phenomenology's concern with lived experience as the foundation for epistemology (Merleau-Ponty 1945, Kockelmans and Husserl 1994), but expands it by situating subjectivity within broader structures of power, ideology, and historical contingency (Weiss, Murphy, and Salamon 2020). This methodological orientation helps to attend to how sustainability becomes sensible—not just in terms of cognition or belief—but as an embodied, affective, and moral orientation toward the land, crops, and future. In this approach, farmland is not only a production site but a site where moral personhood is enacted through agronomic care, risk management, and rational ordering. For instance, farmers' attachment to

clean fields and efficient crop management is not simply technical; it is tied to a historical moral imaginary of good farming. Likewise, Sara Ahmed (2006) has suggested the notion of "orientation" to attend to how subjects are directed by histories that surface as "lines" of movement, shaping what actions and objects are within reach. Understanding sustainability through orientation is to see sustainability not as a goal but as a path shaped by farmers' historical location, institutional incentives, and affective attachments to land and community.

Critical phenomenology allows me to remain attuned to moments of friction, hesitation, unease, and what Lauren Berlant calls "cruel optimism" (2011): attachments to ways of life that are both sustaining and potentially destructive. From this perspective, farmers' articulations of sustainability can be understood as enactments of what Berlant calls "that moral-intimate-economic thing called 'the good life'" (2011, 2). As I show in the chapters that follow, farmers' relations to pesticides, weeds, and soil health are not reducible to clear ethical binaries, but negotiated in social settings such as ERFA meetings, resonating with what Mattingly (2014) calls "moral laboratories".

Being critically attuned enables an analysis that does not simply affirm farmers' perspectives but seeks to understand how the sensibility of sustainability is co-constituted through affective attachments, epistemic regimes, institutional norms, and more-than-human relations. Thus, critical phenomenology enables an ethnography of orientation—an approach that attends not just to what farmers think sustainability is, but how it becomes desirable and is practised.

If the dissertation at times appears theoretically modest, this is intentional. I seek not to add another abstract layer to the already crowded conceptual landscape of sustainability studies but to demonstrate how sustainability emerges as sensible, good, and problematic from within farming practice itself. This reflects a methodological stance: rather than seeking to resolve contradictions through theory, I attend to them ethnographically, showing how sustainability is lived, negotiated, and made sensible in practice. My contribution is therefore less about adding another universal theory of sustainability and more about articulating the situated logics—what I call industrious sustainability—in Danish conventional farming.

Studying from the Middle

I aim to stay with the ambivalences that arise in the space between categories of good and bad sustainability, and good and bad farming. Resource efficiency is neither a story about success nor failure—it is both. Indeed, in the case of farmers like Karsten, we gain a sense of the diverse understandings of responsibility and of the good—here, weeds, pests, and other threats to crops are fought in the name of sustainability and good farming. And as we shall see, environmental concerns emerge from a messy and chemically mediated stance involving humans, plants, advanced technology, machinery, fertilisers, and pesticides. There is no return to small-scale, pre-industrial times without chemicals and big machines. Small-scale farming is neither feasible nor desirable; instead, the good sustainable farmer emerges from within these industrious relations.

Following Haraway (2016)*, staying with the trouble,* in this case, means embracing a relational ethical approach in untangling what 'the good' looks like from the point of view of conventional farmers in the context of sustainable development. Following Van Dooren, Kirksey, and Münster, this approach aims to "hold onto competing ethical obligations, multiplying perspectives on what counts as 'the good.'"(Van Dooren, Kirksey, and Münster 2016, 15). In the context of the Anthropocene, anthropology has increasingly turned its attention toward an ethical commitment to studying, on the one hand, the marginal "suffering" slots (Robbins 2013), which are today represented, for instance, by species threatened with extinction. On the other hand, anthropologists have studied ecological resilience, creativity, and potential, capturing both pragmatic and more celebratory approaches to "right" forms of sustainability and environmental care. Whether regenerative farmers (Ahl 2021), unruly and feral weeds (Tsing 2017a, Reardon-Smith 2025, Argüelles and March 2022), birds threatened by extinction (Dooren 2014), or earthworms, microbes, and beneficial organisms in compost (Jones 2019, Puig de la Bellacasa 2017), these objects of study share being situated on the margins of capitalist accumulation. I see "staying with the trouble" as a methodological invitation to really utilise the full potential of anthropology as a curious discipline that seeks to understand human (and more than human) life worlds, not only from the margins, but also from the middle. In the case of agriculture, I see it as an invitation to understand the conventions of conventional farming, and to see their actions as equally shaped by moral concerns and notions of the good, to hopefully come closer to understanding

how industrial and capitalist growth models exist and pertain in the world despite knowing *so much* about environmental and ecological health.

Staying with the partial truths of "the other"—in this case, the Danish conventional farmer—however, does not necessarily mean relativism. "Ethnography," Kim Fortun (2014) suggests, "can help draw out how nested systems work and harm; ethnography can also *loop*, returning to the systems studied to dislodge what I think of as discursive risks—habits of language (which undergird habits of building, producing, and regulating)—that we have learned to be indifferent or injurious. The ethnographer then becomes a teacher, not as a master with corrections in hand, but as one who unsettles the systems studied so that they gain a capacity for transformation." (323). Thus, while I take seriously claims about sustainability, responsibility, and good farming in industrious farming worlds, I simultaneously critically attend to the broader structures in which ideas about good farming exist.

Fieldwork and Access

From 2020 to 2023, I conducted the ethnographic fieldwork that forms the foundation of this dissertation. During the first fieldwork period in 2020, I lived on a potato farm and conducted research on five nearby farms, which varied in production methods but all exceeded 200 hectares—some up to 1100 hectares—classifying them as large-scale. Living on the farm allowed me to do *participant observation,* in the broad sense of the term (Bernard, Weisner, and Ryan 1998, Musante and DeWalt 2010). From here, I followed the daily rhythms of farm work, such as sowing, cultivation, pest management, and harvest, as well as the daily rhythms of crop development in surrounding fields. I also attended the farmers' business and board meetings. As noted by Thomas Højrup, life and work are very much inseparable on many Danish farms, as they are still to a great extent family-owned and family-run (Højrup 2010). Thus, living on the farm allowed me to follow not only work but also the mundane aspects of daily life and how the two often melt into each other.

From here, I gained access to new farms, became familiar with new people and places, and was introduced to new concepts, things, and phenomena more or less significant to conventional farming in Denmark today. This type of sampling is sometimes referred to as 'snowballing' (Elliot, Norum, and Salazar 2017, 130). The disadvantage of this method may be that gatekeepers only refer you to specific kinds of people. However, I experienced how farmers would happily refer me to farmers who

were different from themselves. For instance, they told me to visit a "completely organic!" couple who ran a biodynamic vegetable production on two hectares because they thought I "might find it relevant" for my research in sustainability. Farmers' recommendations offered insight into local dynamics of exclusion and inclusion (who is like "us" and who is not). They revealed a great deal about local conceptions of sustainability and how they vary across different scales of production. Thus, snowballing turned out to be less of a disadvantage than a source of analytical interest.

Considering the sudden lockdown in Denmark due to the COVID-19 pandemic, my fieldwork went surprisingly smoothly with few to no complications related to COVID-19. One explanation could be that national policies largely prioritised food safety and the continuation of agricultural production. Indeed, being bound to the cycles of biological life as much as people, machines, and politics, life goes on. Thus, access remained uncomplicated.

In 2021, I shifted my focus to following three ERFA groups. An "ERFA-group" (short for "erfaringsgruppe" in Danish) refers to an experience-sharing group. These groups typically consist of 8-10 farmers, agricultural advisors, and sometimes industry experts who come together (on-farm) to exchange knowledge, experiences, and best practices. Topics can include financial management, crop production, livestock health, compliance with sustainability targets, new technologies, and regulatory changes. They are often organised by agricultural advisory services or industry organisations, but sometimes self-organised too. I attended 18 ERFA meetings in three different ERFA groups during the growing and harvest seasons, from February to October. Some are concerned with regular crop management, such as spraying and fertiliser strategies; others are experimenting with conservation agriculture practices, like reduced tillage. Yet, we spent most of our time looking for weeds and pests, discussing strategies for—mostly chemical—intervention. Following these professional peer groups, valuable insights were provided into the custodian scripts of farm management strategies, revealing more intimate and moral aspects of agricultural knowledge making (Krzywoszynska and Goss 2019).

In 2022, I returned to one of the farms where I had conducted research in 2020. I lived on Erling's and his son Kasper's farm during spring and summer, and from here I followed various farmworkers in their daily tasks, such as spraying, tilling, allocating fertiliser, harrowing, removing stones, fixing fences, and so on. I also visited farms from my 2020 fieldwork, revisiting old questions and asking new ones. Since then, I

have visited my field site more sporadically, following news outlets, attending congresses, and various professional events, such as Plantekongres.

The most important group of collaborators in this study is farmers, employees, and farming families. All farmers featured in this dissertation are anonymised, but live either on Salling or Mors. All farmers, except for the farmer I call Ole, farm conventionally. Most farms consist of a mix of pigs (e.g., sows, slaughter pigs, and fattening pigs), cash crops (e.g., winter wheat, winter barley, spring barley, rape seed, and maize), specialty crops (e.g., spinach, seed potatoes, and grass seed), some legumes (mostly broad beans, lupins, and peas), and crops for energy (e.g. willow, grass, and maize). Only one conventional farmer, Erling, has grazing livestock and forestry too. Ole, the organic farmer, was a dairy farmer. They all identify as male and range in age from 30 to 70. Politically, they largely orient towards the right with the party *Venstre* as their "class" party, historically speaking, but some increasingly orient towards *Danmarksdemokraterne,* the party of which former *Venstre* politician Inger Støjberg is now the leading figure. Altogether, largely reflecting the most common trends among Danish farmers (DST 2022). The farmers offer insights into various aspects of farming: field management, production strategies, local community ties, the historical roots of their practices, their approaches to sustainability, and what it means to be a "good" farmer today.

Farmers' families typically consist of wives and children. I spoke primarily with the wives, many of whom worked part-time on the farm, handling tasks such as accounting and administration, while also managing household and childcare. Because they are both involved in and somewhat distanced from the core farming operations, conversations with the women provided an opportunity to "test" my interpretations of events. Although their perspectives are not directly voiced in this dissertation, they have indirectly influenced my understanding of the data.

Farm advisors form a smaller group of collaborators. These are primarily plant-breeding advisors whom farmers hire to advise them on sowing and crop protection strategies. As one advisor explained, their primary role is to "secure the economic *bundlinjen* [bottom line]." This group operates at the intersection of science, politics, regulation, and farming, translating new pesticide regulations and other political decisions into actionable advice for farmers. One advisor was invaluable, bringing me along to several ERFA meetings. Known as Per in this dissertation, he not only taught

me about crop protection but also helped me understand farming jargon, regulatory challenges, and the broader structural conditions farmers face.

The final group consists of scientists. During my fieldwork, I engaged with a range of experts, from biologists specialising in potato production and diseases to agroecologists focused on designing "sustainable" farming systems and practices. Notably, I spent two months at the Department of Agroecology in Foulum, Viborg. While the scientists do not play a central role in this dissertation, their input was valuable in helping me grasp the technical and specialised aspects of agriculture.

Much of my fieldwork consisted of driving through, by, and in fields with farmers, discussing crops, weeds, and yields, similar to Kusenbach's (2003) "ethnographic go-alongs." I was rarely capable of actually doing any work, besides helping to remove stones from the fields or digging out for a drain, so primarily I was assigned to tag along on someone else's workday. Very few operations are carried out by hand, except for things such as digging out drains, removing stones from the field, looking for pests, and cleaning farm machinery. These participatory limits offer essential insights into the "nature"—or perhaps the lack thereof—of modern conventional farming in Denmark. In today's farming, most work is done using specialised equipment, computers, and large farm machinery, and it therefore requires special competencies to operate.

Interviews were mainly a combination of structured and semi-structured interviews (Spradley 2016, O'Reilly 2012). I am inspired by Karen O'Reilly's approach to semi-structured interviews as *guided conversations* where the ethnographer sets the conversation topic but allows unplanned directions to occur depending on what the interlocutor finds relevant and important to discuss (O'Reilly 2012, 118). Moreover, I conducted eight in-depth interviews with six farmers and their wives to embed notions of good farming within the broader history of agricultural development in the local context of my field site. Most of the time, the topics shifted between different scales of agriculture, ranging from concerns about weeds to concerns about feeding a growing world population, reflecting Kirsten Hastrup's (2013) point that fieldwork constantly weaves in and out of local and global scales, addressing both local and global issues simultaneously. Interviews provided insight into farmers' self-reflections about how to be legitimate "good farmers" in the context of climate change and environmental challenges, pointing out the dilemmas and paradoxes of being a good, sustainable farmer.

Besides interviews, the farmers' relationship to farmland and the crops on it was my primary puzzle and object of study, focusing on sustainability and ideas about good farming. Instead of rushing to conventional perceptions of farmland as a production space, I drew methodological inspiration from Isabelle Stengers' concept of slowing down (Turpin 2013, Stengers 2018) to notice the complex moral and social dimensions that farmland also encompasses. In a conversation with Entienne Turpin, Stengers defines it as "(…) multi-critter thinking, caring for entanglement, learning the art of paying attention. And it is also a matter of joy, sometimes dolorous joy, but joy indeed, when you feel your thought and imagination affected, put into (e)motion, attached to what was previously indifferent." (Turpin 2013, 179-180)

Reading the Field

Besides interviews and more classic participant observation, I draw on the work of Ayo Wahlberg and Ruben Andersson, who advocate for viewing field sites not as 'multi-sited' (Marcus 1995), but as a 'site multiplied' (Andersson 2017, Wahlberg 2018, 10-11). This means that while my research focuses on specific locations in Denmark, namely various fields on Salling and Mors, I incorporate broader historical, political, and narrative contexts, expanding the boundaries of the field site beyond its immediate physical location. Throughout my fieldwork, I regularly consulted national agricultural news outlets, such as *Landbrugsavisen*, *Maskinbladet*, and *Agro*, which are widely read by farmers in Salling. Using these media outlets alongside industry reports, sales materials of various kinds, and marketing advertisements, I aim to show that while industrial governance and business-making are a given feature of the agroindustry, it should never, as Brieghel (2019) suggests, be treated as "too banal or self-evident to discuss" (92). In an agricultural world saturated by corporate interests (Pechlaner 2012, Benson and Kirsch 2010) in both professional, research, and commercial communication contexts, I consider it crucial to take seriously their messaging to examine the narrative forms that undergird notions of sustainability and good farming.

The scales of attention throughout this dissertation shift between interviews, documents, observations, archival material, brochures, company websites, news outlets, podcasts, and academic publications, offering context for understanding how sustainability is negotiated and shaped in the agricultural sector.

Chapter Outline

To explore how *industrious sustainability* is assembled, reassembled, and made sensible, the dissertation is structured around seven analytical chapters. Each chapter examines a dimension of the relationship between farmers and farmland, exploring how sustainability and good farming practices are embedded and negotiated within this context. These dimensions include relations to community life, cultural history, agronomic risks, agrochemicals, technology, and soil health. Together, they offer an ethnographic and conceptual mapping of how sustainability is rendered meaningful, desirable, and morally legitimate in contemporary large-scale agriculture.

Chapter One introduces essential paradoxes, dilemmas, and contradictions that characterise what it means to be a large-scale farmer today. Primarily through the lens of Erling, it explores the implications of structural adjustment and agricultural intensification on rural relationships. Central analytical concepts include *affective aesthetics*—how material disorder, like abandoned houses, becomes morally charged—and *moral stewardship*, where farmers curate communities by deciding who and what is worth preserving. These practices reveal how utilisation of land, houses, and resources blurs the line between efficiency and care, survival and exclusion. The chapter situates these dynamics within broader processes of centralisation and state withdrawal, showing how farmers' actions embody both complicity in rural decline and responsibility for sustaining local life. In doing so, it draws the contours of *industrious sustainability* and the dissertation's overall argument: that sustainable development implies an intensification of the affective, moral, and social labour required to keep communities viable amidst ongoing transformation.

Chapter Two critically examines the cultural history of good farming. The overall aim of the chapter is to show how contemporary expressions of "sustainability" in Danish conventional farming are entangled with long-standing narratives of industriousness, innovation, and national progress. In doing so, it opens for an analysis of how these narratives continue to shape present-day solutions to the climate "crisis," including the privileging of technologically driven, knowledge-intensive forms of production.

Chapter Three explores the material ecology of the conventional large-scale farm and the moral economy shaping its operations through central emic notions of *ordentlighed* and *faglighed*. It examines how material production conditions influence the practical and ontological boundaries of sustainability through an

ethnographic juxtaposition of diverse production forms. The chapter demonstrates how crops like starch and seed potatoes, along with particular industry standards, shape professionalism and the imaginative limits of sustainability, illustrating how sustainability becomes ontologically tied to scale. In this way, chapter argues that sustainability is not discursively constructed but materially enacted through farm and crop-specific infrastructures and professional obligations.

Chapter Four further investigates farmers' relationships to their fields, this time in the context of agronomic risk. Through the concept of empirical ontology (Law and Lien 2014), it examines how farmers perceive and recognise pests, weeds, and crop diseases as distinct forms of waste. It asks how risk in the context of weeds, pests, and crop diseases is perceived, performed, and experienced by farmers, farm advisors, and the agrochemical farming industry—and importantly, how it is sought to be controlled. In the context of sustainable development, controlling agronomic risks becomes closely tied to sustaining resource efficiency. Yet, the intensification of social control and agronomic surveillance, I argue, is not only serving agronomic and economic interests, but moral and social ones too.

Further exploring the complexities of sustainability and good farming, *Chapter Five* dives into the agrochemical management of weeds. Pesticides have been documented to introduce ecological harm, long-term vulnerabilities, and risk to the health of farm workers. Still, their use is considered essential for crop management in conventional farming contexts. Being at the centre of environmental and health critiques, this chapter asks how and why pesticides have somehow become an integral part of conventional visions of sustainable agriculture. Drawing on social scientific studies of epistemology and perception in the context of toxics, the chapter explores how the role of pesticides has been negotiated in industry and policy contexts.

Chapter Six shifts focus from toxics to technologies, examining Precision Agriculture (PA). Farmers, politicians, and industry express confidence in data-driven technologies as essential for reaching climate targets and reducing environmental harm. The chapter explores how PA functions as an infrastructural mode of governing sustainability. It argues that PA technologies enable a form of 'industrious sustainability'—one based on documentation and compliance with national goals. PA is not treated as a technological fix, but as a socio-technical system that produces sustainability as calculable (Scott 1998), scalable (Tsing 2015), and market-driven. Through juxtaposing different farming figures and knowledge regimes, the chapter

highlights how PA creates uneven access to legitimacy and shapes who can be imagined within the sustainable futures of Danish agriculture. The analysis contributes to the dissertation's broader argument by showing how sustainability is materially and morally assembled within infrastructures of work and documentation.

Chapter Seven shifts focus to soils, exploring how farmer engagement with soil—looking beyond rather than above the ground—shapes visions of sustainability and the good farmer. While not always driven by sustainability concerns, these engagements offer an alternative way of understanding agricultural fields, their relationships, and their value. Caring for crops and caring for soil are distinct practices with different temporal rhythms, each carrying unique environmental and sustainability implications. Conventional farmers' efforts to care for soil, along with counsellors' attempts to make soil a matter of concern, illustrate how sustainability emerges through a broader vision—one that extends beyond resource efficiency. Essentially, this chapter argues that attending to soil fosters a vision of sustainability grounded in connection, relationality, and embodied engagement. By considering farmland as part of a broader social world rather than through a contained logic of efficiency, more context-sensitive approaches to sustainability emerge.

The conclusion synthesises the key findings of the dissertation, reflecting on the interplay between ecological care, resource efficiency, good farming practices, and sustainability in Danish agriculture. Building on these, the conclusion highlights the dilemmas and paradoxes inherent in current approaches to sustainability. It emphasises the need for making room for long-term ecological temporalities, and it suggests accepting some degree of waste in the agricultural production system to transcend the moral economy of resource efficiency.

Through these chapters, the contribution of this dissertation is as follows. By tracing the ethical, material, and affective contours of good farming among conventional farmers in Denmark, I demonstrate how to approach sustainability not as a technical term or universal concept, but as a social, historical, and cultural phenomenon—this is what I coin *industrious sustainability*. It refers to a particular form of sustainable practice and reasoning that emerges within the logics of industrial farming. I argue that sustainability, in the context of conventional agriculture in Denmark, is best understood as assembled in relation to a moral economy. I identify this moral economy as undergirded by an ideal of resource efficiency, which shapes

ideas of *faglighed* and *godt landmandsskab*. The argument is constructed throughout the chapters and can be summarised as follows:

Industrious sustainability is the expression of sustainability as it is assembled through industry expectations and a moral economy of resource efficiency. It emerges through the technical, moral, and social labour that farmers perform to sustain economic viability, professional pride, and local life in the future amidst agricultural transformation and ecological crisis (Chapter One). Rooted in long histories of agricultural innovation and national progress (Chapter Two), it materialises through crops shaped by industry standards (Chapter Three), the surveillance of agronomic risks (Chapter Four), the continued reliance on pesticides (Chapter Five), and the data-driven infrastructures of precision agriculture (Chapter Six). While these practices make sustainability calculable, scalable, and market-driven, they institutionalise a reduced understanding of sustainability and environmental care that is both unevenly available and temporally compromising (Chapters Six and Seven).

The role for anthropology is to tease out both the certainties and doubts about what the good life is—in this case, what it means to be a good, sustainable farmer.

Chapter One
Marginal Communities: Cracks of Concern



Figure 4: Attempting to clean the roadside with Erling—view from within the tractor where the neighbouring house can be seen on the right

"*Naboskabet* [i.e., the neighbourly relations] means that you will be noticed if you do something wrong. You can't just hide in the crowd. It is deeply ingrained in our consciousness that we are accountable for what we do." Chresten, conventional farmer, 2020.

Remembering

On a Wednesday afternoon in June 2020, I drove around with Erling in his iconic green Land Rover, touring the neighbourhood on narrow roads. While the typical farm visit would consist of driving from one field to another, on that Wednesday, Erling was not only taking me to see fields. Instead, we spent half a day driving through the small villages, past the endless fields and occasional houses that constitute the community context of large-scale farms like Erling's.

At the time, Erling was in his late 60s. Over the past five years, his son Andreas had gradually taken over responsibility for the main production: a conventional pig production, approximately 500 hectares of cereals for fodder, and some specialised crops, such as potatoes and grass seeds. Erling, who was previously a passionate hunter but today primarily hosted large hunting parties on his property, now spent most of his time on wildlife management and nature conservation, taking care of the forest, the hedges, the meadows, wildlife biotopes, and his "hobby cattle," as he called them, because they were considered non-profitable. Yet, most employees characterised Erling as the pillar and brain behind almost everything on the farm, and he would have an opinion every time a decision had to be made, something that was not always met with appreciation. Erling grounded his advice in a combination of professional expertise and personal experience from his lifelong commitment to farming. Among the 12 farm employees, he was undoubtedly the one who had experienced and navigated modern agricultural development—what farmers refer to as "strukturforandringer" (structural adjustments)—most intimately.

Different from some of the younger employees whose education had prepared them for an everyday work life in industrial, modernised, specialised, and large-scale agricultural production run by GPS trackers and computer management, Erling remembered when things were different. Erling was born and raised on the farm he now owned together with his son, and he remembered when his friends from school stopped settling in the local town and started moving into the bigger cities instead. He remembered when the partridges were everywhere to be found, when the air was buzzing with insects. He also remembered when excess chemicals were dumped in homemade holes in the ground, when restrictions on fertiliser were almost non-existent, and when hedges were planted with a fast-growing and invasive form of rosehip. He had done all that too. He remembered when he had more colleagues, and when the roads were filled with different tractors, each with its own belonging. He

remembered when farmers shared the burden of taking up space. Now he and a few other large farms were the only ones to take up space, and thus also the only ones to blame when the roads were dirty, when the air was filled with the smell of slurry, when the lamps inside those houses located closest to the roadside shivered under the rumbling weight of large machinery. Erling remembered many things, nostalgic and ambivalent, about the past.

> When I grew up, smallholdings were everywhere, but as you probably know, with the structural adjustments and everything… If somehow you couldn't keep up, it was challenging to make a living. So maybe that farmer decided to sell the property to someone else, to retire and move to a smaller place. When I was a kid, everyone moved to Breum, but today, everyone moves to Skive instead because it's closer to schools, hospitals, and people's kids.

When I first met Erling, I quickly learned that he had a passionate interest in history, and as a child, he had wanted to become either a historian or a farmer. Perhaps this was what made him particularly opinionated about the present and rather pragmatic about the future. He knew things had been different, that they would change, and that you had to keep up with that change if you wanted to have a future as a farmer.

During our tour, Erling told me about the many different plots of land that he, his wife, and later his son had gradually acquired in the past decades. While the history of the gradual expansion of Erling's farm was, of course, unique in the specificity of places, names, roads, and personal histories that it engaged, there was at the same time something generic and mundane about the development trajectory and how Erling spelt it out to me. Any large farm I had visited could narrate a similar story about gradual expansion; about the specific plots of land they had acquired, from whom, and in what year; about utilising or demolishing belonging buildings; and about the structural adjustments that made development trajectories like theirs necessary and "uundgåelige" (inevitable).

The feeling of inevitability was characteristic of how most farmers spoke of development in the past, but also often of how they would talk about the present. Most farmers experienced the trajectory of agricultural development as outside of their control, and their agency as limited to making informed decisions aligning with what

they perceived as “the future”. This was precisely what Erling had done in the past; made future-oriented decisions by buying land from farmers who had retired from old age and did not have someone to take over; retired out of necessity because growing debt did not offer them any other choice; or retired to another profession because the race to grow bigger had exhausted their bodies, minds, and wallets. Farmers largely perceived this consolidation of farmland as a dire necessity. Now, the future was seemingly “sustainable”; that was what all the politicians said. But the future was also uncertain, and looking to the past, it seemed it always had been.

In the following ethnographic excerpts, the uncertainties, potentials, and risks of the past and future are explored to tease out the moral and social dimensions of agricultural modernisation and intensification. Most farmers I talked to linked poor housing stock to their own experience of neighbouring farms and colleagues disappearing in the *longue durée* inevitability of structural adjustment, a development that stretches backwards and forwards at the same time. While these shifts are often analysed through economic and policy frameworks, they also manifest in deeply affective ways. This is particularly evident in how farmers perceive poorly maintained properties. Buildings left in disrepair are not just physical remnants of economic decline; they become moral concerns, objects of judgment, and symbols of social rupture. Farmers’ discomfort with disorderly properties is not merely a matter of personal taste but reflects a broader cultural narrative about responsibility, rural identity, and collaborative survival. As such, production is not the only sphere in which agricultural intensification takes place—sociality is experienced as intensified too. Inspired by scholars like Yael Navaro-Yashin (2009, 2012), Gastón Gordillo (2014, 2011), and Dace Dzenovska (2018, 2020, 2011), this chapter engages the concept of affect in the context of rural development, localising it in the material world and situating it in historical contingencies and politics.

Affective Aesthetics

In her book *The Make-Believe Space: Affective Geography in a Postwar Polity* (2012), Navaro-Yashin proposes the term *affective geography* to capture a perspective that she calls the affect-subjectivity continuum, “one that attends to the embroilment of inner and outer worlds, to their codependence and co-determination.” (24). According to Navaro-Yashin, scholars miss important insights if they are too focused on retaining the analysis within the theoretical limitations of either subject or object-oriented

approaches to affect, where affect is either emerging solely from within, or from some inherent property in the material objects. Instead, the affective relationship between people and objects must be read in their historical contingency and political specificity (Navaro-Yashin 2009, 9). Broadening the concept of affective geography, I want to suggest the idea of affective aesthetics. It refers in this chapter to a mode of experiencing and interpreting that foregrounds the emotional and sensory intensities embedded in form, material, and spatial arrangements—particularly as they relate to sociopolitical histories. If affective geography shows how emotions are structured by space, affective aesthetics shows us how they are structured and triggered by form. Here, mis-maintained buildings or messy fields are read as charged: haunted by political histories, personal attachments, and dissonance.

Although not set in the context of a previous war zone, like Navaro-Yashin's work, Salling offers a site that is imbricated in a history of loss and appropriation, of winners and losers, and of living among the ruins of a shared history of structural adjustments. The structural adjustments have been described as the most significant change in Denmark in at least the past couple of hundred years, encompassing a fundamental transformation of business and the economy, a hurried mass migration from countryside to city, and what Danish writer Jens Smærup Sørensen, in an essay, describes as "an almost unrecognizable transformation of the entire Danish farmland" (2022). As Smærup Sørensen describes, "Politicians and technocrats are involved, and they are doing what needs to be done: removing the old field boundaries and closing down agriculture, expropriating for road construction and dividing up for single-family homes and industrial plants. They are participating in a revolution, and it *raser så godt som lydløst* [is raging almost silently], and its victims are, in all their apathetic peacefulness, also just spectators."

This chapter examines the broader local context of conventional farmers' lives and work, where ideas of *ordentlighed, godt landmandsskab,* and concerns about the future are intrinsically connected to experiences and narratives of an ever-evolving countryside, much like the one described by Smærup Sørensen. Wasteful materiality—such as poorly maintained houses—is the central entry point to explore these notions, as well as what sustainability can be within efforts to preserve professional legitimacy, and economic and social viability, in community contexts. Along the lines of Navaro-Yashin, I suggest that those material remnants considered wasteful, what Navaro-

Yashin calls “abjects,” are constitutive and “central to the social order or the political system itself” through affective transmissions (2009, 6).

The Empty House Problem: Contamination and Maintenance

“We have a lot, as you’ve probably noticed, a lot of these useless houses around the countryside,” Erling said as he pointed to a poorly kept property located not far from the roadside. I had noticed, and from my own upbringing in the countryside in northwest Jutland, I recognised the familiar and strange image of dilapidated houses in the middle of arable landscapes, randomly situated in between extensive monoculture fields. During my fieldwork in the area, I also frequently passed ‘For Sale’ signs outside poorly kept properties, wondering who might want to live there, but also who just did.

I was curious about what usually happened to the empty properties. He said, “You maintain them, sell them, or demolish them, that’s what you usually do, and there are too many old farmhouses out here. It’s hard to put large barns and machine houses into use, especially if they are not very well maintained, so it’s not easy to talk someone into investing in property like that. But personally, I don’t like to tear them down. I think it’s important that my employees have a place to live, and also that I know who my neighbours are. So, I mostly keep the houses.” From Erling’s description, it seems that the houses are situated rather awkwardly as not-yet-waste: they are hardly usable yet still embody the potential to be so.

I asked about the houses on Erling’s property. Many of them, Erling explained, were listed because of historical value. Erling told me about the different people who lived in the houses: Some were single or widowed, people who no longer had family to live with. Some had lived in the area their whole lives and wanted to stay there, while others had moved there later in life, seeking peace and solitude. One tenant, a woman in her 50s, was deeply in debt due to her former spouse. The spouse had convinced her to invest in a business venture in China that had ultimately collapsed, leaving her responsible for enormous financial losses. Another tenant was a single woman who had chosen to leave behind her large, modern house in town. She had wanted to live closer to nature, preferring the quiet and simplicity of a small house nestled in the forest. Among Erling’s employees, the majority had lived either on the farm or in one of the farm-owned properties at some point during their employment. As such, Erling

seemed willing to rent out his properties to whoever was willing to bring life to the houses.

One day, as we drove back to Erling's property, we passed a small white house situated on a dirt road next to a potato field belonging to Erling. "We are out on old moorland now. Those little houses used to belong to the farm that we drove past. We purchased the land last year, but we have been leasing it for many years. We had to buy the buildings too, which we were not very satisfied with, so now we've tried to sell them on to someone who cannot really afford them," he explained. As he noted, "There are quite a few large buildings that used to be farm buildings, and they're hard to utilise. He has two trucks and can use them for that, so I thought, "That's a good thing," but what can I say?"

A local mechanic and truck driver had bought the property—or almost bought it. To begin with, Erling and the mechanic had agreed that he could buy the house but suspend the payment for a year until he had his business up and running. However, a year had now passed, and the mechanic's business was not going very well; therefore, the mechanic still did not have the money. Now, Erling was contemplating whether he should throw him out or lend him the money. Erling, who had hoped that the mechanic could run a business and perhaps do some renovation on the property if he stayed, was now deeply conflicted about the situation. The mechanic was apparently not doing well, and he owed Erling money. But the debt didn't seem to be what disturbed Erling the most. Instead, it was the fact that if he tossed him, the house would yet again become one among many empty houses contaminating the countryside.

Yet, Erling was in fact selective about his tenants. Like he said, "It's important that *ordentlige folk* [decent people] move into the houses"—people who would integrate into the local community and respect the area. He liked to have familiar relations with his neighbours and would often ask the employees to do some maintenance or at least to keep the property facades neat and orderly. He didn't want, as he put it, "the wrong types". When I asked who he considered the "wrong types," he was blunt. He meant people who did not clean up after themselves, who let their homes and yards fall into disrepair. Couples where neither partner worked, relying entirely on welfare. People who seemed unable or unwilling to manage their lives responsibly. "Weed-types," he said—his term for those who secretly grew hash in their backyards—addicts who brought trouble with them. As we drove toward the next field, Erling gestured toward some houses in the distance. He pointed out one in particular where

the paint on the facade was peeling, the windows were smudged with dirt, and the yard was littered with clutter. It was overflowing with rusted pallets, broken-down machines, stacks of old boxes, and scattered garbage. “If they had twice the space, they would have just messed up twice as much,” he said, shaking his head. “They’re like that.” From a distance, I noticed a hole in the roof and a broken window. “You cannot in decency allow something like that,” Erling said. He believed people should instead maintain the houses: repair façades, and remove trash, tin plates, and rusty machines from the front. It was a lot of work, he knew that, but he also knew that disorderly, poorly maintained, and messy housing stock was like a disease. As he said, “de smitter af på omgivelserne”, meaning that they ‘contaminate’ their surroundings. And the closer one lived to one of these wasteful properties, the more vulnerable one would be to its contaminating effects.

He went on to tell me about something he had once stumbled upon while checking one of his fields. He had been looking for a game box—something hunters use to track wildlife—when he noticed a small white tent hidden among the tall rapeseed plants. At first, he thought it had been put up by some imaginative children playing in the woods. But as he stepped closer, he saw something strange. Inside the tent were the remains of several green plants, their stems still visible in the dirt. It didn’t take him long to realise what he had found: a makeshift greenhouse for cannabis that quickly became breaking news to the horror of everyone in the local community. “They’re like that,” he repeated. These were the kinds of people he refused to have as neighbours.

Erling did not seem able to grasp why someone would “let things fall into decay,” as he said. The messiness of an unmaintained property clearly disturbed him. That was why he retained ownership of the houses, handled leasing himself, and put a great deal of effort into renovating. Doing so, he could decide who lived there, who could become part of the community, and who could not. From these insights, it seems Erling’s role is not just that of a caretaker but of a curator—someone who defines the boundaries of community through the very act of deciding what, and who, is worth preserving. Returning to Navaro-Yashin’s (2009) understanding of affect, something is lacking if we understand Erling’s feelings as emerging solely from subjective opinion, taste, and aesthetic preference. Instead, following Navaro-Yashin, the affective relationship between Erling and the material objects must similarly be read in its historical contingency and political specificity (2009, 9). When Erling morally condemns a

broken roof or a cluttered yard, it must be understood as a response to the intensive historical and political changes shaping his environment: an environment shaped by agricultural modernisation, production intensification, centralisation, and state abandonment.

To Demolish, or Not to Demolish

The historical context and political specificity of Erling's experience with poorly maintained houses are linked to both agricultural development and broader societal tendencies towards centralisation. As such, not all unmaintained houses have once been smallholdings—some have been family houses, schools, cooperative dairies, and small private businesses. It is challenging to distinguish between depopulation specific to agricultural development on the one hand, and broader societal development on the other (Willert 1977). The poorly maintained houses are at once a result of agrarian modernisation and rationalisation, *and* a consequence of contemporary national policies, such as the municipal reform in 2007, where the state amalgamated 217 municipalities into 89 with the political aim of strengthening the public sector. However, "to strengthen" the public sector ultimately meant "to centralise" it.

A study by the Rockwool Foundation (2024) focusing on areas that lost their town hall as a result of the municipal reform reveals a significant decline in public sector jobs (21%) and an overall job reduction of 10% over the following ten years. Additionally, the number of working-age residents decreased by 4%, the number of children declined by 13%, and housing prices dropped by an average of 16%. Further research suggests that the benefits of centralisation are often overestimated, as the societal costs of these reforms are not always fully accounted for (Boje-Kovacs, Mulalic, and Schultz-Nielsen 2024). These costs include infrastructure expenses in receiving areas and economic losses in areas affected by outmigration, leading to an imbalance between urban and rural regions. Overall, these studies suggest that centralisation and municipal mergers have had significant negative social and economic consequences for smaller towns and rural areas, including job losses, population decline, and falling property prices, with cities having fewer than 200 residents being affected most severely (Sørensen and Svendsen 2014, 12). Population decline, job losses, the closure of industries, medical centres, educational institutions, grocery stores, and a general decrease in access to public services still characterise these areas.

The municipality covering my field site has experienced an overall decrease in residents since 2001, which is projected to continue. While the number of residents in Skive increases, towns with fewer than 200 residents have experienced a 7% decrease from 2008 to 2018 (Christiansen and Andersen 2019). Adding to the overall image of population decline, the municipality struggles with an increasing proportion of elderly citizens (those above 65 years), which is projected to rise from 37% in 2018 to 59% in 2045 (Knudsen and Beckman 2019). This means that there will be fewer people to contribute to the workforce, which is already evident in how many large and small businesses have either shut down or been relocated to areas that may attract the necessary labour.

In a 2019 ministerial report, the ministry suggests several political initiatives aimed at strengthening rural areas, including state-supported demolition of vacant houses. Empty or dilapidated houses are considered a central problem in rural development, as they tend to lower the attraction value of rural areas (Erhvervsministeriet 2019, 18). A report from the Danish Building Research Institute from 2007 shows that the material condition of empty houses in land districts closely relates to the attraction value of an area (Gottschalk, Ærø, and Rasmussen 2007). They show that municipalities, including the municipality where I conducted fieldwork, consider so-called "forfaldne" (poorly maintained) houses a big challenge, as the housing stock tends to have a "negativ afsmittende effekt" (negative contagious effect) on their surroundings (Gottschalk, Ærø, and Rasmussen 2007, 17).

The problem is not the empty houses *per se*. Instead, it is the lack of maintenance, dysfunctional interior, devastated façades, and useless remnants that negatively impact the aesthetics and *ordentlighed* that are problematic. The report, for instance, stresses the negative aesthetic impact of rubble and improper maintenance, and how it is directly linked to the socio-economic composition of an area. Often, the improperly maintained houses are traded off to landlords from other municipalities who may only do the bare minimum to comply with legislation in terms of restoration, as they do not necessarily care about local image. Usually, these 'foreign' landlords will have little consideration for the local community. They may lease at a very low rent, attracting so-called 'social nomads' and other socio-economically challenged people (Gottschalk, Ærø, and Rasmussen 2007, 6-7).

Erling's and other farmers' experiences of structural adjustment echo the findings in the different studies above. As Erling said, "People like that [i.e., the 'weed

types'] move here because they cannot afford living elsewhere, but they don't contribute". While Erling's judgement of his neighbours is most likely stereotypical and reductive, it nevertheless stresses a central concern echoed among many of my interlocutors: that the land districts need people with 'real' jobs, 'real' families, and 'real' resources to thrive. During fieldwork in 2021, I contacted a local municipal worker to ask about the scope of the wasteful properties in the municipality where I did my fieldwork. He estimated that about 100 houses had been demolished since 2013, financed by the demolition pool, the majority of which were old farmhouses. However, they received 20-35 applications each year, and he estimated that many of these ended up getting demolished even without support from the demolition pool.

As is evident, both policymakers and residents consider the empty houses a 'problem' for the growth, prosperity and liveability of rural communities, especially when they fall into decay. Thinking about the empty houses through the lens of *affective aesthetics,* we can understand farmers' perceptions of the houses as informed by history, memory, and ideals of *ordentlighed* and viability. Here, ideas about empty and poorly maintained properties as "afsmittende" (contagious) are embedded in an understanding of what it takes for local communities to survive: it takes diligence, cooperation, socioeconomic resources, and *ordentlighed*, reflected in an ordered, well-maintained, and properly built and cultivated environment. The houses can be seen as socially contagious in this context—as wasteful objects harmful to local community life—reflected in the fact that a pool has been set apart to demolish them. Yet, as Erling's case attests, not all agreed that demolition was the solution—becoming waste was not necessarily the endpoint. What they needed instead was a strong work mentality and willingness to contribute and utilise possibilities in productive ways.

Self-Drivenness and the Intensification of Social Responsibility

Erling's local town had fewer than 200 residents and was situated in a municipality with one of Denmark's highest rates of uninhabited houses (Erhvervsministeriet 2019, 21). Despite this, it had managed to maintain the school by converting it from a public state school (*folkeskole*) to a private school (a so-called *friskole*). The local grocery store had also been maintained by local fundraising campaigns and sponsorships, including from Erling. Erling partly ascribed the success of the town to the local dairy. The dairy, which has received national recognition for its organic produce, had rapidly expanded in the last 20 years, and now it attracted visitors and, importantly, a

workforce from all over the country. According to Erling, the dairy was one of the main drivers in the town's survival history, a result he attributed to its cooperative history and spirit. He stressed the ability to independently thrive as a key characteristic. Like he said, "People here are really good at being *selvkørende* [self-driven], and I think that's really important if a town like ours is to survive." The importance of being "selvkørende" may point to strategies adopted in the absence of the state (Lassen and Serritzlew 2010), where fostering independent institutions is a way of taking ownership of community care tasks (England 2010). Yet, as Erling's emphasis on the cooperative success of the dairy suggests, self-driven is also historically anchored as not only a survival strategy, but a virtue.

Erling had previously told me about several local initiatives that he appreciated, such as a walking path that would take visitors on a beautiful hike by the seaside, leading them from the town through parts of his property, and ending up at a museum for a local hero, Jeppe Aakjær, that had now turned into a heritage site and a local community building, housing cultural and artistic events. Erling was exceptionally excited about the establishment of a new community building next to the grocery store, which would host workshops on community and landscape development through citizen involvement. We drove to the local harbour that, despite its insignificant size, seemed very significant to Erling. Erling was engaged in the harbour museum board, where they continuously worked for the preservation and possible renovation of the museum. Driving back, we passed what was once the ferry diner that a couple in their 50s had now bought, renovated, and turned into a distillery. "That is really something I support, Cæcilie. When people come and actually invest in improvement, instead of tearing down the properties."

Kim England (2010) demonstrates how changing geographies of care emerge due to globalisation and state abandonment, particularly in the health care system in the context of the UK. Here, care previously supplied by the state is increasingly shifted to the family in the UK. She highlights how this shift changes the parameters of citizenship and individual and collective responsibility. In a similar vein, the places where I conducted fieldwork are all affected and shaped by what may be called a relative state abandonment. I call it "relative" because while the state has abandoned many land districts in terms of health care, public transport, and public services (Lassen and Serritzlew 2010, Sørensen 2012, Jensen 2010), it is increasingly present in the shape of environmental politics and climate regulation in agriculture. In this

context, farmers like Erling become central pillars who, as landowners, can support local community life by providing paths, economic resources, or other activities.

Emerging from the perspective of state abandonment and independence, Erling can be seen as a responsible community caretaker when deciding who is, in fact, the good neighbour. Here, Erling's commitment to the right (resourceful) neighbours may be interpreted not simply as an aesthetic preference or an economic self-interest. By keeping ownership and overseeing tenancy himself, Erling does more than preserve old buildings; he preserves a vision of the kind of people needed to protect local livability, which we may understand as a form of moral stewardship. Moral stewardship describes the "intensified" social responsibility that serves to preserve orderliness and social coherence in changing times, a gatekeeping of the moral community of *ordentlighed:* of properness, decency, and hard work.

The following literary perspective complements the farmers' narratives, offering a parallel to understand how the transformation of rural spaces is experienced not just as an economic loss, but also as an erosion of identity and a sense of belonging.

Stories from the Margins

As mentioned, farmers on Salling frequently use the concept of "strukturforandringer" to point to the political and economic dynamics that have intensified production to benefit large-scale farmers, whilst worsening the conditions for small-scale businesses. But structural adjustment is more than a political-economic development scheme: it is part of a vibrant and dynamic fabric weaving together and continuously informing farmers' experience of survival and risk. In Danish literature, particularly in "egnsfortællinger" or "egnslitteratur," which is a form of locally situated storytelling, structural adjustments—like land reforms and adaptation to the global market economy—have been portrayed through narratives from the margins of Denmark, giving voice to the lived experience of political decisions made in Copenhagen, far from local community life in places like Salling and Mors.

Authors like Knud Sørensen (1928-2022), a former land surveyor from Mors, have depicted the structural adjustments in agriculture and the existential consequences for people living in and around it. Every farmer I worked with knew Knud Sørensen, and I got the impression that they perceived him as a "local hero" of a kind, and a legitimate representative of rural people's life worlds because he—as opposed to most parliament politicians—had in fact walked door to door, talked to

people, been in their homes, and listened to their stories. In that sense, Knud Sørensen's stories are perhaps the closest we get to a living ethnography of more recent structural adjustments in the local area in the years of his writings. Literary works like *Marginaljord* (1987) and *Naboskab* (1991) poetically, and in Sørensen's characteristic low-key fashion, depict the structural adjustments through subtle allusions to how modernisation and industrialisation affect both landscape and people's social and neighbourly relations. Sørensen describes how larger farms absorb smaller ones and reveals through neighbourly relations how life is unsettled, while people are doing everything they can to normalise and silence the new order of things. For many farmers, this results in a sense of rootlessness and alienation—an existential crisis in which their identity vanishes as the land is either sold or mechanised. As such, many of his writings are characterised by unsettlement and a feeling of loss—a sense that something fundamental is dissolving, not just a professional change, but a way of life that is no longer possible. Like in the novel "Karl" that depicts a woman's guilt and crumbling marriage from having to take on work outside of the house because her husband is unable to run the farm. Or the story "Bare lidt gammelt halm" (Just a little old hay) about Anton, who decides to set his barn on fire to repay debt through the insurance money.

A recurring image in Sørensen's writings is the encounter between traditional agricultural idyll and new technological advancements. Tractors replace horses, and family farms turn into industrial farms. In *Marginaljord* (1987), meaning "Marginal soil", Sørensen portrays the shifts in management in the 1980s in the chapter "Den sidste bonde" (The last peasant), as he writes,

> The property had once been his. An average farm had it still been in the eighties. An average farm where one could walk around in solitude with one's 40-50 cattle and try to get the most from it. Ploughing, seeding, and harvesting. Feeding, milking, and mooing. That was the state of things.
>
> Then all the reliefs had begun to come. The computer control of an automatic feeding system was one of the first, and it was a relief, it certainly was. It was also expensive, but everyone could hear and see that it would pay off. Soon, the entire production was computer-controlled; one thing led to another. He was connected to the central system and had to prepare not

> only feeding plans but also fertilisation plans, field plans, accounts, and budgets, with daily budget control.
>
> He really tried to remember how it had all been before, but he couldn't quite. And that was only half a dozen years ago, he thought. He also thought - in a sudden self-defence - but it was necessary, it was.
>
> The next step had been his joining LFP - the Joint Agricultural Planning. And it was probably here that the real upheaval had come. But that too had been necessary. Only those who were connected to LFP were guaranteed sales to the dairies and slaughterhouses at current EC prices. Planning and management must go hand in hand, was the slogan in those years. (Sørensen 1987, my translation from the Danish original)

The way I interpret it, a central existential issue in Marginaljord, as well as other literary works, is how people become strangers in the landscape they once knew so well. One of Sørensen's recurring images is that of empty farms, abandoned fields, the closing of local grocery stores, and the arrival of newcomers. As small farms and communities disappear, and as computer systems connect farms with central management, Sørensen questions what happens to rural community life, the sense of independence and neighbourliness, and the sentiment for livestock and landscapes. He shows that people not only lose their livelihoods but also their bond with the land and the community that was once rooted in agricultural life. The people, farmers, and rural communities experience their way of life changing irrevocably, as evident in the above quote, creating a sense of inevitability and homelessness—not in a physical sense, but in a more existential one. Writings like Sørensen's not only depict a farming culture and class in decline—the dissolution of "bondestanden"—but also the very existential experience of modernisation by individual farmers and their families.

The majority of my interlocutors were uncomfortably aware of the fact that their continuous survival came, and still comes, at the expense of other lives and livelihoods. As one of my interlocutors, Chresten, expressed it, "The biggest farms are the ones that manage to make the best deal with sellers, banks, and distributors. If you have a small farm, you cannot afford machines, and you also don't have the financial liquidity to make any loans because you can't secure a return on your investment. That's a

problem." Chesten explained that it was problematic because it created so-called "storskala fordele" (economies of scale). "Take our wholesale cooperative for instance," he said, "they make huge purchases for many farmers at the same time, and that gives us excellent prices. That's good for a farm like ours. But there's no doubt it has a downside. It also means that small local salespersons go out of business as everyone suddenly buys their machinery or tools through these big cooperatives. So, in that sense, we're contributing to that development. But we spend around 800.000 kr. a year on agrochemicals, and we save around 10-11% through the cooperation – that's not insignificant for our economy."

Chresten stressed how "rational" farm management and modernisation came, and still come, with a cost. He explained, "What happens when you have a farm of our size is that we buy other properties, and then we make 'columns', which means that if we buy a property, then we want to merge 50ha in that area to cultivate wheat—that is rational." Chresten acknowledged that if the agricultural landscape had been composed differently, then there would perhaps have been four crops on the 50 ha. "After all," he said, "that provides a little more diversity. But now we are making a desert with 70-80 ha of wheat in one place, and that's all there is in that area."

But as Chresten acknowledged, making space for everyone was a dilemma, "It's a constant trade-off—should there be a motorway, a country road, housing, or agricultural land? We are constantly taking from nature just to exist here. Right now, for example, we have spinach, these row crops I told you about, and there are plenty of pheasants, partridges, and hares. It's grain cultivation that poses a challenge—it takes up a lot of space. But certain wildlife species, like roe deer and others, are actually thriving in this farmland landscape. They are increasing in numbers because they adapt and have gained a huge food supply from all the winter crops they can feed on. That's a good thing. And then, of course, there are all the small species—tiny insects, small animals, and everything else that we don't focus on as much. We don't really see them, but of course they're still there."

He concluded, "And that's perhaps the disadvantage of how we do things. Then you don't have the diversity in the countryside that you could wish for. But those are just facts. And we can't change that. What will our licence to produce be in the future? I don't know. But as it is, it's a matter of thinking in *kroner og ører* [i.e., thinking in terms of economic gains], and we damn well have to."

As the quotes illustrate, narratives of rational and efficient farm management, which are negatively affecting biological life and social infrastructure, coexist with narratives about the benefits of food supply for wildlife and the necessity of trade-offs. Like Knud Sørensen's *sidste bonde,* Chresten constantly weaves in and out of goods and bads, of gains and losses—he navigates a very complex relation between nature and farmland. At the same time, he reiterates his own so-called "licence to produce" through a sense of necessity and pragmatic reason.

This double-edged sword of being efficient, modern, and future-oriented was also expressed by Erling, who seemed to acknowledge why people would perhaps dislike living squeezed in between expansive fields, exposed to the sound of rumbling combine harvesters, the smell of slurry, and the merciless cold Western winds. Erling stressed what he considered a negative tendency of farmers to rationalise and make everything orderly. "We've removed most of the natural borders and shelters along the way to make everything rational, all the embankments and hedges… I do think that's a mistake." Like he said, "Farmers today focus a bit too much on making everything rational." Thus, he too struggled to strike a balance between being an efficient large-scale farmer and a good community member.

Gastón Gordillo (2014, 81) asks, "What is disrupted when space is destroyed?" While there was never a sudden destruction or rupture at play in the context of agricultural modernisation in Denmark, but rather, as described by Smærup Sørensen (2022), a revolution "raser så godt som lydløst" (rages almost silently), the question seems equally relevant to pose today. Both literature and personal narratives show exactly this: that change, industrial and/or sustainable, does not happen in a vacuum, but in a context of neighbourly relationships, community concerns, and common responsibilities. In these complex realities, the good and the bad are not clearly defined. Farmers acquire farmland while being concerned about the dissolving possibilities for small-scale farming and about their neighbourly relationships.

The following is an excerpt from an interview with Ole, an organic dairy producer, that may help to understand and further expand the complex interplay between continuous farm expansion and collaborative survival.

Expansion and Extinction

On a Saturday in August 2020, I went to visit Ole. Ole was an organic dairy producer in his mid-60s, and he grew up on a neighbouring farm just 200 m down the road. He

rarely took a day off work, and this Saturday was no exception. Contrary to previous visits, mainly consisting of driving around his property, looking at fields, buildings, and old barns, that day, Ole had invited me inside his house. As a host gift, I had brought along some Danish pastry after questioning myself if it was perhaps too early for cake at 9 am.

The entrance led into a utility room, and as I entered, I almost trembled as a big brown Labrador greeted me. I noticed a bowl with dog food next to a row of dirty working boots placed on a plastic mat on the tile floor. An electric fly catcher was hanging from the roof, a bowl and some cleaning detergents sat next to the sink, and it seemed to me that the primary function of the utility room was to prohibit the outside from coming in. This was the last stop for all things dirty. As I struggled with my shoes, the pastry, and the overly cuddly Labrador, I could hear Ole's footsteps approaching the door. He opened. "Come in!" he said, reprimanding the brown dog to its basket. With the shoes off my feet and the cake in my left hand, we shook hands, and I handed over the pastry to Ole. As it turned out, it wasn't too early for cake. "My wife has left for the garden," Ole said as we entered a large common area. Still, despite her physical absence, I noticed her presence on the kitchen table: fresh buns (*rundstykker*), strawberry jam, cheese, ham, butter, and a few symbolic slices of capsicum. "Have some", Ole offered, pointing at the table. While I had already had breakfast, I knew from experience that farmers only rarely, if ever, rejected food when offered, so I decided to stick with conduct and accepted the offer. I sat down at the dinner table in the open kitchen space across from Ole. It was my third visit to Ole's farm, and as I announced to him on the phone a few days earlier, I would like him to tell me more about the structural adjustments in agriculture, and Ole's experience of it.

In the middle of the table next to coffee cups and half-eaten buns was a stack of documents, most of them containing satellite photos of Ole's property. "So, my plots are the ones marked with a red line," he said. I noticed the oddly distributed plots all over the map, "…and the yellow ones, well, actually, it's important you don't share this with anyone, but we're negotiating with the seller as we speak," Ole said in an almost muted tone. The maps were part of Ole's way to convey the development of his property from when he got ownership from his parents in 1999 to where the farm was now, in 2020. Back then, the farm had just converted to organic production due to favourable prices for organic milk, and it covered roughly 200 hectares. Ole saw that

everyone around him was buying plots, so he started doing the same. “Expanding, expanding, expanding… That’s what we did”. Taking his time, Ole gave me a chronological and meticulous run-through of the different plots. “Today”, he said, “we own around 800 ha of land”. “That sounds like a lot”, I replied, and it was. However, it was not the first time I had encountered such a story of land acquisition, and the statistics of agricultural development in Denmark in 2020 spoke for themselves. Size had gone up, while the number of farms had drastically decreased (DST 2020). While I could understand that buying land had been a fundamental business survival strategy during the 1990s and 2000s, I wondered why expansion continued to be such an integral dimension of running a business, so I decided to ask Ole about the tendency to keep buying land that I recognised from conversations with other farmers. I could tell by the look on Ole’s face that he himself was somewhat puzzled. “In fact, it doesn’t make much sense at all… I used to work as a financial farming consultant, which you're aware of, and I have witnessed countless bankruptcies because people made the wrong investments. I witnessed so many farms fall off the track because they thought if they got bigger, they would earn more,” Ole said. He paused shortly before he continued with a serious expression on his face. “But I can tell you one thing. It’s not the size of your farm that determines whether you’ll make money or not. It’s how you manage it.” Ole was looking down, stirring his coffee cup without drinking any. He took a deep inhale before exhaling and then looked up. “I think that many of us [farmers] are diseased when it comes to land acquisitions. We don’t actually need the extra plots, but for some reason we keep buying them… When it became possible to expand, we just started expanding, and since then, we just haven’t stopped”.

I asked him where he got the plots, and he explained that he primarily acquired them from ‘willing’ neighbours who had decided it was time. “Most farmers prefer selling it off to a local colleague, rather than some outsider, because to them it matters who owns the land,” Ole said. So, the neighbours eventually gave up and sold off their land to local colleagues like Ole, people they knew would care for the local community, echoing Erling. Talking to Ole about the tendency of land acquisition back in the 1980s and 1990s, he said, “It was crazy back then. Some of these farmers lived off 20 cattle! Even as little as 10 cattle! Can you believe that?”. At this point in the conversation, Ole’s wife, Hanne, had re-entered the kitchen space. She was not sitting down with us but standing a bit afar, brewing coffee and ordering plates for the Danish pastry that I brought. From the way Ole frowned as he described the past, I got the sense that the

topic of land acquisition was bringing in an uncanny sense of nostalgia. Hanne had clearly been listening in on our conversation and asked, “Do you remember that neighbour, down at the corner of the barley field?” Ole was leaning forward with his elbows on the table, his gaze fixed on the coffee cup in front of him. He hesitated for a moment before he looked up and nodded. “No, but really, Ole, what did he have? Maybe 10 cattle?” Hanne asked, before she paused and then looked at me. “Cæcilie, you should have seen his place. He was one of those young single men, he must have been around 20, and he was literally living in his own filth. There were buckets with his own faeces everywhere around the house, and the house was completely unmaintained, and the smell…” Hanne paused. “That wasn’t a living.” Ole and his wife eventually bought the plot owned by the young man. Among many ‘willing’ neighbours was also a young man who could not follow the structural adjustment. As it turned out, despite Ole’s initial comment about “living off 20 cattle,” it was not. Not a living, that is.

Today, the idea of living off 10 or 20 cattle seems even more obscure. According to Ole, that would be no less than impossible, unless you had a highly specialised niche production. When Ole took over the farm from his parents, he knew this. He knew that he had to acquire more land, expand the livestock, and rationalise the production. As a modern cattle producer, 10 cattle are nothing. To transform 10 cattle from nothing to something, you need to add more cattle and more land, so Ole did. He shifted his attention once again to the map in front of us and began to point to all the different plots, matching them with a specific year of acquaintance and from whom he bought them. “This one was owned by one of the pioneers in organic farming”, he said, pointing to a relatively large plot northwest of his property. “He was too early for his time… He tried so hard to make a living from organic production, and all the neighbours thought he was crazy with his weeds everywhere. The organic prices were terrible as well, so he couldn’t.” Ole was stirring his coffee cup once again as the wrinkle between his eyebrows grew even deeper. Something in me wanted to know if the organic farmer had succeeded, knowing that he most likely had not. Before I got to ask, Ole said, “he ended up in deep debt. They found him in the barn, hanging from the roof”. Ole was not looking at me, but kept his eyes fixated on the coffee cup.

Affect and Social Disintegration

"What is disrupted when space is destroyed?" asks Gordillo (2014, 81). Returning to Gordillo's question, Ole's story highlights how structural adjustments have caused social disintegration and disruption. The slow disintegration is not only material, in terms of houses decaying or infrastructures falling apart. A poorly maintained infrastructure or house is affective in the sense that it "disintegrates the conditions of sociality that define a particular spatial node" (Ibid., 81). Bankruptcies are spatial disruptions as they leave farms empty, once again evidence of the ongoing and presumably unstoppable structural adjustment. The empty houses, as pointed out by Erling, are ruins that haunt the landscape, conveying tales of structural adjustment, growth, and survival, as well as decline and death. Like Tim Edensor's (2005) 'industrial ruins', the poorly maintained houses bear the characteristics of ruins, as "spaces in which involuntary memories may be stimulated" (837), like Ole's memory of the organic farmer who ended up taking his own life. Homes without people, train tracks without trains, and abandoned dairies and slaughterhouses are affective: the affective experience is a feeling structured by politics, history, and a mundane sense of existential threat. The material environment is affective in the sense of being a bearer of a history that haunts not only the present, but also the future. In this sense, the messy and wasteful cannot only be understood as "industrial ruin" or "debris of progress" (Edensor 2005, Gordillo 2011). In the context of Danish agriculture, debris, rubble, and ruins are also often seen as pointing to the future as objects of utilisation, development, improvement, and potential.

The dissolution of sociality is experienced and expressed in different ways in the empirical material presented in this chapter. In Erling's case, it is experienced in old friends moving into the cities and being substituted by 'bad neighbours' that do not have the same resources to contribute to the local community. Materially, bad neighbourliness is associated with decaying buildings, messy facades, disorderliness, and a lack of maintenance, which Erling interprets as a lack of community engagement. The lack of community engagement, as we saw, is problematised because it is inscribed into a larger historical framework of rural-to-urban migration, depopulation, centralisation, and agricultural structural adjustments, in which community engagement and neat aesthetics are intimately tied to the liveability and survival of local communities, livelihoods, and workplaces. As such, the messy aesthetic of the poorly kept properties is affective in the sense that it engages an ethics

of community care. Read in this way, Erling's growing contempt over 'bad neighbourliness' is not simply an expression of contempt for messiness, but that allowing things to decay is associated with community withdrawal, and for many farmers, it is specifically associated with those farms that gave up on development, like in the case with Ole.

Dzenovska (2018, 19) writes how ruins in the Latvian countryside are not only "nostalgic objects of the past and the past's futures" but also "harbingers of the dystopian futures inherent in the present". Similar to Dzenovska's ruins, the empty or poorly kept houses are nostalgic objects because they convey memories of the structural adjustment with all its losses. In that sense, it is not sufficient to think about waste as ruinous artefacts from the past (Navaro-Yashin 2009, 6) or as the material by-product of development, but instead, as also suggested by Martínez (2017), as a site of care, repair, and ethical decision-making directed to the future. In Erling and Ole's stories, the proper utilisation of waste becomes consequential for farm viability and local survival. In the context of structural development, waste emerges as an ethical demand: to do something, to develop, to utilise, and to endlessly expand so that farmland will not end up in the hands of a stranger with no sense of community concern.

Considering the empty and unmaintained properties as wasteful, buying plots, like Erling and Ole did, is, on the one hand, a strategy to utilise waste: an expression of economic responsibility. On the other hand, it is an expression of neighbourly responsibility, a sub-politics of collaborative survival (Solnit 2009), by securing local ownership and avoiding foreign privatisation. Here, the restoration of orderliness is a form of community care.

Utilising Waste

Utilisation. What does that even mean? To use, to utilise, to exploit. Nytte, benytte, udnytte. Nutzen, benutzen, ausnutzen. Utilisation, being placed in between the neutral use of a tool, an opportunity, a chair, and the connotations of colonisation and violence inherent in the verb "to exploit," seems inevitably and awkwardly situated on the verge of tipping to one side. However, utilisation—as embodied by Erling's life and work—emerges as a dynamic, multifaceted concept: both a practical economic strategy and a moral orientation. In general, the idea of developing and utilising is associated with an unquestionable good. Or as Erling described it, "I've always seen opportunities to be a

player in the area, and if you just tear down the buildings, nothing will happen either." Yet, Erling's story challenges us to rethink what it means to 'utilise'—not as a fixed category but as a spectrum of practices and meanings that unfold in lived experience. It invites us to question whether utilisation is inherently an act of taking or whether, in specific configurations, it can also be an act of giving, sustaining, and co-creating a shared world.

On several occasions, I asked to follow Erling around on a 'normal' working day. We always ended up driving sporadically around the area, fixing broken fences, moving his cattle, checking up on the carpenter, fixing a water pipe, giving orders to the forest manager, removing a stone from a brim: fixing, repairing, sustaining, moving, preserving. At the time, Erling had also appointed himself head of renovation and construction and hired a retired local carpenter to do the work. The carpenter, who did not work on Fridays, wished to return to the area and "get his hands on something" (*få noget fra hånden*), and Erling liked having many employees around, so Erling offered him the job. Now the retired carpenter was slowly but surely renovating the façade of an old farm estate that they had bought a couple of years back.

Erling told me they had bought it because it came with a piece of excellent land and because it came with a functional piggery that could efficiently be utilised in expanding their pig production. But also, because the old estate had historical value to the area. Erling, who once told me that he had dreamt of "becoming either a historian or a farmer" as a kid, cared about the estate and its maintenance. Still, he also knew that it would be difficult to find any buyers for the house as they would live right next to someone else's piggery and someone else's farmland. The house itself measured around 300 m^2 and "could easily house one or two families," he said. Erling told me that it was "of course difficult to find families to want to live next to the piggery", so when an elderly woman asked, he agreed. It was clear from Erling's explanation that this was not ideal, but as he stressed, "She is nice and quiet, and it's nice to have some life in the building again".

Overall, I was astounded by the amount of effort Erling put in renovation, reparation, and maintenance compared to many other farmers who preferred tearing down—often because renovation was considered economically irrational in an area where real estate speculation was limited to land. Over the past 45 years, land consolidation had resulted in an impressive housing stock of around 15 houses, and Erling had not demolished a single one of them. Instead, he had kept leasing the

houses distributed around his property for a symbolic sum that hardly reflected the economic expenses it took to sustain them. Clearly, Erling utilised in the most positive sense he could think of: he made the most of the properties, contributed to the area, made sure good people lived there, and so on. However, the proper utilisation remains a contested terrain in some places, self-contradictive even, because the options for serving political goals, community desires, and one's own economic survival clash in landscape preferences and conflicting expectations over the functional use of farmland and countryside. Many farmers found themselves both upholding and undermining local liveability—an ethical paradox philosopher and anthropologist Alexis Shotwell (2016) might describe as living within unavoidable complicity.

Frictions and Dust: Compromised Collaborative Survival

Later that week, I found myself in the passenger seat of a small tractor owned by Erling. He had just finished surface tilling a field a couple of kilometres from his farm and mentioned that the tractor had dragged significant piles of dirt onto the adjacent road—right next to a house. He said he was going to sweep the road and asked if I wanted to come along. "We didn't do that ten years ago," he remarked. "Back then, there were fifty farmers all sloshing up the roads. Now there might be four. So everyone knows exactly which field belongs to whom."

We picked up the roller and drove back to the spot where the tractor had been entering and exiting the field, leaving mounds of soil behind. Opposite the field entrance stood a small house. The wind was blowing from the south. When Erling lowered the brush, and it touched the asphalt, a dense cloud of dust burst from the brush head and drifted directly toward the house. I could tell Erling was unsure whether this was the right thing to do. I wasn't sure either. We didn't speak much. I remember thinking it had to be either plague or cholera—dirty roads or dirty windows and cars—but I wasn't sure if saying it out loud would be inappropriate.

"It's plague or cholera," Erling mumbled, doubting if he should end the operation and spare the house from additional dirt, or if he should carry on and at least leave a clean road. We continued for a while. He tried to slow the brush down, but the cold wind kept swirling the dust regardless, blowing it straight at the house. Behind the windows, the presumed owner stood watching. I wondered for a moment if they planned to come out and say something. They never did. Honestly, I would've likely stayed inside, too, had a cloud of dust containing particles of human and animal waste

blown in. Now the dust coated the windows, the cars, the flowers—possibly even the herb garden. Eventually, Erling just drove across the road without engaging the brush. The soil was merely loosened but still lying on the road in big piles. If the sweeping effort had once had a sense of purpose, it was now very difficult to notice. We drove off, leaving the road dirty behind us.

Erling was clearly frustrated about the whole situation and stressed how it had become increasingly difficult for farms of his size to practice *godt landmandsskab* in accordance with neighbours and local communities. Owning most of the land in the area by now, he felt overtly visible. Erling explained that most people knew the colour of his tractors, they knew his staff, and if they heard a loud rumbling sound outside their house, it was likely that one of Erling's people was responsible.

What Erling's experience attests to is the ambivalence of being at once a community member and an industrialised, large-scale producer. Being a large-scale conventional farmer trying to keep up with structural adjustments essentially means being complicit. “Traffic is only getting heavier and more frequent,” he said, referring to the weight and increased frequency of trucks, already burdened by the transportation of pigs, and now also the transportation of slurry to and from farms to biogas plants. “The roads here aren’t built for that kind of traffic,” Erling stated.

Being complicit, in Alexis Shotwell’s (2016) terms, means acknowledging that all doing departs from an embodied position that is already historical, already always inscribed in “webs of suffering” (5). Being aware of these foundational ties, according to Shotwell, is essential if we are to actually find better ways to live together across species, as it means recognising the world as it is “partially shared, offers finite freedom, adequate abundance, modest meaning, and limited happiness. Partial, finite, adequate, modest, limited—and yet worth working on, with, and for.” (ibid.) Acknowledging that it was likely never Shotwell’s intention for her text to be applied in the context of large-scale industrial farming in Denmark, I feel compelled to invoke her concepts, nevertheless, as a way to think about Erling’s—and many other large-scale farmers’—situation. Rather than seeing Erling’s actions as contradictions or as an expression of poor morals, Shotwell helps us see them as inevitable negotiations within a system that demands both environmental responsibility and its deferral. Purist notions of farming—cleansed from technological, industrial relationships, and freed from pesticides and toxics—are not available to Erling. And is purism even a good place to begin with? Or asked differently, is it even possible or desirable to start from—

or return to—a state of purism? Along the lines of Shotwell, this dissertation suggests it is not. Instead, to move away from the status quo and enable other orientations, it is crucial to attend to the messy worlds in which conventional farmers are embedded—worlds crafted through collective historical narratives, professional pride, polluting practices, successes, technologies, and machines. As Shotwell (2016) writes, "Purism is a de-collectivizing, de-mobilizing, paradoxical politics of despair"—"a [harmful] approach because it shuts down precisely the field of possibility that might allow us to take better collective action against the destruction of the world in all its strange, delightful, impure frolic" (Ibid. 8–9).

Shotwell's conceptual offering is to highlight complicity as the foundation for being in the world. Erling's attempt to clean the road shows us exactly this: to act at all is to act from within a compromised position. Shotwell reminds us, drawing on Donna Haraway (2016), that such entanglements are not grounds for withdrawal, but for responsibility: finite, partial, modest, but worth engaging (Shotwell 2016, 5). While attempting to mitigate the negative impact of his own agricultural activities, his efforts fail to do so, highlighting the precarious coexistence of large-scale agriculture and other forms of rural life.

The Inevitability of Harm

Today, the intensity of farms shutting down their businesses has decreased. Yet, different intensities seem to have taken over, run by a different engine: sustainable development, or "sustainable intensification", a concept both explored by researchers and deployed by Danish agricultural associations (Pretty and Bharucha 2018, Hastrup, Brichet, and Nielsen 2022, Bæredygtigt Landbrug 2018). Farmers largely agree that sustainability is "the future"—a future which, as we shall see, is framed by policymakers, agricultural associations, and farmers themselves as attainable through a technology-driven improvement of farmers' resource use, and by contributing to the green transition through various means.

At the time of fieldwork, energy projects like solar panels were seen as one of the new "golden eggs" of sustainable development, as farmers could earn substantial economic rewards by "planting", so to speak, a field with solar panels or wind turbines. However, the financial gain came with a cost that not all farmers appeared willing to pay. Chresten, for example, was outspoken about solar panels. He said, "I don't want to look at a field that *flimrer* [i.e., is flimsy], then I'd rather look at wind turbines." At

the same time, other farmers were establishing wind turbines, selling their land to the municipality, and applying to set up solar panels. Yet, doing so often placed farmers in conflicting positions regarding neighbourly relationships due to the unwanted industrial aesthetic that solar panels bring. Therefore, it was not resistance to sustainability per se, but a resistance to the industrial landscape aesthetic that these new forms of land use introduced, along with the conflicts they generated.

Erling had told me about a trip to Scotland with his ERFA group. Here, large areas were covered with tunnels made of plastic for vegetable production. According to Erling, it looked "industrial." One of his colleagues had seen the extensive plastic plains in Spain on one of his flying trips— "Areas the size of Funen", Erling told me. The extensive plastic plains were greenhouses for vegetable production. "More vegetables will change the countryside. Many critics want the countryside to look different, but you know, I actually think it looks quite nice. If we grew more vegetables, it would look different, more urbanised. You know, the landscape quickly becomes a reflection of what we grow, so we need to think about that if we want people to live here too". Here, ideas about "proper" landscape aesthetics co-create what sustainability can and cannot be. From Erling's perspective, the countryside already looks "quite nice", something plastic tarps and flimsy solar panels will change.

At the same time, Erling struggled to balance his own professional ambitions with caring for the local landscape and its residents. A great example he told me about was when he tried to apply for a project to build 7 wind turbines. But like he said, "It was shot down, ha-ha". Erling told me that when they started the project, he had walked from door to door to inform people about the wind turbines, and at the time, had been met solely with positive reactions and appreciation. He said, "We went around and explained the project to all the neighbours, and everyone actually thought it was an excellent idea with green energy". But then the frictions began. "Some neighbours, particularly three ladies, started worrying about whether they could sell their houses, which, it turned out, they couldn't anyway. One lady, actually a really nice lady who borrowed our bathroom while she was renovating her house, got really upset. These ladies caused so much unrest, and then they allied with the wind turbine opponents. And then consultants from the organisations opposing the project came to make a real estate assessment of their houses and said that they would lose over a million DKK on their houses if the wind turbine project were realised. 800 people signed against the project."

Erling was bummed about the outcome, mainly because he had seen so many good potentials for the local community and because he felt like he had truly tried to involve the local community: "Back then, those who were implicated by the mills could buy shares, and the city could have gotten 2 million for urban development and maybe they could have built more paths. It's just a real shame, because it could have given so much." Erling told me that everyone within 600 meters had thought it was a good idea because they could have received economic compensation, but everyone living in the 600 m–1 km radius was against it. While Erling sympathised with the opponents, he saw their resistance as disillusioned. From Erling's perspective, the implicated houses already had a questionable future, and the wind turbines were simply the final push. Like he said, "Those houses that are located along the road in a small town like ours, built probably around 1930, no one will buy them in the future. A house like the one Marie and Anders bought is really nice because it's away from the road, but many houses in the countryside don't have a future."

From the perspective of the futureless future for the houses, the mills were seen as a positive contribution, a potential for creating alternative futures in an area that already seemed to struggle to make space for everyone in "the future." But the project ended where it ended: with signs, signatures, annoying announcements, and people who stopped saying hello. Like he concluded, "I've almost only done something that people thought was positive, and then I started this project. It was actually probably one of the worst things I had ever been involved in in my whole life." Thus, the confrontation between Erling's own ideas about good farming and local expectations shattered local ties, if only for a moment. Erling's story illustrates how negotiations of sustainable development occur in complex social landscapes, intertwined with landscape aesthetics, real estate values, and local community life. It also illustrates different ideas about what makes "the future" possible. While the neighbours see large "industrial" energy projects as an obstacle to their future flourishing, Erling considers this kind of development as inevitable for creating a future at all, even as it compromises local landscape preferences.

Despite the scars from the local conflict, Erling still fantasised about solar panels on one of his more remote fields, but needed to find out if he was allowed to plant some fast-growing vegetation around the panels to make a vegetation "shield", as he called it. The shield was a consideration of his neighbours: a protective aesthetic measure to avoid decreasing real estate values due to industrial aesthetics. He wanted to plant

sika-fir or willow, but it was uncertain if he was allowed to do so, as the regulation only allowed "home-dwelling species". Erling believed that it had all become a bit sacred—after all, "It is for the sake of the neighbours," he said, "as they are the ones who have to look at it."

Erling's negotiation of the solar panels can be seen as an example of negotiating different futures. While his own and his neighbour's visions of the future are very different—one has solar panels, one does not—Erling seeks to shorten the distance between the two by creating a shield. Yet, the shield is at best an effective aesthetic illusion masking the industrial landscape transformation, and Erling knows this. In Erling's vision of how the future can and should be realised, loss, extinction, and erasure seem to be central and inevitable elements. His ideas about survival are built on this very experience: that small farms disappeared as larger ones persisted. Here, the planting of sika-fir or willow can be seen as an attempt to ease social tensions and preserve social dignity, integrity, and legitimacy.

I will suggest that this is best understood as an "intensification" of social responsibility; a result of tension between different future imageries and how they should be realised. What I mean by intensification of social responsibility is the increased need for farmers to justify their production, or what they call their "licence to produce", due to what appears as increasingly different visions of what the countryside should be and who it should provide for. Is it a production site or a recreational place to live? Being both, farmers like Erling and Ole, but also Karsten, Chresten, Peter, and many others, struggle to navigate industrial production relationships, a neoliberal market economy, state regulation, neighbourly relationships, and sustainability demands. In my view, their complicity is not a failing of the individual. Drawing on Shotwell (2016), to enter a respectful and meaningful dialogue about what forms of agricultural production is needed to make both farmers and local communities flourish, it seems necessary to attend to complicity, which in this case I take to mean acknowledging the historical and political contingencies that make certain farming practices flourish and specific professional identities emerge, and ask how other worlds can emerge from this mess. This is what the next chapter sets out to do.

Chapter Two
An Anthropological Inquiry into Cultural History



Figure 5: Old drawing of Erling's estate hanging in the cellar apartment where I lived during fieldwork in 2022

"There has always been a *stolthed* [pride] in being a farmer. You have your field, and your field is judged by those who drive by with the window down. That is kind of a… *faglig stolthed* [professional pride]. We have always had certain crops, once, it was the beets. Those who had really nice and clean beets were also skilled farmers. It was a status symbol if you had some clean fields. Today, you can "spray yourself out of the problem", some might say. But then again. The first impression one gets of a good farmer is tied to whether they cultivate the land nicely. *Er det gjort ordentligt* [Is it done properly]? *Ser det ordentligt ud* [Does it look proper]?"

Chresten, a conventional farmer and pig breeder, 2020

Cultural History and Ethnography: Progress and Rupture

The overall aim of this chapter is to show how contemporary expressions of "sustainability" in Danish conventional farming are entangled with long-standing narratives of industriousness, innovation, and national progress. In doing so, it opens for an analysis of how these narratives continue to shape present-day solutions to the climate "crisis," including the privileging of technologically driven, knowledge-intensive forms of production that I term *industrious sustainability*. Exploring both historical events and contemporary society's interpretation of them is part of what it means to conduct anthropology that is historically attuned (Hastrup 1992). Drawing on Kirsten Hastrup's (1992, 5) insight that culture and history are "adjective to one another", the chapter treats history as a cultural product: events are registered as "historical" not merely because of their objective "truth" properties, but because they acquire significance within particular cultural frames.

A central part of this inquiry concerns the process by which agricultural knowledge became externalised and professionalised, from being embedded in farmers' own practices to becoming the domain of state agencies, industry actors, and universities. As Brichet, Brieghel, and Hastrup (2023, 2) argue in the context of Danish livestock production, intensive farming as a response to climate goals is "nourished by the continuous production of scientific knowledge and research related to issues such as feed intensification, genetics, and health." A similar case can be made for crop production, albeit oriented towards plant breeding, nutrient management, pesticides, and precision agriculture. Understanding how this shift occurred—how the figure of the Danish farmer came to embody a professional identity compatible with (and indeed, dependent on) scientific knowledge—is essential for grasping the ways technologically driven intensification is today framed as a sustainability strategy.

The chapter is structured chronologically (Figure 6), tracing developments from the late eighteenth century to the present. While such a structure inevitably creates the impression of a causal chain culminating in contemporary farming practices, the intention is not to present the present as the inevitable outcome of the past (although some farmers, like Erling in the previous chapter, *do* in fact experience development as inevitable). Instead, the chronological form serves as an analytical device, enabling an examination of how successive political, economic, and epistemic arrangements have made certain agricultural forms appear both possible and

desirable at specific historical moments. This approach allows for attention to both ruptures and continuities, as well as to how the "making" of history is itself a cultural act. As Hastrup (1992, 7-8) frames it, "events are happenings of social significance; that is how they are registered as events in the first place and distinguished from the motley and continuous mass of mere happenings".

As such, the chapter approaches cultural history as an analytical practice rather than as the study of a bounded empirical object, a linear reconstruction of historical "facts," or a fixed site of inquiry (Damsholt 2010, Sahlins 1985, Hastrup 1992). From this perspective, the purpose is to illuminate the historical conditions of possibility for particular worlds to emerge in which forms of farming, knowledge, and professional identity dominate. Thus, the purpose of the chapter is not simply to describe a chain of events, but to suggest that the good farmer registers as a cultural construct assembled again and again as a response by various "developments" (like the cooperative movement or the draining of the heath) and "breakdowns" (such as the grain crisis, the environmental movement, or the overproduction crisis). Treating history in this way, we can see how the good farmer (understood as innovative, knowledge-intensive, specialised, increasingly large-scale and increasingly resource-efficient) is framed both as a problem and a solution to agricultural development at once.

Figure 6: Selective timeline of the history of Danish agriculture based on the chapter (by author)

Period & Date	Event / Development	Key Features & Context	Impact on Farmers & Agriculture
1788	Repeal of *Stavnsbåndet* (serfdom) & Great Land Reforms	Promotion of hereditary tenancy, education, and productivity, linked to physiocratic ideals	Farmers gain self-ownership incentives; shift from estate to individual farming; consolidation of land
1810s–1830s	Land consolidation & early rationalisation	Fields are gathered into single plots; geometric land surveying replaces irregular patterns.	Productivity rises; farmers tied identity to land ownership; early capitalist adaptation after the grain crisis (1819–30)
1830s–1870s	Enlightenment policies & rural disciplining	Royal Danish Agricultural Society promotes vocational training, agricultural schools, civic virtues, the church, and schools as socialising agents.	Emergence of rational, disciplined, "agricultural individualists"; peasantry shifts towards a capitalist market mentality
Mid–late 1800s	Grundtvigianism & cooperative movement	Folk high schools democratise education; cooperatives promote independence & collective organisation.	Cultural, economic, and political awakening of middle peasants; farmers as central liberal political actors
1870s–1910s	First Industrialisation of agriculture	Response to cheap imported grain: cooperative dairies, standardisation, specialisation	Livestock & dairy exports boom; feed crops replace meadows; knowledge centralised; mechanisation spreads
1913–1937	Institutionalisation of agrochemical research	Establishment of State Plant Pathology Research Institute; industry–state collaboration; national pesticide label	Early state–industry–science integration; legitimisation of pesticides
1950–mid-1980s	Productivist phase	State/EEC support for intensification, specialisation, mechanisation, chemicalisation; Marshall Aid tractors replace horses	Output grows 2% annually; fewer, larger farms; heavy reliance on fertilisers and pesticides.
Mid-1980s onward	Debates on post-productivism & sustainability, first Pesticide Action Plan (1987/1988)	EU reforms (e.g., milk quotas, set-aside schemes) link subsidies to environmental/rural goals, national targets to reduce pesticide use, and nitrogen	Environmental Governance. Farmers face tensions between economic viability and environmental demands.
2000s–present	Sustainable intensification & efficiency focus	Triple bottom line framework; innovation-driven solutions; high-tech farming emphasis, agreement on green transition of Danish agriculture, principles to reduce GHGs and nutrient emissions while maintaining economic growth, competitiveness, and jobs	Efficiency as a cultural and policy ideal; continued reliance on technology; questions about inclusivity and ecological limits

From Serfdom to Self-Ownership

The period from the 1700s to around 1830 marks the era of the Great Land Reforms (de Store Landboreformer), the aim of which was to improve the "welfare of the peasants" (*Bøndernes Vel*), promising "improved prosperity of thousands" (*mange Tusindes forøgede Velstand*), as stated by Reventlow in 1788, through the repeal of the feudal serfdom, also known as *Stavnsbåndet,* and the introduction of self-ownership (Danmarkshistorien). *Stavnsbåndet* meant that men between the ages of 14 and 36 were tied to serve on the land on which they were born. The land was owned by an estate, meaning that peasants in feudalism worked under what historian Birgit Løgstrup (2015) describes as "slave-like" conditions. In August 1788, Count Christian Ditlev Frederik Reventlow, a prominent Danish statesman, introduced the hereditary tenancy, which meant that the deed to the land was passed down within the farmer's family. In practice, this shift meant that the tenants became almost complete owners, with only a few obligations to the crown. Yet, Løgstrup and others describe how this marks not only a shift in ownership and obligations, but a critical shift in farmers' relation to farmland (Løgstrup 2015, Fritzbøger 2023).

Indeed, the purpose of the reform was not only prosperity, but to create a more efficient agricultural production. According to Reventlow, self-ownership (selveje) was essential for achieving this, alongside educational efforts to foster an informed and progressive society. Reventlow, in a reformist Christian spirit, advocated for the enlightened, educated peasantry to pave the way for the state's highest aspirations, namely, higher productivity and income from agriculture. Like he said in his speech, "With God's help, […] we hope that the peasants of these counties will not only be counted among the most prosperous but also among those who, through greater enlightenment than is now common, will distinguish themselves by virtue, good manners, and piety." (*og saa haabe, ved Guds Bistand, […] at disse Amters Bønder ikke alene skal tælles blandt de meest velhavende, men ogsaa blandt dem, som ved meere, end nu almindelig, Oplysning udmærke sig ved Dyd, gode Sæder og Gudsfrygt*.)

In Reventlow's aspirations, the peasantry was not only to cultivate the land, but to do so in a productive and orderly way, where "the commons will resemble well-fertilised fields; when the sour meadows and marshes will be transformed into rich grazing lands; when useless thickets will be cleared, and valuable forests and undergrowth will be carefully preserved. […] A time when the reorganised peasant

farms will all be surrounded by large, well-cultivated gardens of vegetables, herbs, hops, and fruit trees, as well as willow and other useful trees. [W]hen the farmhands will take pride in being the hardest workers, and the peasants will strive to be the best employers."[1]

The expansive reorganisation of the agrarian sector as the foundation for economic growth, which, scientifically and ideologically, was "linked to the ideas of physiocracy and enlightened absolutism" (Holmgaard 1981, 11). Etymologically, physiocracy denotes the "rule of nature," and is characterised by "a belief that government policy should not interfere with the operation of natural economic laws and that land is the source of all wealth" (Britannica 2020). In other words, a liberal economic logic grounded in extensive cultivation of land. Self-ownership was seen as providing the impetus and breeding grounds for such physiocratic policies and developmental leaps. Combined with the consolidation of farmland from common to individual land, these reforms gave way to significant shifts in farmer identity—self-ownership meant self-identification between farmer and field. With fields being owned by farmers, and not by an estate, treating weeds and diseases inside one's own field, as well as disease in one's livestock population, was considered meaningful practice. This individualisation of farming, along with the newfound incentives to optimise production methods, resulted in both significant productivity gains and land-use changes over the next 100 years. As noted by Fritzbøger (2015, 19), "The agricultural landscape had been transformed into a vast production apparatus, which was increasingly operated with new technology: more efficient field tools and new, high-yielding varieties of plants and animals." By 1858, farm productivity had doubled.

Yet, as noted by various historians, these shifts were, of course, not simply managerial, but also social and cultural (Fritzbøger 2015, Holmgaard 1981, Løgstrup

[1] Danish version, "Jeg seer den Tid imøde, i hvilken Udmarkerne ville ligne de vel giødede Tofter, de sure Enge og Moser ville være forvandlede til feede Haardbunds Enge, unyttigt Krat være bortryddet, nyttig Skov og Underskov omhyggeligen fredet, alt skadeligt Vand afgravet, alle Kampesteen brugte til varig Indhegning med Steengierder; den Tid, i hvilken de udskiftede Bøndergaarde alle omgives med store veldyrkede Kaal-, Urte-, Humle- og Frugthauger, med Pile- og andre nyttige Træer; den Tid, i hvilken Kløver, Kartoffel, nyttige Roers Dyrkning ikke mere vil være en Sieldenhed; i hvilken Tienestekarlen vil sætte sin Ære i at være den skrappeste Arbeider, og Bonden at være den bedste Hosbond;" Full text: https://danmarkshistorien.lex.dk/C.D.F._Reventlows_Minerva-tale,_15._august_1788)

2015). As Fritzbøger (2015, 19-20) notes, "The rapid demographic and economic growth rates of the time, which mutually conditioned each other, would hardly have been possible if the rural population itself had not also changed in character." In other words, free ownership and inheritance of land did not suffice to create the desired socio-economic growth, but needed enlightenment. "Bonden" (the peasant) should become a "landmand" (a farmer). If agriculture were to develop to exploit its full potential, it would require knowledge of the best methods and products. "Knowledge had, so to speak, become the limiting factor", as Fritzbøger notes (2015, 20).

Crafting an Ethics of Efficiency

Much akin to Max Weber's (1956) descriptions of the emergence of the protestant ethic, Danish scholars have identified important shifts in attitudes to work, spirituality, and community among the Danish peasantry following the abandonment of serfdom and the rise of scientific enlightenment and rationalism (Schmidt 1979, Østergård 1992, Manniche 1927, Bjørn 1977). Schmidt (1979, 8-9), for instance, describes the de-feudalisation as a "physically bloodless social revolution" (fysisk ublodig samfundsrevolution) in which tenant farmers were transformed into mortgage administrators and commodity producers. As he puts it, "When the old era's weeds had been cleared away, the class-divided soil of the new era remained". From this perspective, the time after the repeal of serfdom can be seen as a piece of "consciousness history", where a combination of economic booms and Enlightenment policies shaped the mentality of the peasant class: "so that he came to think, feel, and act in accordance with the new system's needs" (Schmidt 1979, 9). Holmgaard (1981) also highlights the 'grain crisis' of 1819-1830 as central to forcing farmers to think in capitalistic terms. As he writes, "Even though the majority of peasants did well throughout the crisis, they had gained a life-lesson in the new tough conditions of the economic system—in every parish people knew peasants for whom things had gone wrong" (15). Peasants who had not already adapted to the new conditions were forced to. According the Holmgaard they had to learn how to "think and act rationally under the conditions of a *capitalist* system" (1981, 15, my emphasis).

A broader idea of farmers' "general" education emerged. The goal, according to Schmidt (1979), was to develop "agricultural individualists with an appropriate degree of intellectual life" and to channel "the raw energies of sensuality into purposeful work" (10). This development was not only economic but also an extensive disciplining

of the rural population, where external economic coercion gradually became internalised as an "inner compulsion" (Ibid.). Social change became part of consciousness, making the transformation appear as a natural process. The Enlightenment policies were concretised through vocational training, institutionalised through the already established Royal Danish Agricultural Society (Landhusholdningsselskabet, est. 1769) that disseminated scientific knowledge and production methods, and notably through the establishment of the Royal Veterinary Agricultural University (Den Kongelige Veterinær- og Landbohøjskole, est. 1858), but also the church and the school system (est. 1814).

The Royal Danish Agricultural Society played a central role in this transformation through a reward system aimed at promoting systematic and calculative management (Schmidt 1979, 18, see also Fritzbøger 2015). From the 1830s, the society supported the establishment of agricultural schools and built an elite of "heroes of the working life," who received financial support in exchange for submitting to supervision and regulations. A significant obstacle to this development, according to Schmidt, was the so-called "peasant spirit," which he describes as a persistent, destructive force characterised by cheerfulness, sensuality, and a lack of work discipline. The Royal Danish Agricultural Society sought to counteract this tendency through parish libraries, educational writings, and collaboration with the church and schools. As Schmidt (1979, pp. 20-22) demonstrates, rationalist priests served as significant socialising agents, tasked with disciplining the rural population. From 1820, agricultural economy was introduced as an educational subject, paving the way for a more scientific approach to farming. An early manifestation of this was *Brief Instruction in Agriculture* (Kortfattet undervisning i Agerdyrkning) from 1835, which covered topics such as soil analysis, the necessity of fertilisation, crop rotation, and operational capital.

At the same time, emphasis was placed on promoting "civic virtues" such as diligence, frugality, and a sense of duty. The Royal Danish Agricultural Society compiled a so-called "model-list" for peasant libraries, which outlined the central educational efforts: Farmers were to become agricultural individualists and free themselves from the sloppiness of the past. According to Schmidt, they were to cultivate a Christian-moral self-discipline, where *påholdenhed* (thrift), *arbejdssomhed* (industriousness), *flid* (diligence), *nøjsomhed* (frugality), *pligtopfyldenhed* (a sense of duty), and *punktlighed* (punctuality) became core

virtues, and wastefulness as a sin (Schmidt 1979, 25). The modern farmer was emerging as a rational, economic figure, ready to enter a modern and capitalist market economy, and to make the most of the Danish soils.

At the same time, the 1830s saw the emergence of religious and social independence movements, in which figures like Grundtvig played an important role. These so-called "independence movements" were central to the emergence of the modern farmer as a liberal political figure in opposition to state control (Østergård 1992). Here, science played a central role. Fritzbøger (2015, 51) notes how C.E. Fenger in his inaugural speech for the opening of Landbohøjskolen in 1858 described science as "the only sure basis" for gaining practical experience, and the school was to be a place where "science is not only learned, but also developed". He writes, "Science, in the definite singular, was considered in the second half of the 19th century as a collective term for the enormous wave of enlightenment that uncovered all the truths that had hitherto been hidden" (2015, 51). The University of Copenhagen established an independent Faculty of Mathematics and Natural Sciences in 1850, and professional associations for various sciences, such as biology and mathematics, were founded in the decades preceding and following this development. Fritzbøger (2015) notes that scientific discoveries "shaped social life and created faith in progress to a degree that may be difficult to grasp today" (51), yet arguably, as we shall see, this faith in progress is indeed still present, especially when paired with technological development.

The First Industrialisation: Standardisation, Specialisation and Export

In a Danish context, the period from the 1870s to the 1910s is often coined 'the first industrialisation' (Wåhlin and Østergaard 1976, Kristensen 1989, Hansen 2010). This period encompasses a fundamental reordering of the Danish economy, politics, and production forms, as well as farmland. From the beginning of 1870, the drop in grain prices due to cheap grain from the USA and Russia challenged Danish farmers, forcing them to rethink their economic structure and production. Broadly speaking, the peasants' relationship with the central government was marred by a mistrust of its ability to solve the various crises for the peasantry. Instead, crises had to be addressed through internal reorganisation of production and political organisation, resulting in a strong, independent organisation of Danish farmers that, to this day—despite comprehensive regulation (Larsen 2016)—still possesses significant political influence

(Larsen, Ellersgaard, and Steinitz 2016). Some of my interlocutors even identified themselves as part of a "stand" (i.e., a class).

The pillars in this independent organisation were the cooperative dairies and the machinery of the cooperative movement through which the Danish peasants are said to have emerged "collectively as a class representing the industrial capitalist" (Holmgaard 1981, 30). Precisely this—industrialising agriculture and collectively acting in accordance with a capitalist market-economic logic—is often framed as crucial for extending the Danish farmer's viability as a small-scale producer domestically to become part of the capitalist market economy. Uffe Østergaard (1992) suggests that it presented a "cultural, economic and political awakening of the middle peasants" (5), which paved "the Danish road to agrarian capitalism" (Wåhlin and Østergaard 1976, 15). Ideologically, the cooperative dairies, which spread rapidly from the 1880s, embodied a democratic and libertarian structure, promoting economic independence and collective thinking. Compared to Marx's descriptions in The Eighteenth Brumaire of Louis Bonaparte (Marx 1852) of the French peasants who were largely unable to attain the status of an independent class and thus became an appendage to the bourgeoisie in the cities that grew out of early industrialisation, the Danish peasantry independently organised. They managed to defend their societal interests in terms of economy, politics, ideology and religion, culture, consumption, production and sales against the liberal-conservative centralised state in a way 'unprecedented' by any other country (Holmgaard 1981, 32).

The rise of cooperative dairies resulted in a surplus of residual by-products, and by repurposing dairy by-products such as skimmed milk and whey as livestock feed, a new lucrative export adventure of butter and bacon was enabled, which to this day still stands as one of the biggest export successes in Danish history: a history imbued with farmers' and the industry's innovative skill and ability to utilise waste produce. In 1914, agriculture's share of Denmark's exports was 60% and livestock had quadrupled in just 40 years (Jørgensen 2020). With an increased livestock production enabled by dairies, Danish farmland turned increasingly dominated by growing feed for animals, substituting grasslands, meadows, and the like with feed grain, and by essentially removing grazing livestock populations from the open land (Bøgh Sørensen 2025). Furthermore, through damming, drainage, and heath cultivation, the agricultural area increased by 25% between 1860 and 1914.

A cooperative production organisation also meant standardisation. Compared to the diversity of family farms, cooperative dairies presented an organisational form that combined the family farm with rational, industrial mass production of internationally competitive quality goods. Farmers submitted themselves to product quality control, and backed by the Royal Veterinary and Agricultural University, new methods of soil treatment, pest control, and crop varieties changed the production pattern of Danish farmers (Fritzbøger 2015, 51). While successfully increasing production, farmers simultaneously lost part of their independence as processes previously done by hand were taken over by agricultural machines, such as sowing, mowing, and threshing machines, in addition to row cleaners and steel ploughs. Farmers' associations disseminated research results and new operating methods, agricultural schools trained farmers for more efficient, technological, and specialised production, and in the cooperatives, systems for knowledge collection and quality control were established, ensuring a homogeneous high standard. As such, knowledge production was centralised and institutionalised (Jørgensen 2020).

Furthermore, production was becoming increasingly *specialised,* meaning that farms previously variously composed of pigs, cows, hens, vegetables for human consumption, and feed for livestock, turned narrowly focused on just *one* production (Kærgård and Dalgaard 2014, 17-18). Today, the degree of specialisation is close to 100% in either crop production, cattle farming, pig farming, or other types of specialised production. The process of agricultural produce becoming standardised and specialised prompted an increasing emphasis on professionalism, shifting the role of the farmer from one of independence to that of a 'producer'. In that sense, the liberal farmers were increasingly caught in a contradiction between Grundtvigian ideals of freedom, independence, and libertarianism on one hand, and regulation, institutional dependency, and economic dependency on state subsidies on the other. However, a sense of liberal independence persists.

The farmers I encountered expressed this independence through consistent critiques of those in political power: the "Christiansborg politikere" (i.e. Christiansborg is where the parliament is seated), and through negatively charged idioms like "skrivebordspolitikere" (desk-politicians) and "københavnerlogik" (Copenhagener logic). These idioms express a shared opposition to "far-away" legislation and political ambitions that many farmers see as distanced from what is going on "on the ground". As one interlocutor, Henrik, said, "The debate about

sustainability is taking up much space when we are together in farming contexts. And it is frustrating *when you just know* that things are different out here in the real world." He also said that it was challenging to explain how things "faktisk hænger sammen", i.e. how they actually work. As an example, Henrik highlighted that if yields were increasing and a pig was using less fodder, "then we are in fact taking care of the climate". According to Henrik, farmers did not disagree that the climate problem needed to be solved, but disagreed about the methods to do so. As a result, nuances and what Henrik saw as professional facts—the increasing yield and less fodder as climate-friendly—were challenging to convey, because, like he said, "Those who are for the climate argue with their emotions while *landbruget* [the farming community] argues with *videnskaben* [science] and *fagligheden* [the professionalism]". From Henrik's position, modern politics emerge as a feral sphere where values and emotions dictate the state of things.

We will return to Henrik. For now, what his perspective illustrates is how the self-identification of a pragmatic and rational modern farmer indeed lingers in the present. Further, many farmers will proudly oppose their work mentality to that of the "city desk people," and defend hard labour as a moral value in and of itself. As Chresten, a conventional farmer, said, "Many Jutlandic workers in Copenhagen are not just there because of work, but because the firms experience a high demand for Jutlandic workers. They work cheap, they are reliable, they damn work, and they are never sick. The Jutlanders get less than DKK 100 per hour (15 USD), but they do their job, and then they are out." Statements like these illustrate a central narrative shaping what it means to be a modern, good farmer: being independent, hard-working, reliable, responsible, and decent, guided by rationale instead of values and emotions.

The Productivist Phase

While the years leading up to World War I and II are seen as presenting a fundamental industrial reordering of the Danish economy, politics, and importantly, production forms, the period after World War II is often framed as a period driven by the principles of *productivism* (Wåhlin and Østergaard 1976, Kristensen 1989, Hansen 2010). Broadly speaking, the productivist phase refers to the period between 1950 and the mid-1980s; a period of agricultural modernisation characterised by "a commitment to an intensive, industrially driven and expansionist agriculture with state support based primarily on output and increased productivity" (Lowe et al. 1993,

221). Kristensen (2003) characterises the period by three major trends: *specialisation, intensification*, and *concentration* of production. While specialisation has already been covered, *intensification* refers to productivity increase through the use of new technologies, breeding research, and chemical inputs, meaning that more is produced per hectare or per livestock unit. During the 1980s, the output from Danish farmers increased by 2% annually, and the inputs per unit decreased for all production types, reflecting improved resource efficiency (Kristensen 2003, 21-22). *Concentration* refers to how production is concentrated on fewer but larger farms.

Productivism was first supported by a domestic market scheme to secure farmers' income by direct payment (Jakobsen 2015, 60), and later through the EEC/EU Common Agricultural Policy (CAP), designed and implemented in 1962 to support production and farm income (Pe'Er et al. 2019b). Productivism is often further associated with supported mechanisation linked to the Marshall Aid, substituting 45.000 workhorses with 17.000 tractors (Kærgård and Dalgaard 2014, 15), and chemicalisation through the implementation of Green Revolution technologies such as artificial fertilisers and pesticides, supported by national testing units (Jørgensen and Nielsen 2013, Fritzbøger 2015).

Agrochemical Relations

The history of agricultural modernisation is also closely tied to the introduction of pesticides. While significantly increasing in the period after WWII, the introduction of pesticides dates back to the early 20th century, specifically 1913, when the State's Plant Pathology Research Institute (Statens Plantepatologiske Forsøg) was established to test pesticides. In 1930, a formal collaboration between the Ministry of Agriculture and the industry led to systematic field trials. By 1937, the Dansk Agrokemisk Forening (Danish Agrochemical Association) had been founded to strengthen the sector. Notably, they managed to settle an agreement on the development of a national "official recognition" label validating pesticide efficacy that pesticide producers could use for marketing purposes as a form of legitimisation (Jørgensen and Nielsen 2013).

Like elsewhere (Pimentel 1996, Shattuck 2021a), agrochemicals enabled production on a vast scale. Where human hand weeding had once been a limiting factor, agrochemicals paved the way for bigger fields. Sometimes referred to as the Green Revolution model, this is the capital-intensive 'industrial agriculture' aided by chemicals, breeding, and advanced machinery, which developed in the USA and later

spread to most of Western Europe. Unprecedented worldwide yield growth was achieved (Shiva 1991, Moore 2010). Fertiliser helped improve soil fertility, pesticides helped optimise yield by effectively combating weeds and diseases, genetic breeding allowed crops to grow faster, slower, or more sideways, and enabled plants to develop resistance to specific pests (Borlaug 2002). Some scholars highlight these benefits of fertilisers, pesticides, and new crop breeds as "immense" in terms of reducing hunger and improving nutrition (Tilman et al. 2002, 671).

Environmental historian and historical geographer Jason Moore writes that "It is difficult to overstate the success, in capitalist terms, of the post-Second World War agricultural revolution" (Moore 2010, 398). What the sentence "in capitalist terms" alludes to is, of course, the negative costs in environmental and biodiversity terms (Bakker et al. 2020, Ofosu et al. 2023, Arendrup et al. 2024). Yet, ecological concerns about the potential harms of these new technologies were widely absent, and in Denmark, the use of artificial fertilisers and pesticides skyrocketed in the 1970s without much notice (Kærgård and Dalgaard 2014, 16). This is also noted by Jørgensen (2020), who writes that, "Man's influence on nature was thus pervasive, but without discussion of what it would mean for nature or the domestic animals". However, the 1980s gave way to some of the first scientifically informed critiques of agrochemicals and their influence on the health of ecosystems and biodiversity (Carson 1962), which echoed in Danish politics. Here, the first so-called "pesticidhandlingsplan" (pesticide action plan) was passed in 1986/87, targeting a 50% reduction in active substances and treatment frequency (Jørgensen and Nielsen 2013), which is a clear example of national environmental governance. Today, Nielsen et. al. (2020) show that Denmark has already implemented significant reductions in the use of pesticides and antibiotics in Danish agriculture compared to similar countries, and a 50% reduction in nitrogen loads to the aquatic environment over 30 years. Yet, agrochemicals remain a central pillar in conventional agriculture. *Chapters Four* and *Five* in particular explore the negotiations of this awkward coexistence of efficiency and environmental concerns in times of sustainable development, arguing that the close integration of state research and industry played a crucial role in constructing risk perception among Danish farmers, shaping the dominant narrative of pesticides as a rational and necessary part of efficient crop production.

The Post-Productivist Phase? Towards Sustainable Agriculture

As mentioned in the introduction to this chapter, the 1980s mark a somewhat ambivalent point in understanding the "direction" of agricultural change, so to speak. While some have argued for a shift in agrarian politics towards "post-productivism" (Ward et al. 2008, Wilson 2001, Mather, Hill, and Nijnik 2006, Almstedt et al. 2014, Ward 1993, Kristensen 2003)—understood as initiated by the EU's so-called MacSherry reform that shifts agricultural subsidies away from being granted mainly per unit of production, and instead ties them more closely to other priorities such as environmental protection, rural development, and landscape management (Dalgaard et al. 2025, 81)—the very idea of being somehow "beyond" productivist tendencies has been challenged from various sides (Muirhead and Almås 2012, Bjørkhaug, Almås, and Brobakk 2012, Kristensen 2001).

Søren P. Kristensen (2003, 15) mentions production surplus, declining societal economic importance, and serious environmental problems as essential drivers of this shift to post-productivist agriculture. In a Danish context, historian Ann-Christina L. Knudsen (2009, 276) highlights the 1984 EU milk quota system as one of the "post-productivist" responses to address unwanted "butter mountains" in the dairy sector. As she writes in her book Farmers on Welfare (2009, 277), "What could have looked like the Promised Land overflowing with milk and honey, instead was seen as representing an inefficient and over-expensive CAP. In the politics of memory, it surely seemed better to have too much food than too little, but these developments flattered neither the public image of the farmers, nor the Community [i.e. the EU]." This is reflected in an article from Landsbladet (1984) where the chair of *Ribe amts Landboforeninger* (The Farmers Associations of Ribe county) was quoted saying that, "Denmark is the only country in the world exporting more than ¾ of production. Denmark will in all negotiations stand as the biggest sinner regarding overproduction of milk". Similarly, massive surpluses in grain began to fill the storage capacity of the EU, which at the time had no market for the produce. The solution was not price reductions, but so-called set-aside schemes, where farmers were granted financial compensation *not* to farm so that "the underlying welfarist ideas of the CAP were not seriously dented" (Knudsen 2009, 278). Yet, the effects of production limitations such as quota systems and set-aside schemes were highly questioned, "no more than an exercise in containment" (Fennel 1997, 325-327, in Knudsen, 2009).

Although industrialisation and the ”productivist paradigm” (Burton and Wilson 2012, Walford 2003) is sometimes viewed as something society has moved beyond into what above is instead referred to as “post-productivism” (Mather, Hill, and Nijnik 2006), there is also ambivalence about the applicability of the concept (Kristensen 2001, Bjørkhaug, Almås, and Brobakk 2012, Burton and Wilson 2012). The very idea of being in a post-productivist phase is, for instance, challenged by what Burton and Wilson (2012) coin “neo-productivism”, which in the case of the New Zealand dairy sector meant “boosting productivity through ongoing investment in innovation and delivering long-term economic growth and sustainability” (MAF 2010, in Burton and Wilson 2012, 63). According to the authors, sustainability was overruled by goals of economic growth. Yet, what perhaps best characterises sustainability in Danish agriculture (and elsewhere) today is precisely this insistence that sustainable development and economic development are not mutually exclusive but go hand in hand.

The coexistence of economic and environmental interests is reflected in the 2021 “Agreement on green transition of Danish agriculture” (Aftale om grøn omstilling af dansk landbrug) (Finansministeriet and Ministeriet for Fødevarer 2021). The foundation of the deal was the agreement that a reduction in emissions of greenhouse gases and nitrogen to the aquatic environment was needed. Complying with the recently settled Climate Act (2020), the agreement was grounded in the following principles:

1) Agriculture must be developed and not dismantled *(Landbruget skal udvikles og ikke afvikles*)
2) Agriculture must be transformed to be more climate and environmentally friendly while remaining economically sustainable (*Landbruget skal omstilles til at være mere klima- og miljøvenligt samtidig med, at det er økonomisk bæredygtigt*)
3) Agricultural greenhouse gas emissions must be reduced as much as possible, taking into account the continued sustainable development of the industry, the competitiveness of Danish agriculture, sound public finances, employment, cohesion, and social balance (*Landbrugets udledning af drivhusgasser skal nedbringes mest muligt under hensyn til en fortsat bæredygtig udvikling af erhvervet, dansk landbrugs konkurrenceevne, sunde offentlige finanser, beskæftigelse, sammenhængskraft og social balance*)

4) Nutrient emissions must be reduced to improve the aquatic environment (*Udledningen af næringsstoffer skal nedbringes for at forbedre vandmiljøet*)
5) Agricultural production must take nature and biodiversity into consideration (*Landbrugsproduktion skal ske under hensyntagen til natur og biodiversitet*)
6) Agriculture must be ensured sustainable framework conditions and the retention of jobs in all parts of the country (*Landbruget skal sikres bæredygtige rammebetingelser og fastholdelse af arbejdspladser i alle dele af landet*)
7) Agriculture must continue to create jobs and help produce good, healthy, climate- and environmentally friendly, and safe food, thereby maintaining its crucial position in Danish exports (*Landbruget skal fortsat skabe arbejdspladser og bidrage til at producere gode, sunde, klima- og miljøvenlige og sikre fødevarer og derigennem fastholde sin afgørende position i dansk eksport*)

The principles outlined express a dual commitment: Ensuring, on one hand, the sector's continued contribution to national development and economic growth (also understood as "economic sustainability") to maintain its "crucial position in exports", while on the other hand making it more climate and environmentally friendly *and* considerate of nature and biodiversity. These principles—and political targets—introduce a central tension to what it means to be a farmer today, namely the tension between what often seems like mutually exclusive concerns inherent to the concept of sustainability as a "triple bottom line". A key concern of sustainable agriculture today is to balance the often-contradictory logics of what is referred to as the "triple bottom line" of sustainability (Purvis, Mao, and Robinson 2019). Sustainability is commonly conceptualised as having three dimensions—economic, social, and ecological (or environmental). In the context of agriculture, the financial dimension relates to maintaining productivity and profitability; the social dimension addresses aspects such as rural community well-being, labour conditions, and equity; and the ecological dimension concerns the capacity of natural systems to provide resources and ecosystem services without degradation for coming generations (see "Our Common Future" (WCED 1987) for a more detailed description).

In the political agreement above, the second bullet explicitly links sustainability to economic viability. The third bullet complicates the issue by stating that greenhouse gas emissions must be reduced "as much as possible"—a phrase that introduces flexibility but also ambiguity. What determines what is "possible"? If emissions reduction is conditional on maintaining industry development, employment, and

economic competitiveness, does this imply that environmental goals may be compromised if they conflict with these economic priorities? The conditioning of environmental goals by economic growth suggests that competing interests may ultimately constrain the extent of emission reductions.

Questioning how environmental costs such as nutrient and pesticide leaching, volatilisation and waste streams can be minimised while maintaining high yields, Tilman et al. (2002, 672) condenses the challenges in the following framing: "In one sense the answer is simple: crop and livestock production must increase without an increase in the negative environmental impacts associated with agriculture, which means large increases in the efficiency of nitrogen, phosphorus and water use, and integrated pest management that minimizes the need for toxic pesticides." However, in reality, "achieving such a scenario represents one of the greatest scientific challenges facing humankind because of the trade-offs among competing economic and environmental goals, and inadequate knowledge of the key biological, biogeochemical and ecological processes" (ibid.) The tension between different gains and costs in sustainability assessment is thus framed as central to the pursuit of being a good sustainable farmer today. Yet, as mentioned, the truly thought-provoking aspect of agricultural sustainability today is the sought resolution of the contradiction between economic and environmental sustainability through the prisms of "sustainable intensification" and "resource efficiency".

Sustainable Innovation: Denmark as a Global Leader for Sustainable Transformation

A central concept to the pursuit of sustainable agriculture, suggests Dalgaard et al. (2025, 89), is *efficiency,* measured as *output* per *input*. In contrast to productivism, "efficiency" in agriculture typically refers to the optimal use of inputs—land, labour, nutrients, water, pesticides, and capital—to achieve the highest possible output without unnecessary *waste* (Hansson, Manevska-Tasevska, and Asmild 2020, 2, Leibenstein 1966). Historically, the concept of efficiency has been closely linked to the idea of the efficient farmer (Ingemann 1997), which is said to have emerged as a response to uncertain markets, overproduction, and the pursuit of sustainable development goals.

In the 1960s, farmers suffered from a lack of cost coverage for one-third of their production, which meant many farmers had to give up farming, resulting in the loss of

6,000 farms each year. An important note here is that it is not the lack of cost coverage that is the issue, but rather the economic and structural conditions that have caused this decline. Yet, various initiatives were launched to ensure competitiveness. The restructuring of the land legislation in 1967 made it possible to operate two properties together and merge farms up to 100 hectares. The farmers' educational foundation was strengthened through the introduction of the 'Green Certificate' (det Grønne Bevis). A significant educational rearmament of financial and technical counselling in local farmers' associations was prioritised. For many farmers, the legislative changes and educational strengthening were seen as "preparation for the future terms and conditions", such as the educational strengthening 200 years before. As expressed by a columnist in *Landsbladet* (now *Landbrugsavisen*) in 1969:

> "It is about time that more secure working conditions are created for *den effektive danske producent* [the efficient Danish agricultural producer] than has been the case in recent years. Danish agriculture must, with help from *et effektivt produktionsapparat* [an efficient production apparatus], be prepared to seize the opportunities that arise." (Landsbladet 1969, my emphasis).

Ingemann (1997) suggests that efficiency became the new telos for the still numerically shrinking group of farmers who survived and prospered by implementing new technologies, such as agrochemicals, and by rationalising agricultural farmland through the removal of hedges, pits, wetlands, and "irrational" cropping systems. Broadly speaking, efficiency was seen as *the solution* for farmers to stay competitive in the face of unavoidable structural adjustments and global competitiveness.

Yet, Ingemann (1997, 5) also suggests that efficiency has, in fact, paradoxically exacerbated income problems rather than solving them, as income did not follow costs for the adoption of new technology. Furthermore, he assumes that environmental costs have increased accordingly, as farmers tried to produce more in their areas. Ingemann's critique, as I read him, highlights how efficiency has been institutionalised not only as an *economic ideal* but also as a *cultural norm,* and even an ideology. So, while efficiency is offered as a solution and unquestionable good that serves broader cultural and political narratives about modernisation and progress, its reliance on

technological solutions often obscures the social and environmental costs of intensive production (Ibid., 26).

Today, efficiency measures, such as nitrogen efficiency, are used as a central indicator to assess sustainability in agricultural production in Denmark and elsewhere (Dalgaard et al. 2025, Mirzaee and Nafchi 2025, Meena and Kumar 2022). Yet, higher efficiency does not automatically equate to greater *ecological* sustainability. For instance, one method for assessing agricultural sustainability is *nitrogen efficiency*, defined as the ratio between output of farm products (crops and livestock) and nitrogen input from sources such as fertilisers and feed. As documented by Dalgaard et al. (2025, 89), nitrogen efficiency declined from about 30% in 1950 to around 20% in 1983, but has since increased to approximately 40–50%. In generational terms (≈30 years), this corresponds to a doubling in the most recent generation. Yet, while nitrogen efficiency is an important indicator of how effectively resources are used, it primarily reflects the *economic* dimension of sustainability by linking inputs to production outputs. Nitrogen in the environment can still be substantial even with improved efficiency (Dalgaard et al. 2025, 91). In other words, economic and ecological sustainability may not move in parallel, which has proved a key challenge for assessing sustainability in agriculture (Tilman et al. 2002).

Besides efficiency, intensification is identified as a sustainability strategy (Pretty and Bharucha 2018, Schiefer, Lair, and Blum 2016, Ioris 2018, Brieghel 2019, Meena and Kumar 2022). In a Danish context this is exemplified in innovations such as feed additives for cows so that they emit less methane (Brichet, Brieghel, and Hastrup 2023), molecular scale protein innovation (Brieghel, 2019), and the emphasis in the recent political agreement also referred to as the “Tripartite Agreement” (Regeringen 2024) that Danish agriculture must focus on being "high-tech" (*højteknologisk*) and must "intensify on robust soils" (*intensivere på robuste jorde*), through investment in what some call “dubious technical fixes” (Jensen 2024) such as the production of biochar and feed additives. Technological fixes have generally held a central place in political agreements on sustainable development, and it seems they have never stopped being a source of controversy. Yet, technological innovation seems to be non-negotiable as a core strategy to sustainably “intensify” the agricultural sector—something that seemingly has to do with the sector’s self-identification as possessing uniquely innovative capacities due to a history of collaboration between industry, state, and research institutions. In “AgriFoodTure: Roadmap for Research” (Olesen et

al. 2021), a roadmap developed post the 2021 agricultural agreement, this coupling of history with Denmark's potential to become a "global leader" in green innovation is made particularly clear.

Here, it says that Denmark—besides from already being viewed as "among the most sustainable in the world"—has unique potential to become "a front-runner of an innovative and disruptive green transition of food production internationally, powering a new generation of green global export opportunities." (7) Yet, they suggest an "untapped potential" for increasing the collaboration across key players. According to the authors of the roadmap, this potential derives from "a long tradition of collaboration across the food value chain and from building an innovative and knowledge-intensive sector based on close collaboration between large multinational companies and small innovative start-up businesses, authorities, innovation clusters, NGOs, and research institutions." (Ibid.). Furthermore, "a unique tradition for data generation and technological development and implementation at all levels in the production system from field to fork, including *efficient use of resources* throughout the product chains" is highlighted as paving the way for new assets for the Danish sector through "unique collaboration among actors that make data available for research and development, e.g., for selective breeding in animals and plants." (Ibid., my emphasis) These assets include the development of new precision farming technologies and a strong position in the food ingredients and biotechnology sector.

Concluding the introduction, they manifestly state that "Considering the strong platform that we stand on and taking departure in new innovative ideas and disruptive thinking, Denmark is in a unique position to develop and implement the green transition of the agricultural sector and food industry." (Ibid.) As such, the Roadmap underpins a central characteristic of Danish visions for sustainable agricultural development: namely, that sustainability is thought to emerge as the result of technological innovation, a capacity inherent in the tight collaborative efforts between industry, the state, and research institutions. Yet, while innovation-driven solutions—such as precision farming, AI-based monitoring, and improved cultivation systems—offer efficiency gains and emission reductions, they raise questions about accessibility, cost, and unintended consequences (Ingemann 1997, Wolf and Wood 1997). For instance, does the focus on high-tech solutions risk marginalising smaller farms that cannot afford to invest in such technologies? And to what extent does this roadmap

address deeper structural challenges, such as overproduction, farm size, or dependency on agrochemical farming methods?

Another important question could be posed to—one that is less concerned with changes to production methods, and more concerned with lived experience. As noted by Ingemann (1997) almost 30 years ago, efficiency was not simply a mode of production, but what we may understand instead as a mode of conceptualising and imagining efficiency (in Danish, "forestilling"). From Ingemann's analysis, one can conclude that the very conception of efficiency as a positive term promising to solve the economic challenges of the agricultural sector (5) was what drove production patterns to change. Similarly, it could be suggested that sustainable intensification is as much a practice of ideas as it is a practice of production. This leads me to the following question: If we approach "efficiency" and "sustainable intensification" not only as changes to agricultural production methods, how, in the process of sustainably developing Danish agriculture, are agrarian socialities and moral worlds intensified too? This is what the dissertation's coming analytical chapters seek to illuminate through ethnographic attention to the concept of sustainability.

Conclusion: The Reproduction of the Good Farmer

Being, as noted by Sahlins (1985, xii), the institutional form of historical events, society bears the past through selected narratives, such as the story of Danish agriculture as innovative and highly productive—being "good for the world" (Regeringen 2022, 29) by feeding (or producing food for) twice the national population. This chapter has aimed to illuminate how such narratives have been assembled, and how they continue to shape present ideas of what Danish agriculture can and should be, and of what the Danish farmer ought to embody. At the heart of this agrarian self-understanding lies a professionalism characterised by innovative skills, technological adaptability, and resource efficiency. The cooperative movement, which enabled Danish farmers to enter the world market through standardised production, and the scientific institutions that underpinned this transformation (e.g., the Royal Veterinary School), are repeatedly invoked as proof of an almost natural national capacity for progress (Fritzbøger 2015, Christensen 1989, 120). In the understanding of Danish agriculture as being "good for the world" due to its innovative capacities, high-quality produce, and sustainability efforts, the well-rehearsed narrative that *landbruget skal udvikles og ikke afvikles* (Danish agriculture must be developed and not dismantled)

(Finansministeriet and Ministeriet for Fødevarer 2021, 2) becomes legible and politically persuasive.

The figure at the centre of this history is a particular kind of farmer: efficient, rational, and scientifically grounded. Crucially, this figure has not only endured but been actively reproduced in moments of rupture. Economic crises, environmental degradation, and political reforms have time and again positioned the farmer as both problem and solution: held responsible for overproduction, pollution, or inefficiency, yet simultaneously mobilised as the key agent of recovery through renewed rationalisation, technological innovation, and professionalisation (Haubjerg, Bendtsen, and Bitsch 2021, Hansen 2016).

Today, complying with climate targets is considered a national political goal. Farmers are expected not only to "feed the world" but also to provide common goods such as reduced contribution to greenhouse gas emissions, the protection of coastal waters, the provision of energy, and the restoration of biodiversity (Regeringen 2024, Finansministeriet and Ministeriet for Fødevarer 2021). At the same time, they are expected to collaborate and voluntarily apply for the environmental schemes that are necessary to reach these goals. This demand implies a restructuring of values, notions of professionalism, identity, and everyday practices. And indeed, the farmers I encountered during fieldwork did often feel caught between competing pressures—like the need to comply with increasingly stringent environmental standards while maintaining economic viability. Yet, when staying with farmers' own understandings, sustainability is less a fixed model than an evolving, culturally embedded notion, entangled with broader ideas of the good life and of what it means to be a good farmer. Furthermore, sustainability is embedded in and constrained by the very production logics and forms shaping Danish agriculture. To illustrate this, the following chapter explores the large-scale conventional farm as a production site where certain crops mark the territory of sustainability in large-scale, conventional farming.

Chapter Three
Entangling *the Good Farmer* in Crop and Scale



Figure 7: Straight rows of cereal crops with wind turbines in the background. The so-called "sprøjtespor" (spraying track) is visible on the left side—a "rational" field.

Sustainability Entangled

This chapter introduces the central components of my field site, including the large-scale farm, its crop production, and the moral economy that shapes its operations. Paying attention to the types of production systems, including crops and the control regimes they entail, is crucial for understanding the conditions for sustainability. One of the most critical lessons from the conventional farmers was their ability to constantly force my attention to detail: to specific crops, their needs and their relationships, but also to particular soil types and their affordances in terms of production. Paying attention to these specifics is also a way to avoid being carried away by straightforward explanations, which frame sustainability as something farmers either celebrate or reject. I suggest instead that sustainability is tied to industry demands, production scale, and concerns about viability within specific production scales. Following this, I treat crops not just as agricultural units, but as agents that mediate moral economies, institutional logics, professional ideals, and environmental limits. I argue that specific crops allow specific visions of sustainability to thrive while sidelining others, illustrating how sustainability is tied to professional ideals and material production conditions. As such, there is no "one crop" or "one farm" but many that offer different conditions of sustainability to take root. I explore how sustainability is not only discursively constructed but materially enacted through crop-specific infrastructures and professional obligations, and discuss what this entails.

Before diving into the large-scale farm, I introduce the emic concept of *ordentlighed,* which can be understood as a form of moral economy (Sayer 2005). Moral economy denotes how economic behaviour is not only dictated by market logics, but by moral ideas about right and wrong. Similar to concepts of *good farming* identified in rural sociology (Riley 2016, Burton 2004), *ordentlighed* serves as both an individual moral compass and a socially recognised standard by which farmers judge themselves and others, distinguishing "good" from "bad" professionalism. The concept is central to my analysis of how professionalism and morality shape agricultural practices, as well as ideas about sustainability and viability.

Ordentlighed: Intertwining Sustainability, Materiality and Morality

During fieldwork, I encountered many competing ideas about sustainability: Was it about animal welfare, climate, biodiversity, or the environment? Often, these various dimensions were confused or at least explained in overlapping ways. Like this quote

from conventional farmer Chresten, “Well, there’s *dyrevelfærd* [animal welfare] and there’s *miljø* [the environment] with the fjords and such. And then of course there’s CO2, but that’s also *miljø*”. Here, climate change and environmental issues are merged into a single category, *'miljø',* illustrating the variety of agendas the concept of sustainability is sought to encompass. During the visit, we discussed sustainability, politics, and regulation, and I asked Chresten about his and his colleagues’ attitude to sustainable development. “Well, it’s really positive,” he said, “I haven’t actually heard anyone who is against it.” He explained, “The sector wants to turn to the other side and show that they’re doing something good. And then we want that *stolthed* [pride] back.”

It was 2020, the very beginning of fieldwork, and I was still trying to grasp what farmers actually meant when they talked about sustainability. They repeatedly mentioned *ordentlighed* as a guiding principle. Karsten, for instance, who had stated that, “Agriculture has always had crises. I’m more worried about whether we can produce it *ordentligt*”. Most farmers agreed that sustainable development was a good thing, but also that it had to be done in an *ordentlig* (orderly, decent, proper) way that sustained or enhanced *faglig stolthed*, consolidated in the word *ordentlighed* (orderliness, decency, properness). In this context, the notion of *ordentlighed* emerges as a key term through which sustainability is enacted—morally, socially, and aesthetically. So, what does it mean to be an *ordentlig* farmer?

During interviews with farmers, consultants, and researchers, I encountered various versions of *ordentlighed* and *godt landmandsskab*. Some would stress the importance of cleaning the roads after driving; pulling the tractor over when there is a car line behind you; making sure there is “space for everyone” in a countryside significantly marked by agricultural activity, as we saw in chapter one. Furthermore, allowing weeds to dominate a field, accepting high piglet mortality, or depleting soil fertility for future generations were all described as *uordentligt* (improper). Rather than being restricted to technical management, *ordentlighed* encompasses broader questions of responsibility, trust, respectability, and stewardship of land, animals, and social relations.

Farmers also linked *ordentlighed* to matters of utility and efficiency. Farmers often stressed that fertile land should never be wasted. This could mean both taking fertile farmland out of production, or, like Flemming, a conventional farmer, expressed it, “I can’t bear to see good Danish clay soils to be planted with solar panels”.

Ordentlighed, in that sense, can be seen as an agrarian ethics that combines economic rationality with moral imperatives of productivity (Thompson 2010). Wastefulness—such as allowing arable land to grow wild—is interpreted as indecent because it violates both economic and ethical expectations.

Ordentlighed is also expressed as being industrious. Hard work is a visible marker of legitimacy, often symbolised by a "clean" field. Weeds, conversely, signify laziness, incompetence, or reliance on subsidies rather than skill and labour. Chresten linked it to *faglighed* (professionalism). He said, "There has always been a *stolthed* [pride] in being a farmer. You have your field, and your field is judged by those who drive by with the window down. That is kind of a… *faglig stolthed* [professional pride]. We have always had certain crops, once it was the beets. Those who had really nice and clean beets, they were also the skilled farmers. It was a status symbol if you had some clean fields. Today, you can "spray yourself out of the problem", some might say. But then again. The first impression one gets of a good farmer is tied to whether they cultivate the land nicely; *er det gjort ordentligt* [is it done properly] *og ser det ordentligt ud?* [and does it look proper?]". As Riley and Robertson (2022, 439) note, such visible indicators serve as *objectified* (symbols and material objects which have a high cultural value and confer prestige onto the owner—such as high crop yield or high-value agricultural machinery in the field of farming) forms of cultural capital through which farmers assess one another's commitment and ability. Industriousness thus bridges moral identity and practical achievement. While *ordentlighed* was used in various and interchangeable ways, the term embeds a sense of responsibility and obligation, whether to community, colleagues, or a broader sense of society.

Yet, as Chresten and I got deeper into our conversation, the ambiguities began to unfold. He said, "Well, it's easy enough to say, 'my farm practices *ordentlighed* and my farm practices *bæredygtighed* [sustainability]' It's the degree of it, and who decides those boundaries? On this point, I can tell you that farmers don't agree. If you put 10 farmers together and ask them to define what their farm should look like in 10 years if it is to be sustainable, you will get very different answers. The only thing we are sure of is that we need something to eat."

Chresten's quote is relevant here for several purposes. First, it highlights that the concepts of sustainability and sustainable development are subject to various interpretations. Second, that these interpretations are closely linked to other concerns such as *ordentlighed*. Third, that *ordentlighed* and *bæredygtighed* needs to be

understood in relation to the specific material conditions and production concerns characterising different farms, as these will be decisive of how the terms are interpreted and integrated. Thus, as also mentioned in the introduction, Chresten underscores how sustainability cannot be detached from the specific *faglighed* characterising the "10 farmers" asked and their 10 different farms.

He said, "Well, *ordentlighed*... To me, the word *faglighed* comes into play too. Well, it's clear that when I drive around in my car and look at fields—and I do that all the time, I look mostly at fields and not so much at the road—I can see this professional skill. And then you can discuss what a "bad" field is. But in my world, what I look for in fields today—and that's because that's the way I get the most out of it—is whether it looks like one that will give a big yield. If it's clean and neat, and the same all over the field, right? That is what makes me think, "That's good for my farm." Or I don't know if it is, but it's good for my wallet. And that's how I need to think." Chresten himself was a large-scale pig producer operating 800 hectares primarily with grain utilised as pigs' feed. Chresten's explanation makes clear that ordentlighed is inseparable from specific professional demands: to be an *ordentlig* pig producer, one must achieve neat, high-yielding fields that display both competence and economic prudence.

As Chresten's comment suggests, we can see different notions of professional ordentlighed ingrained in the material conditions and professional demands characterising a farm. If sustainability, as the farmers said, had to be done *ordentligt,* we must think about sustainability from a different angle than one of politics, namely from materiality and morality. This raises a broader question: what does the *rational* and *large-scale* farm entail in terms of professional virtues, ideas of *ordentlighed*, and sustainability? To address this, I turn first to the historical shifts in how rationality in farming has been defined.

The Rational Farm

In earlier times, a farm was considered "rational" if it had a varied production—as opposed to a specialised one—consisting of cattle, pigs, hens, crops for animal and human consumption, and so on. In fact, around 1950, the average Danish farm had a plot of around 15 hectares with "an average of 2.5 horses, 15 head of cattle, half of them cows, 16 pigs and 120 chickens." (Kærgård and Dalgaard 2014, 9). As Kærgård and Dalgaard write, "A diverse crop production with both grains, beets, and clover grass was also a prerequisite for effective land use through a systematic crop rotation. *"Man*

skal være tro mod ens kone og ens sædskifte" [One must be faithful to one's wife and one's crop rotation], the farmers of the time used to say." (Ibid., 11, my translation). As such, common opinion was that variation in production had to be linked if you were to have a rational business. However, as also illustrated in *Chapter Two*, the introduction of chemical pesticides and new industry-bred crop varieties fit for large-scale production allowed another "rationalisation" to take place.

In contrast to the average farm described by Kærgård and Dalgaard (2014), today's average Danish farm is highly *specialised* with only one or two productions, and residual products have largely been absorbed by the industry, making it superfluous to think in terms of integrating by-products into the production. Over the past 70 years, the versatile farm has been posited as the antithesis to the large-scale 'rational' farm of today, as operating 1000 hectares—instead of 15—in a rational way requires a simplified production. This was essentially the perception among the farmers I encountered during fieldwork. Rational production had to be specialised, and it had to be large-scale.

A typical large-scale conventional farm in Denmark spans approximately 75 hectares, though many exceed this by far. Most full-time farms reach upwards of 175 hectares, and in some instances (even within organic sectors), exceed 1,000 hectares. The farms I conducted fieldwork amongst were placed among the highest figures. Chresten's farm operated around 800 hectares and a large pig production, using technology and precision machinery, monocultures, and was grounded in contract-based relations with the feed and food industries. There were few employees, and most were working inside the piggery with fattening pigs. The farm was structured around rotational cultivation of cereal crops like wheat and barley, as well as rapeseed, with much of the production destined for industrial processing or livestock feed for pigs, rather than direct human consumption. This is not unusual.

It is a mode of farming deeply embedded in Denmark's national agro-industrial model – a model where 80% of all produce is exported, especially pork. In 2024, cereal crops alone occupied over 1.2 million hectares—almost half of the total Danish agricultural area (DST 2024a), the majority of which is used as pig feed. Denmark's globally oriented food economy, built around pork and dairy exports, produces enough food to feed up to 15 million people—more than twice its population (Finansministeriet and Ministeriet for Fødevarer 2021), which is largely made possible through intensive pig production. Such productivity is often viewed as a sign of

success, efficiency, and technological advancement. In a way, we can see this framing as delineating the boundaries of what counts as "proper" professionalism. As Erling, whom we will meet below, suggested, today's large-scale farm increasingly calls for *forretningsfolk* (businessmen) rather than *naturfolk* (nature people).

Nature Men or Business Men?

Erling's farm estate operated roughly 900 hectares cultivated with a mix of grass seeds, fodder cereals for the farm's pigs, energy crops like willow and rapeseed, and potatoes. Compared to most other farms, Erling's farm was an old estate, which in his case meant that it came with "non-productive" areas too: a forest, some meadows, and some very uneven plots of farmland bordering the fjord, classified as so-called Natura2000 areas where cultivation is prohibited. Yet, Erling had managed to receive subsidies for things such as so-called 'urørt skov' (undisturbed forest) where old branches are left to rot in the forest bed, grazing for meat cattle, as well as restoring a drained watercourse. Like he said, "I like to have as many activities as possible".

One might say that utilising the variation on his farm was "rational" to Erling, but that would not be entirely true. In fact, Erling spent a lot of time and effort to make all these activities possible. To most farmers, having so many different production branches would be considered irrational, rather than rational. Yet, it was clearly about more than rationality to Erling—as we saw in Chapter One, Erling tried to find ways to maintain everything from buildings to landscapes. He did so not only to sustain production, but also to sustain employees, landscape diversity, and local community life. We may say that from Erling's perspective, sustainability, to some degree, reflects the idea that diversity is necessary to sustain flourishing (Tsing 2015). I want to suggest that this understanding is linked to the specific material conditions of Erling's farm: the forest, meadow, fjord, etc. These conditions are what Erling must depart from to think about sustainability in a way sensible to his own production.

Yet, as mentioned in Chapter One, Erling considered looking after cattle, making biotope plans, and forestry as "hobby" activities—things that he had time for because his work life was different now that Kasper (Erling's son) had taken over most responsibilities. With time, Erling had come to increasingly appreciate the value in those things, but like he said, "I couldn't see the value when I was younger. Back then, it was more about growing bigger and stronger—just like my son now." When I asked Erling about the role of nature care in sustainable farming, Erling said, "The new

generation of farmers—they are trained differently. They are more *forretningsfolk* [businessmen] than *naturfolk* [nature people]. Therefore, they do not have the same understanding of nature that farmers once had." Erling believed that activities like hunting contributed to gaining an understanding of nature. Hunting regulations also forced farmers to make so-called "biotope-plans". As Erling explained, "The fact that we release all the pheasants we do—if you want to get that permit, you have to meet these and those rules. There are about 20 different measures, like making a habitat for owls, or a hole in the ground, a dike, or planting a hedge with flower stripes."

Yet, according to Erling, many of these measures were so "firkantede" (square) in their structure that farmers too easily risked failing in terms of regulatory compliance, thereby inflicting themselves with fees and economic punishment. As a result, most farmers tended to prefer productive farmland to nature areas. Erling thought the subsidy should be spread more evenly. Like he said, "Why should only the field get subsidies, why can't there be a little left for the edge [i.e., less productive land situated often between or surrounding a field]? I would like to give some of the 100,000 kr. to the edge." According to Erling, it was not the ideal situation. Like he said, "It would be really good for farmers if people did not think we were only interested in spraying and cultivating. Nothing substantial has changed in the field structure we currently have. We don't have a tradition of taking out poor farmland, and we don't get encouraged. Like, very few farmers make a stripe in the middle of their field, but it is those small things that may actually make a difference".

In 2020, agricultural subsidies in Denmark were—and still are—part of the EU's Common Agricultural Policy (CAP), amounting to approximately DKK 7 billion annually, the majority of which came from the EU. Back then, support was primarily divided into two main categories, also known as the "two pillars" (EU 2022): Direct payments on the one hand, and funding for environmental and rural development initiatives on the other. While Danish farmers today must comply with a range of specific environmental conditions (so-called *GLM-krav*) to receive direct payments, this was not the case at the time of fieldwork. So, what Erling referred to is the fact that the majority of agricultural subsidies consisted of direct payments based on productive farmland. This meant that farmers received subsidies in proportion to the amount of land they cultivated productively. This model of area-based support has been shown to create an incentive structure where larger farms with more land receive a disproportionately large share of the subsidies (Pe'er et al. 2020, Kristensen 2003,

Pe'Er et al. 2019a), favouring intensive production and a model in which economic viability depends on scale and conventional cultivation.

The remaining 15–20% of the subsidy, allocated to various environmental and climate schemes, as well as rural development initiatives—including subsidies for organic farming, nature conservation, and innovation—was more challenging to access because it often required national co-financing and additional applications. From Erling's perspective, the incentives for becoming a "nature man" remained relatively weak, as the financial returns from these programmes were often harder to access and lower than the traditional area-based subsidy. Erling was not the only one complaining about bureaucratic constraints, not just for engaging in nature care, but for doing anything, really. His son Kasper, for instance, felt like he was increasingly being "ansat af staten" (employed by the state) in the sense that production demands and financial returns were politically determined through the agricultural subsidy, and by the constant changes in regulation.

From here, the Erling's "activities"—like taking care of grazing cattle by fixing fences, cutting off tree branches, and moving the cattle from one area to another, or making biotope plans, planting flower stripes, and engaging in forestry—were characterised by being demanding manual and bureaucratic labour, and fitted poorly with current ideas about "rational" farming. While Erling considered it sustainable to utilise the diversity of the land, these things were time-consuming, not only in practice, but also in acquiring the necessary knowledge. Like he said, shrugging, when I asked him if Kasper intended to take over the forestry and the cattle, "Probably not. He doesn't have time. It's a lot of work to familiarise yourself with the rules, to apply, and to do it right. So, if you're not actually interested, it is very unlikely to have a future." On the farm, sustainability was instead conveyed by a massive sign (Figure 8) on their piggery, which was in many ways more representative of the farmers I met.



Figure 8: Sign on Kasper's piggery. "Vi går Klimavejen": Frem mod et bæredygtigt landbrug. I samarbejde med Danish Crown.

The sign says, "We go the Climate Way: Towards a sustainable farm with Danish Crown" and signals to an outsider that Kasper's (Erling's son) pig production was on a path to becoming sustainable in partnership with Danish Crown, a Danish farmer-owned cooperative food company and one of the world's largest pork exporters. The sign was part of a campaign for a more "climate-friendly" pig production, and as Kasper explained it, the purpose of the campaign was to "document" each pig's climate footprint. He explained, "So I need to register what we use, how much fodder and heating and so on, and then Danish Crown can use that documentation to compare with other countries and show that our pigs are produced in a sustainable way". As such, documenting resource efficiency is used to market Danish pork as a climate-friendly and sustainable option.

Interestingly, Kasper mentioned he did not need to do anything differently to get the sign on this production facility—it was really only about documenting and using that documentation for global export marketing. This understanding aligns with prevailing narratives about sustainability, which are often linked to what farmers and industry refer to as *climate efficiency* (Landbrug and Fødevarer 2019, Haubjerg, Bendtsen, and Bitsch 2021, Sæhl 2021). This is the idea that sustainability can be achieved by making Danish agricultural products "climate-neutral" (Landbrug &

Fødevarer 2019). Here, sustainability is linked to production units rather than production systems. In the Danish Crown case, for example, sustainability is achieved by optimising the pig (the production unit), instead of reducing production numbers or changing its structure (the production system). This strategy has been coined "sustainable intensification", referring to the processes by which the pig—or crop (Pretty and Bharucha 2018)—is made more resource efficient, often involving some kind of technological intervention. It is also a sustainability that is tied to industry and markets in the sense of being used to brand Danish produce through documentation, while not necessarily changing anything about how products are produced.

Erling and Kasper's different ideas about sustainability illustrate Chresten's point that farmers' own ideas about professionalism and "rational" farming shape how they think about sustainability, too. In Kasper's case, sustainability is envisioned from inside the context of what he thinks it means to be a modern, professional pig farmer in Denmark today. Kasper's efficiency-oriented "climate" focus is very different from Erling's multifunctional sustainability view, encompassing nature, meadows, and biotopes. In that sense, what is deemed rational—productivity-wise—shapes what can be considered as rational in terms of sustainability, too. The following section returns to Chresten and his point about how farmers' sense of professionalism and "rational" farming shape their notions of sustainability. It does so through a juxtaposition of different production forms and farms—the small-scale versus the large-scale—as to illustrate how different production conditions create social, territorial, and imaginative exclusion, such as the impossibility of imagining "a life without fertiliser" or pesticides.

Living a Life without Fertiliser

We were suddenly interrupted by the doorbell. Chresten did not get up immediately, but nodded towards the window in the entry, communicating wordlessly with the person outside. Chresten turned to me and explained, "It's vegetables from Sort Muld. He comes once a week with a vegetable box from their garden, with his rain jacket, knitted sweater, and holes in his pants. He and his wife are *total* organic farmers. No pesticides, no tilling. Like, they *actually* live a life without fertiliser. And I have no problem with that. There's nothing wrong with that." I felt intrigued by Chresten's own astonishment. I wondered what it meant to "*actually* live a life without fertiliser", and since it seemed like an achievement to Chresten, I wondered what made a life without

fertiliser possible. What was it that made it simultaneously possible for some farmers yet impossible for others to live without fertilisers, pesticides, and a plough?

Chresten told me that Sort Muld is a small vegetable production in the northern part of Salling. The production facility—if one can call it that—is a 2-hectare plot of which 1 hectare is utilised as a garden and greenhouse. Peter and Louise, the farmers owning Sort Muld, farm the land using only principles from permaculture and regenerative agriculture. They have only small, manual tools; they do hand-weeding with the help of their children, and they handle all packing, storing, and delivering themselves. Their idea was to keep the soil "levende" (alive), as Chresten told me, through a carefully planned crop rotation that circulates nutrients and permanent soil cover, such as mulch. Chresten thought it was great, hence the weekly delivery. He said, "I think it's excellent that young people like that come with all their ideas", yet he did not see Peter and Louise as colleagues in any professional sense.

Considering all the manual labour, attention, hours, and techniques it required to farm just 1 hectare with vegetables for human consumption, we can begin to understand both Chresten's initial astonishment and what it takes to live a life without fertiliser. Like he said, "Imagine if I had to hand-weed 800 hectares! They can do that because they only have two, but so much work goes into that way of producing. I truly think it's great, but it's not the path for a business like mine". While some may see Peter and Louise's production as an exemplary kind of sustainable, small-scale production, Chresten did not think about it in this way. To him, they did not represent an ideal to strive for but were their own kind. Chresten's primary contact with them was through vegetable delivery. Other than that, he said, "We might discuss how harvest is progressing, weather, and the more general stuff, but most often I feel like we are doing two different things".

Chresten's description of the small-scale producer—with his rain jacket, knitted sweater, and holes in his pants—confirms the sense of doing two "radically different things". Furthermore, the comment that Peter and his wife Louise, "*actually* live a life without fertiliser", reveals how far away imaginations of producing without chemical and industrial inputs are in the world of the large-scale industrial producer. Sustainability must be achieved differently in conventional farming worlds. The small-scale vegetable producers from Sort Muld and Chresten's own large-scale industrial production seem, from this perspective, hardly commensurable.

To say that some things are commensurable is another way of saying that they are capable of being measured by the same standard of values or that they have a common measure (Small 2018). It seemed Chresten's and Peter and Louise's farms were not. I suggest that scale is an important measure for understanding this incommensurability. Tsing (2015, 38-39) describes scalability as "the ability of a project to change scales smoothly without any change in project frames", yet something that takes "a lot of work". In Tsing's conceptual framework, scalability is linked to what she coins "the plantation": a self-contained figure with interchangeable units (labour and crops) derived from the European colonial plantation model that later became inspirational for industrialisation and agricultural modernisation.

In some ways, the "rational" large-scale farm rests on a model similar to Tsing's plantation. Indeed, fodder production is highly scalable—one single variety of grain can thrive on 50 hectares because labour is machine-driven and chemically supported. Industrial crops, such as the starch potato, are also emblematic of such scalable units: bred for standardised outputs, designed for fungibility in global markets, and reliant on inputs that reduce ecological variability. As such, industrial crops allow for large-scale farming to thrive. Compared to the scalability of grain or potatoes, the regeneratively grown vegetable crops at Sort Muld are labour-intensive. These are not easily scalable. Instead, Sort Muld's regenerative approach is deeply *situated* and thrives only in the specificity of the small-scale. This makes their practice, from the vantage point of industrial farming, not just impractical but ontologically incommensurable.

For Chresten and others like him, to "live a life without fertiliser," as he phrased it, is seen as outside the entire infrastructural, economic, and epistemic system that supports large-scale conventional farming. Small-scale, regenerative vegetable productions were "ideas," as he put it, a gesture rather than a system. From his perspective, Chresten's farm and Peter and Louise's farm seem like they are on two completely different development paths—as if they operate according to distinct logics, in different worlds. From here, we can begin to see how.

To better understand how sustainability in large-scale conventional agriculture evolves in relation to the forms of production and the level of professionalism, I will now examine the concrete material conditions and obligations farmers face in their daily lives when producing crops. Certain crops establish specific relationships: with the soil, with the organisms in the field, with the economy, with the farmers' self-

perception—and with weeds. Crops are analytically significant in the context of sustainability, as they reveal attitudes and practices of good farming that underpin and influence conventional ideas of sustainability.

The following two sections examine two distinct types of potatoes: the starch potato and the seed potato, exploring the implications of these crops, contracts, and production obligations for sustainability.

The Needy Crop

In the past—before pesticides and automated machines, I was told—beets shaped the good farmer identity. Chresten said, "We have always had certain crops, once it was the beets. Those who had really nice and clean beets, they were also the skilled farmers. It was a status symbol if you had some clean fields. Today you can "spray yourself out of the problem", some might say." Chresten told me that beets were needy—they placed high demands on soil quality and type, and because not all soil types were suitable, access to beet production was unequal. Those with access to good, proper soil conditions were also those with access to prestige. Beets were vulnerable to weeds and diseases, especially in early growth stages and had to be hand-weeded several times during growth season – but the truly hard work was when the beets had to be harvested by digging them up from the soil: demanding manual and physical labour that was tough on the body, but at the same time displayed skill, a good work ethic, and a strong body. Was this the *faglige stolthed* Chresten thought had been lost? Professionalism has indeed changed, as also sketched above, from being tied to the management of a varied production to being about yields, improving the relation between inputs and outputs, technical skill, and making the right future-oriented decisions. To gain a closer understanding of what *faglighed* means today and its implications for sustainability, I will now turn to a pair of crops that reflect extraordinary skill.

The starch potato (*Solanum tuberosum* ssp. *tuberosum*) occupies a distinctive position within Danish agriculture as a highly specialised and industrialised crop. Yet, it also occupies a paradoxical position in Danish agriculture. It is both an agent of technological and economic modernisation and a source of ecological strain. Its cultivation binds farmers to intensive input regimes, even as it promises stability and market security. In this respect, the starch potato exemplifies the compromises inherent in striving for "sustainability" within an industrialised food system.

Understanding how Danish farmers navigate these compromises requires attention to both material entanglements and institutional structures—to the potato's biological needs, industrial requirements, and the ethical obligations that farmers associate with soil care. Within this space of tension, we find the contours of an agricultural future that remains very much contested.

In 2024, 65,447 hectares were cultivated with potatoes. This represents an increase of nearly 60% since 2004—an increase which, according to Statistics Denmark, is "primarily due to a rise in *industrikartofler* [industrial potatoes], where the cultivated area has more than doubled." (DST 2024b). So-called "industrikartofler" in this context refer to potatoes used for starch or power utilised in industrial food manufacturing, textiles, paper, glue, and other applications. The figures paint a striking picture: In 2024, 50,154 hectares were used for industrial potatoes, while only 5,648 hectares were allocated for table potatoes. This marks a remarkable shift from 20 years earlier, when numbers were nearly equal. While the increase in industrial potatoes is driven by a rising demand for starch for industrial produce, especially as a protein substitute in vegan products, Danish farmers would likely not be as invested were it not for grower-owned cooperatives like KMC, serving as key intermediaries between farmers and the agro-industrial demand for plant-based starch.

KMC is the largest potato company in Denmark, specialised in seed potatoes and starch potatoes for industrial manufacturing. 94% of their products are exported to 86 countries inside and outside of Europe. KMC was founded in 1933, when the Danish state decided that Danish farmers should produce potato starch to meet the country's needs. This led to the formation of KMC (then "Kartoffelmelcentralen"), which was tasked with selling the combined production of seven Danish potato starch factories that had been granted a concession by the Danish state. In 1988, KMC's development department was established to improve existing products and, just as importantly, develop new ones. Through the 1990s, KMC focused on products for the food industry, which proved to open the doors to what they call on their website, "the land of opportunity." Among other things, the new focus resulted in KMC establishing a new factory in 2003 for the production of granules and flakes. From initially selling exclusively potato starch, KMC now has more than 60 different potato-based products on the shelves, and has developed a broad portfolio of patented potato-based

products—from starches for industrial food processing to protein substitutes for vegan markets.

Starch potatoes are—as the name indicates—grown solely for the production of starch content. The starch potato has been selectively bred for high amylopectin content, making it particularly suited to industrial starch extraction. However, this potential can only be realised under carefully managed conditions: sandy, well-drained soils, steady water supply, large quantities of nitrogen and potassium, and a very long growing season compared to other crops. And to enable the very long growing season, the potato must be protected from fungal diseases, as it is highly susceptible to diseases such as late blight (*Phytophthora infestans*), necessitating repeated fungicide applications. In fact, the long growing season needed for optimal starch development, combined with the potato's vulnerability to fungal attacks, is precisely what makes starch potatoes the most sprayed crop in Denmark. In 2022, fields with starch potatoes were sprayed on average 18.45 times per season (Miljøstyrelsen 2022, 72). As such, starch potatoes come with chemical dependency. As the agency states, "A change in the area cultivated with starch potatoes compared to seed potatoes is expected to affect the overall use of pesticides in the main potato crop, as starch potatoes are generally the type of potatoes that require the highest use of pesticides (kg/ha)" (43). Furthermore, KMC advises farmers to spray not only against fungi, but also weeds, as "Experiments with untreated joints have repeatedly shown that good weed control gives 100-200 hkg/ha in additional yield!" (KMC). But apart from chemical dependencies, successful starch potato growing also depends on well-prepared soil.

As KMC writes in their growing guide for starch potatoes, "Potatoes love loose soil, preferably 20-25 cm deep, by a thorough ploughing or several harrowings." However, tillage has been shown to disrupt nutrient cycling as it breaks down soil structure, reduces soil organic matter (SOM), and negatively impacts the overall soil health (Tully and Ryals 2017). Furthermore, over-reliance on synthetic fertilisers depletes soil health by favouring the growth of certain microorganisms over others, thereby reducing microbial diversity and organic matter decomposition, leading to soil degradation (Kraut-Cohen et al. 2020). Thus, the production of potatoes for industrial manufacturing involves specific chemical and soil disturbance regimes. When industrial starch is the final aim, it becomes hardly imaginable to "live a life" without agrochemicals, fertilisers, or deep tillage. Thus, the needs of the starch potato—the

long growing season, the porous soil, the clean field bed—condition how far sustainable potato production can go.

Looking at KMC's own sustainability report provides a good example of these limits. In their sustainability report, KMC states that the potato holds the potential to "unlock" a sustainable future (KMC 2023/24). But the potatoes do not "unluck" a future without chemicals, but rather a resource-efficient future based on climate efficiency. As they write, "The potato itself has a low climate footprint and delivers many calories per hectare. When we consider this in the context of a future where the demand for plant-based foods and food ingredients with a low climate footprint is only increasing, our product range certainly has a role to play. KMC and our cooperative members are part of the food solutions of the future, and we are proud of that." (12). Part of their ambition is to replace animal protein with potato protein in fodder and other manufactured products.

On paper, their ambitions do not stop there. Instead, the goal is also to incorporate sustainability into plant protection. As they write, "We aim to minimise the use of plant protection as much as possible through advising the growers. Depending on the weather, the goal is to reduce it by 10-30% each year." However, as of 2023/2024, the status of the goal was unchanged, as the year had been wet, "and based on the weather conditions, as measured by local weather stations, we have not recommended a reduction in the use of pesticides." Making one's sustainability goals depend on the weather is hardly a commitment. However, as they write, "We are simultaneously working on developing more resistant potatoes, which will help further reduce the use of pesticides." (15). But before these new varieties have been developed, the starch potatoes remain a potato with chemical dependencies and needy of intensive tillage, allowing only specific forms of sustainability to take root—reflecting that under 1% of starch potatoes in Denmark are farmed organically (DST 2024b). I will now turn to Karsten, a dedicated potato producer, to situate central concerns about potato production in his everyday life. Also, to further understand why living a life without industrial tools (fertilisers, pesticides, and deep tillage) seems so unimaginable from the perspective of some farmers' sense of professionalism.

The Seed Potato Farmer

Prestigious, skill-demanding, risk-laden, and high value. Karsten was a 'part-time' organic practitioner and 'part-time' conventional practitioner. Being 'part-time' meant

that he cultivated his fields organically in his crop rotation, so *in between* his main crops. Karsten's main crop was the potato, both starch and seed. While starch potatoes, as we saw above, are heavily dependent on chemicals, seed potatoes place particularly high demands on the farmer. When it came to seed potato growing, Karsten had to be—and was—uncompromising in his principles.

Karsten sometimes compared himself to other farmers, who he describes as "just growing grains for pigs". According to Karsten, they did not need to care for cleanliness in the same way. While farmers growing grains "just" for pigs could practice no till, not tilling was a practical impossibility according to Karsten. He needed the plough more than anything, as his potatoes had to be seeded in a 30 cm depth.

It was clear from his comparison that he understood grain production in a hierarchical relationship with "high value" crops like potatoes and seeds, where fodder was "less needy" of attention. Because, like he said, "The pigs don't care". KMC, on the other hand, did care, Danespo cared, and so did the other "high value" seed companies like Vestjysk Andel. As such, specialty crops like potatoes—because they are contract-based, need specialised equipment and great investments to be grown—are seen as more vulnerable, giving farmers a higher sense of obligation to protect them from disease and provide the most optimal conditions for success. They are, as Karsten phrased it, "high value, high risk" crops. The higher the value, the higher the risk—essentially shaping sustainability as conditioned by these risks.

Karsten exported his seed potatoes to Egypt, Morocco, the Mediterranean region, and Portugal, to countries that, according to Karsten, were themselves unable to produce seed potatoes for their potato production. As he explained to me, "Those countries don't have a proper climate for seed potatoes, not as we have in northern Europe". More importantly, he told me, "The farmers don't have the same farming conduct as we do in the North. They allow all kinds of crap to enter the field, and you simply can't allow that in a potato production". Karsten was talking about weeds and fungi—the two most problematic components in his potato production, followed by the weather and the market prices. And compared to the non-European countries, Karsten saw Danish farmers, including himself, as superior in controlling this "crap"—something he was proud of. Karsten did not allow what he called "crap" in his fields.

Compared to starch potatoes, seed potatoes were demanding in a way that required even more specialised knowledge, equipment, and fungal control. Karsten explained that a minimum of 6 years had to pass between growing potatoes in a field

to avoid propagation of pests, as some pests stay in the soil for several years and may transfer to the new potato tubers. Further, the field had to be "deep cleansed" beforehand, killing remaining weeds or disease residues agrochemically. The soil needed meticulous tilling to create the right bedding. Then there was the timing: Spraying at the right time was crucial to avoid propagation of late blight, careful harvesting was needed to prevent damaging the potato tubes, and ideal dry and temperate storing conditions were needed to prevent fungal outbreaks in storage. Keeping the seed potatoes free from viruses and fungi was really Karsten's primary concern.

Late blight (LB) is a disease caused by the fungus-like microorganism *Phytophthora infestans*. The spores travel by wind, and if the leaves are wet, the spores can germinate and enter the leaves. The disease spreads rapidly and can kill a crop entirely within a few weeks, reducing yield by up to 80% (Haverkort et al. 2009, 253). To illustrate, LB was a major culprit in the potato famines of 1840s Europe, most vividly exemplified by the devastating Great Famine from 1845 to 1852 in Ireland, where no less than one million people died from starvation (Bourke 1964). LB infected potato crops throughout Europe during the 1840s, causing an additional 100,000 deaths outside Ireland and influencing much of the unrest in the widespread European Revolutions of 1848, and completely changed the societal landscape (Zadoks 2008). As the disease overwinters and can multiply in the subsequent potato cultivars, the threat of LB can partly be countered by using high-quality, certified seed potatoes exported from different regions (Runno-Paurson et al. 2013, 249), such as the ones Karsten was producing. At the time of fieldwork, breeding potato cultivars with resistance to LB had so far had unsuccessful results, and talking to a plant pathologist, she told me that there is no prevention for LB outbreaks, "only control." For instance, applying fungicides frequently throughout the growing season, reminding us again of the potato as one of the most sprayed crops in Denmark (Miljøstyrelsen 2022).

According to Karsten, however, the high application of fungicides was also linked to establishment costs. Because potatoes needed much effort—cleaning, tillage, packing, and storage—they simply *had* to perform. But performing is also about one's professional image. Karsten told me that farmers who wanted to become "certified" seed producers needed first to apply and then demonstrate their worth by complying with strict growing regulations. If they did not comply, two things could happen. Their produce would be downgraded or discarded as animal feed, or they could lose their contract. As Karsten explained, "We don't get as much for an A potato as we do for E potatoes, so we want to sell them as E potatoes." To sell them as E-potatoes, farmers like Karsten had to ensure less than 0,5% disease in a field. This is also what made him so reliant on Reglone. Like he said, "There is no way we can get around using Reglone, if they don't come up with an alternative. It would be headless to produce seed potatoes without it. Just think about all the fuel and the extra soil compaction from chopping the leaves manually. Is that sustainable? I don't believe so. There's no way. Without Reglone, I'm done with potatoes."

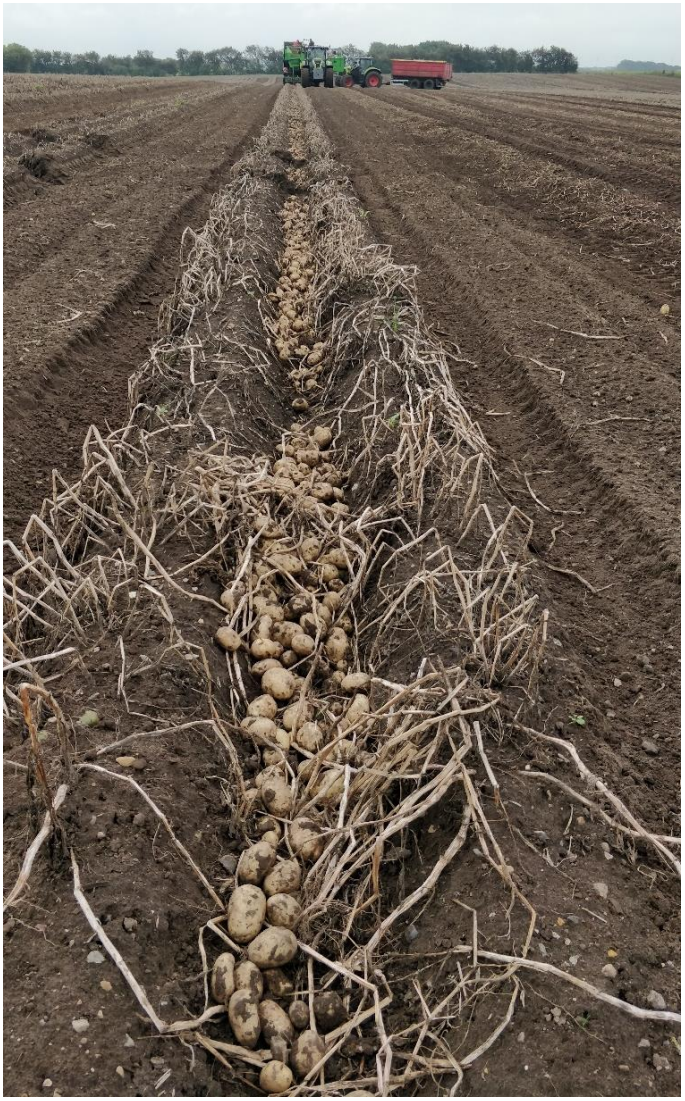


Figure 9: Potato field prepared to take up potatoes. The field has been treated with a desiccant (commercial name: Reglone, chemical substance: diquat bromide) prior to harvest.

Reglone has been a more or less constant matter of concern to potato farmers—and the entire potato industry—due to regulatory changes that limit or prohibit entirely their usage with reference to their potential harmful effects on human health, terrestrial and aquatic environments (Høyer 2020, Ritzau 2020). For many years, the ongoing dispensations for using the product—enabled mainly by industry-university

collaborations (Bredsdorff 2021)—were thus seen by growers like Karsten as a great conquest. As he told me, “There are others out there who would like to buy in on a contract, so keeping it is not granted. To do that, you must be among the best”. Thus, Karsten’s resistance to further restrictions on chemicals ties into economic concerns, professional image, and industrial obligations that he can only fulfil by means of agrochemical control. This brings us to a broader point: pesticide use, rather than being a matter of ignorance or disregard, often becomes a *moral obligation* within these systems.

One of the structural components for the strict disease thresholds was export. As Karsten explained, “When you have to transport them far for export, you need the cleanest potatoes. All countries, such as Egypt, Lebanon, Jordan, and Saudi Arabia, have their own regulations for what can be imported. Some countries say, “We only want E potatoes, A is a no-go”. If that is the case, it places some pretty big restrictions on what can be done. Worst case, there are too many A potatoes among Danish producers, and then we’re talking about a lot of money. But that’s “the game”– and that’s just how it is.” If there were too many A potatoes, Karsten had the opportunity to sell them as starch potatoes—a clear downgrade, in his opinion, from the prestige of seed potatoes.

At the time of field work, two of Karstens' fields had been registered with more disease than allowed, meaning that they were probably to be sold as class A. In a third field, Karsten had found a lot of so-called ‘spildkartofler’—potatoes from tubers of another variety that had not been completely removed after harvest and thus resided in the ground. Karsten told me that even though it had been six years since the field had been sown with potatoes, the leftover tubers had somehow survived and were now polluting and propagating diseases to the new lot. Karsten ultimately ended up removing all the tubers, “deep-cleansing” the field chemically and mechanically. The total demolition of Karsten’s field reflects how the combination of crop needs and market demands together shapes professionalism as a commitment to notice, detect, monitor, and manage potential threats to the cleanliness of seed.

Farm Viability: Professionalism or the Loss of Pride?

While organic starch or seed potato production is technically possible, it is generally considered economically unviable due to disease pressure and low yields, as also expressed by the CEO of KMC, Peter Burgaard, in a news article published by

Økologisk Nu (Bregendahl 2024). In the feature, the CEO states, "We must acknowledge that, after many years of trials, we have not been able to create a profitable market for organic potato starch, which is why we abandoned the effort three to four years ago." In contrast to organic potatoes, conventional industrial potatoes can stay in the ground and continue growing well into October and November, because blight can be controlled with chemicals. As they write, "It is precisely the possibility of treating the potatoes with pesticides that makes a big difference in yields between organic and conventional production—and in the potatoes' journey from the soil to Danish dinner tables. And in which dishes they can be served." Consequently, most growers remain embedded in conventional systems where sustainability is operationalised and envisioned primarily in terms of resource efficiency, as evident in the KMC sustainability report (KMC 2023/24).

Crops reveal the specific circumstances under which sustainability is made emergent—as in the case of the potato, sustainability emerges both as an inherent quality of the potato (as climate-friendly), but also as a constraint (as environmentally unfriendly) due to its vulnerability to disease, soil disturbance, and dependence on agrochemicals. In her book *Matters of Care* (2017) philosopher Maria Puig de la Bellacasa describes how the logic of productivity compromises long-term, ecological, and reciprocal relationships of care to the land by reducing care to control: "Productionism", she writes, "not only reduces what counts as care (…) but also inhibits the possibility of developing other relations of care that fall out of its constricted targets. It reduces care from a coconstructed interdependent relation into mere control of the object of care." (186).

In the context of seed or starch potatoes, care becomes a matter of controlling inputs, complying with phytosanitary standards, and achieving export-grade quality—not of cultivating reciprocal ecological relationships with the land. From the perspective of the seed or starch potato, regenerative and organic practices are ultimately calculated as economic risks, and pesticide use is a necessity to ensure consistent yields and quality. When farmers are required to perform consistently high and clean yields, the only meaningful care of the crop becomes mechanical or chemical, and it becomes challenging for farmers to see themselves as "nature men". What counts as sustainability is here redefined by institutional, market-driven, and technoscientific regimes. This means that pesticide use and soil cultivation, while affecting both earthworms and mites, and creating stress reactions in the microbial

biomass (Petersen et al. 2016, Kraut-Cohen et al. 2020), are seen as outside the professional demands of a rational and viable starch production.

Yet, as mentioned by Chresten at the beginning of this chapter, he felt that most conventional farmers had lost their confidence, and it was difficult to change this because of the expectations and ideals shaping production. He said, "When I look at the research, for example on *Svin* (i.e., farmers magazine on pig production), it's always about the most pigs per sow per year, how I can make the biggest growth contribution, how I get my PVO up as quickly as possible. Then, of course, that's resource efficient, but no one ever tests how the meat tastes. That doesn't happen. The only thing we breed for is lean meat, that's what people want. When you buy pork today, you buy "a" pig. And it's very standardised, it's the same pig. And when you buy chicken, you get a chicken, and it actually tastes pretty much the same every time. There's not that much difference. We need to learn to make something different."

According to Chresten, the conventional farmers had lost their pride due to standardised, scalable bulk produce like his own. He mentioned the campaign by Danish Crown that rewarded farmers for their resource-efficient production, yet saw it as another driver for standardised production. In this regard, Chresten saw sustainability not as something positive in itself, but as a potential to change things. Chresten's primary concern was to make sure that sustainability did not mean yet another standardisation. He wanted sustainability to become an invitation for farmers to begin producing niche, high-quality produce instead of bulk, thereby bringing back *faglig stolthed* to the farmers, their workers, and their local communities.

Yet, alongside his ambitions for niche produce, Chresten knew what was good for his wallet. He said, "Today, I have to produce some cheap, good feed for my pigs. And then I have to produce some grass seed and some spinach seed, which I'm measured on. I get paid according to the quality, cleanliness, and quantity I deliver. And that's how it is in our rapeseed too. So that's why I enjoy a field that's nice and clean. But let's say there were a few weeds in my grain because I did not spray against weeds, and I got paid DKK 1,5 more for my pigs per kg because it was sustainable, then I would enjoy that field too. But what we enjoy is that we make the income we need to pay our bills and run our farm. It's not certain that it's the right thing to do. But that's the situation I'm in today." Chresten's comment illustrates how care becomes "reduced" (Puig de la Bellacasa 2017, 186) – not due to a lack of intention, but due to structural limitations. From this perspective, it becomes necessary to think about environmental

dimensions (soil health, microbial health, biodiversity) in sustainability as less a choice or active neglect than a practice that requires specific compositions in scale and crop choice.

Sustainability and Scale

Escobar (2017) suggests that all concepts entail exclusions—whether social, territorial, or imaginative. From this perspective, the very definition of sustainability should be what we should pay attention to—reworking conceptual boundaries to rework the boundaries of real life. Farmers' various ways of engaging and applying the concept of sustainability in relation to their own production suggest something else: namely, that we need to understand instead the material and moral fabric of the farms that make specific interpretations desirable. These material conditions not only determine production choices but also shape the very figure of the good, *ordentlige* and *faglige* farmer.

This chapter has shown that professionalism matters profoundly to sustainability, but always through the lens of material conditions and institutional obligations. The dominant model of "resource-efficient" sustainability proves viable only within large-scale industrial farms. In this sense, sustainability itself becomes conditioned by scale. The pertinent question we are left with seems to be not only whether small-scale models can scale up, but whether dominant notions of sustainability can, in fact, scale down, or if they become predicated on the erasure of diverse, unscalable forms of production and care.

Thus, we begin to see the contours of the concept of *industrious sustainability*. This concept describes a particular vision of sustainability emerging in conventional Danish agriculture—one that is premised on resource efficiency, calculative rationality, and technologically mediated forms of environmental responsibility as viable to the conventional large-scale farmer. This form of sustainability does not stand in opposition to industrial farming but is instead *constituted* through its very economic logics and embodied in the moral figure of the good farmer. To further explore the role of viability and professionalism in shaping sustainability, the following chapter explores lay risk assessment in the context of crop management.

Chapter Four
The Moral Economy of Agronomic Risk



Figure 10: ERFA meeting, scrutinising a susceptible rape seed leaf to identify if the leaf has been infected by light leaf spot. One farmer is using a magnifier to notice.

“What has Henrik done to his rapeseed?”

The weather was hot. On June 23, 2022, I joined the ERFA group, *Verdens Ældste*, or The World’s Oldest. The group had been formed in the earliest days of ERFA groups, back when it was possible to apply for an ‘ERFA-subsidy’ to cover the costs of a professional farm advisor. Today, farmers have to pay to be part of a group, meaning that some farmers, like Karsten, increasingly demand to gain something from participation. As he said, he needed it to be “something more than a social coffee gathering.” However, most farmers enjoyed the professional community gatherings. From my own experience, too, ERFA gatherings occasion much more than drinking coffee: they socially anchor the good farmer.

Today we gathered at a farm in the northern part of Mors, owned by Gerd. The temperature had slowly crawled up, reaching about 30 degrees, as the usual choreography played out: a row of cars filling up one by one, a circle of silence, farmers, an advisor, and me. Being in late June, all the crops were well established, most treatments were over by now, so the tour was more about assessing status and getting an idea of where things were headed, and of course, taking the proper measures if necessary. It all started how it usually started, and at the end of the day, my notebook took shape as follows:

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1. Winter wheat (variety: Kvium)
2. Rapeseed (variety: Swedish model): sown 10/8. Treated with
Pictor Active, Propulse and Kerb in the spring.
3. Spring barley (variety: Fairway): 150kg seed with 8kg grass
spread. Primus XL, Mangan (nutrient), Propulse. Late manure.
Note: Has a lot of scab at the bottom. Sprayed 2 days ago
with Comet (fungicide), Prosaro (fungicide) and Cerone
(growth regulation)
4. Winter barley (variety: Median): Ryegrass at the bottom
from an old field. There are a lot of weeds: Gold Hejre.
5. Oat (variety: Heerup): Lice in the field. Can be controlled
with Folicur/Orius Max.
6. Should have been a rye field, but we didn’t get any
further...
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We were soon distributed in three cars, headed on a tour around Gerd’s farm. I was in the fortunate position of co-driving with Carl, who always seemed to speak his mind without hesitation. Besides being a farmer, Carl was also in charge of the plant section

in one of the local mills, and it somehow made him feel entitled to comment particularly harshly on the cleanliness of the fields we drove by. Carl sat in the front seat, Flemming was driving, and I was sitting in the back. As we passed a rapeseed field, Carl asked Flemming to slow down before eventually making a full stop. Apparently, the field demanded their full attention, and I clearly sensed a great puzzlement over "what on earth" the farmer owning the field had been doing to his rapeseed at this time in the season. Being in mid-June, most treatments in rapeseed should be over. Clearly, someone had been driving just now, which led to great speculation about what and why. Carl seemed particularly concerned about the situation, commenting that "there is no damn way we can go home today without knowing what he has been out with", meaning what form of compound the rapeseed had been treated with—if any. As no immediate relief seemed to result from their speculations, Carl decided to call the mill. Apparently, they both knew the farmer owning the land, Henrik, so Carl called to ask if Henrik had been by recently to pick up some kind of agrochemical compound—or some other "hocus pocus". However, no clear answer was provided. But Carl continued unabated to repeat, "No, but we simply cannot go home today without knowing what he has been driving with." As we arrived at our field destination, Carl involved the remaining group. Still, not even Per, the farm advisor, could provide any good suggestions, as he explained it was "Far too late in the season for some of the planned sprayings," like the spraying against light leaf spot. Carl ended up concluding that it had to be some "hocus pocus". Astounded by the whole situation, I felt at once amazed and slightly concerned about the consistent effort to inspect other farmers' field practices to the extent of almost systematically investigating other farmers' practices. The critical inspection of the rapeseed field eventually stopped, replaced by a close field inspection of the fields we were now standing on.

The first field was sown with Ryegrass, a grass seed. During spring, the Ryegrass had been treated with six different compounds, but despite the efforts, the field edge was sprouting with Italian Ryegrass and Cocksfoot (or Cat's Grass). Both Italian Ryegrass and Cocksfoot are considered problematic weeds: Italian Ryegrass has developed resistance to several herbicides, and Cocksfoot is often framed as an "aggressive" perennial grass as it grows in any soil, is drought resistant, and can completely over-run some grasslands. While Per was generally positive about grass seed as a 'good crop' for soil health because it left a lot of organic material in the field,

he also contemplated how seed grass is "controlled very strictly" by the seed companies, who are not reluctant to cancel a contract if the area becomes too small, or if the quality declines one year. The strict control and requirements of seeds were quickly confirmed by Carl, who commented loudly on the appearance of weeds in the grass seed field. Carl, who now seemed to take on the authoritative position as product manager, commented loudly on the areas, stating that "It's not going to work. It's expensive, both for the farmer and the mill. It easily costs 30t yield/ha."

Rendering Risk Visible

This chapter examines agronomic risk management as a key site where industrious sustainability is both justified and enacted as part of a broader moral economy of conventional farming.

In farming, weeds, pests, and diseases are calculated as risks to agricultural resource efficiency and farmer income (Johnson 2013, Oerke et al. 2012, Schuster 2021, Jussaume, Dentzman, and Owen 2019, Kudsk and Streibig 2003). Yet, at the same time, they do not emerge as risks in and of themselves. Instead, they are rendered risky—not only in economic terms, but in social/moral terms too—through social experience, situated perception, narration, and management. In contemporary Danish agriculture, such risks are co-produced by a heterogeneous assemblage of actors: farmers, consultants, chemicals, seeds, legislation, weather patterns, algorithms, fungi, and stories. Following van Loon and Adam (2000, 2-3), risks are constructed—future-oriented threats that *might* happen. In that sense, risk is not a reflection of objective dangers, but a speculative construction that shapes present actions. In the fields, these "might be" events are managed not just with chemicals, but through diagnostic tools, sensor-based warnings, embodied know-how, and shared speculation. As such, agricultural risk is not simply perceived as a fact out there to be known, but performed and experienced, as the example with Henrik's rapeseed illustrates. This chapter explores how risk in the context of weeds, pests and crop diseases is perceived, performed and experienced by farmers, farm advisors and the agrochemical farming industry—and importantly, how it is sought to be controlled.

Drawing on the notion of "empirical ontology" as well as political ecology (Law and Lien 2013, 356, Argüelles and March 2022, Harlan and deWet 1965), I consider crop risks as shaped in practice: in field trials, observations, warning systems, sponsored newsletters, and consultant recommendations, particular weeds and

diseases become legible—and necessarily actionable—as threats. Some entities, such as Septoria or Italian ryegrass, are hyper-visible, frequently cited in meetings and marketing materials. Visibility, in this sense, is not only linked to a reality "out there" but produced through regimes of attention and intervention.

Importantly, the chapter foregrounds the unstable ontological status of what a weed, pest, and disease is. As we shall see, a common perception of Italian ryegrass, Cabbage seed weevils, and light leaf spot—to mention a few—is that they do not behave predictably. They mutate, travel, resist, and spread in uneven ways. As one consultant put it, "They are always a bit ahead of us." Yet, following Law and Lien (2013), the determination of weeds, pests, and diseases as posing a particular risk is ontologically "slippery". Drawing on feminist STS theory, they argue that relations between humans and other species are what generate the (multiple) possibilities of what some entity—in their case, salmon—is (372). I draw on this idea of *slippery* to explore how weeds, diseases, and pests come to be risky, cunning, unpredictable, and indeed, slippery.

The first part of the chapter focuses on the empirical ontology of agronomic risks, including weeds, pests, and fungal diseases. The second part explores the moral economy of these agronomic risks, drawing on social theory of speculation and gossip (Gluckman 1963, Paine 1967, Dilley and Kirsh 2015). Work on speculation and gossip suggests that informal knowledge exchanges are not merely idle talk but central mechanisms through which communities negotiate uncertainty, assign responsibility, and maintain moral order. From this perspective, the management of agronomic risk becomes a central terrain for exploring the uncertainties of farming today and how these uncertainties underpin negotiations of sustainability. The chapter draws on a series of field visits from ERFA group meetings, in which small groups of farmers and consultants walked through fields, inspected crops, and negotiated appropriate courses of action and management in relation to pests, weeds, and diseases. I see these so-called "markvandringer" (field expeditions/walks) as facilitating more than the transfer of knowledge about an objective reality, but as ontological and moral laboratories (Mattingly 2014, Law and Lien 2013). That is, social spaces in which knowledge and morality are produced in practice. Essentially, this chapter argues that the good sustainable farmer is negotiated in the context of agronomic risks.

Noticing: Slipperiness and Professional Skill

I was often astounded by the farmers' ability to notice, identify, and localise weeds in the fields, even from far away distances. On many occasions, I had been driving around with farmers. From their position inside a car, they were able to point to specific fields and call out their 'cleanliness' or lack of such, judging whether or not the farmer in question had done a good job in ploughing, sowing, spraying, and "keeping it clean". As we shall see, field inspections can be understood as performances negotiating moral and professional legitimacy—one's "license to produce". Here, being able to notice agronomic risks is considered central to professionalism. Before delving into the specificities of how farmers notice, know, and engage with agronomic risk, I briefly differentiate between weeds, insects, and diseases.

Weeds, as vividly visual entities, are easily recognisable, and identifying the specific species only requires a quick glance in the "Ukrudtsnøgle", or Weed Key, pamphlet handed out to the farmers at the beginning of the season. Here, it is relatively easy to see if the root of the grass is red, purple, or green, to see the threshold for treatment, and from that, determine the proper treatment. Insects are also relatively tangible, at least compared to fungi, although not as easily detectable as weeds. Insects, like the rapeseed pollen beetle, will move around in the field, and as the advisors often jokingly said, they usually disappear even before getting into the field. Some insect species, like rape pollen beetles, are easily detected as their movements are somewhat uniform, while others, like the cabbage seed weevil, are more unpredictable. Diseases and fungi are undoubtedly the most slippery kind, and were also treated as such, mainly due to their imperceptibility. Besides that, they are often airborne or spread by raindrops and humidity, and late blight, for instance, may stay in even dead plant material like old potato tubers or reside in the soil. Diseases and fungi may survive and propagate in new plant material, causing farmers to see them as exceptionally slippery forms of agronomic risk.

Knowing Fungi

Per asked the group of farmers, "Does it pay off to spray against fungi?". Per was the farm advisor and head of the ERFA group I was following. The answer to the question came from Per himself as he replied, "Generally, we say it does."

In the years leading up to my fieldwork, identifying and spraying against fungal diseases had become increasingly routine and increasingly profitable for farmers. As

one of the farmers said, reiterating after an often-repeated saying of Per's, "Spraying against fungi pays for the spray, and the rest is profit". So, it was about learning how to notice fungal attacks in time for treatment. In the context of pathogenic fungi, *Septoria* was of course not the only concern, but also *light leaf spot*—a fungal disease particularly harmful to rapeseed. Yet I was told that fungal diseases were notoriously difficult to notice, something I got to experience during a field inspection looking for the white sheens characteristic of *light leaf spot*. Economic reasoning and moral reasoning here fuse: profitability is invoked as a justification, but underlying it is also the performance of being a responsible, attentive farmer who does not let fungi 'slip past' unnoticed.

Per walked with firm steps straight into a bright yellow rapeseed field, where the rapeseed plants were almost growing above his head. He stopped for a moment before he grabbed one of the plants with a quick snap and pulled so hard that the roots were torn free from the soil, and now hung dangling in the air with the soil sprinkled around them. The rapeseed stalk was split at the root—a sign of rapid growth. On the one hand, the stretch marks seemed clear evidence that the plant could not keep up the pace of growth induced by fertiliser and genetic engineering. Yet, from Per's perspective, the concern with the split stem was not how it was grown, but rather that it was split, making the rapeseed vulnerable by creating an entry point for insects and fungal diseases to enter the plant.

"Try to look here for a moment", he said while holding one of the leaves between his hands. The six farmers crowded around Per, and I tried to squeeze in from the side so I could catch a glimpse of the leaf. "If you look really closely, you can see that the leaf has a white, almost greyish sheen". The farmers grumbled. I found a gap between Flemming and Jørn, and with a bit of goodwill, I could see the whitish sheen on the stem. "That's a farmer's nightmare," Flemming said, "and it has only become worse as they take away our chemistry," he added. I could sense the dissatisfaction from the surrounding farmers, but had difficulty determining whether it was directed at the white spots or at the environmentalists who, according to them, were directly responsible for "reasonless" chemical restrictions. This difficulty exemplifies how risk is co-produced: ambiguity in the leaf itself requires expert mediation (Per, tests), demonstrating that risk is performed across human and non-human actors (Law and Lien 2013) rather than discovered as a fact 'out there'.

As it turned out, the fungal diseases *were* notoriously difficult to notice. The white spots on the leaves were too easily confused with damage from driving in the fields, so even if they did find the characteristic spots, they could not be sure that it was, in fact, the right disease. But expertise like Per's made the disease increasingly visible, tangible, and manageable. Per told them to pick a couple of the suspected leaves, place them in a sealed plastic bag, and find a warm spot, such as the window shelf, and wait for a day or two to see if the white markings had spread or not. If the spots had developed and spread, it was most likely due to a fungal infection with light leaf spot, triggering a fungicide treatment. Per had told me that spraying against fungi was essentially "warning-based", which meant that national field trials would usually determine when farmers were advised to spray. This could sometimes be a disadvantage, resulting in overapplication, he told me, as farmers "sometimes spray without knowing if they actually have a problem". The challenge was that the fungal diseases tended to slip from one's sight before identification was certain, due to having a long latency period and an uncertain infection pattern.

As noted by Per, weather conditions could severely affect the spread of fungi, such as rainfall and humidity, which increased the spread exponentially without the ability to see where or how much. Therefore, Per's task was to help farmers detect attacks in the field so they would not spray solely based on warning systems. However, even for Per, recognising fungal attacks could be difficult. Advising farmers to spray only after seeing the fungi was challenging because, in many cases, spraying truly "paid off." Additionally, Per's role was ambiguous because he was also responsible for supporting farmers in making responsible economic decisions. If wheat or rapeseed had a reasonable market price, it was hard to find good reasons for the farmers not to spray.

While the above articulations of uncertainty and agronomic risk are primarily linked to the biological traits of fungi, Flemming's comment about chemical restrictions highlights another aspect of uncertainty and vulnerability that goes beyond biology into the realm of politics. Here, slipperiness becomes politicised: fungi seem uncontrollable not only because of their biology but also because regulation limits the available tools—risks shift from ecological to political spheres.

Before returning to Flemming and what we may understand as the structural uncertainties underpinning the moral economy of agronomic risk management, the next section will briefly describe how chemical producers render the problem of fungal

slipperiness actionable and solvable. Here, agronomic risks, such as Septoria, are co-produced through warning systems and marketing materials, which render them legible as risky "problems" to farmers' professional identity. I build on Argüelles and March (2022), who argue that agro-industrial weeds are entangled with and are central to the political economy of industrial agriculture rather than 'outside' its domain, as something that disturbs the otherwise neat orderliness of modern production (55). Yet, I seek to expand this line of thinking by adding that weeds, pests, and crop diseases are not only central to the political economy but also to the moral economy of farming. Here, practices of managing, noticing, and killing are central to the ongoing construction of the good, responsible, and even the "sustainable" farmer.

Narrating Proliferation and Control

It was warm and humid, a few flies were swarming around despite the dedicated attempt to keep them out, and a sweet and familiar smell of freshly cut grass mixed with the characteristic odour of piggeries filled the atmosphere in the living room. Store-bought brownie bites, black coffee in pots, cold beer, and a pack of sodas were distributed on the table, and a few seconds passed by before the first beer cap popped, and the next ones followed in a quick stream. We were finally seated, and I guessed that I was not the only one who was thirsty and a bit roasted. I grabbed an orange soda, so too did the farming counsellor—we were driving. Thinking about it, I suppose that everyone except the host was in fact driving. Yet, it did not seem to matter this afternoon. The air was too thick, the sun too warm, and we had just finished three hours in the fields looking at spring barley, rape seed, grass seed, winter wheat, and another winter wheat.

It was the farmers' very last ERFA meeting before harvest, and until harvest, it was about ensuring that the crops had what they needed and praying for favourable weather conditions. The growing season—or spraying season, depending on who you ask—was nearly over, but a few attention points were still needed. Exhausted and fairly disengaged, Per handed out the mandatory appendices filled with this week's special "attention points"; The growth stadium of particular crops, and what pests the farmers had to be particularly wary of in this specific stadium. This week, *Septoria* was a significant attention point. *Septoria* is a fungal disease specifically targeting wheat. Besides being a topic throughout my fieldwork period, it was particularly pronounced among farmers and advisors in 2021 because a new fungicide, Balaya—produced by

global chemical producer BASF—had been released to the Danish market. On the chemical producer BASF's website, the agrochemical Balaya is described as a "Broad-spectrum fungicide for all cereals with both curative, preventive and long-term effects. Balaya has a particularly good effect against *Septoria*, where it also affects resistant types." (BASF 2025a).[2] Balaya contained a new type of azole, which I learned was what made it effective on resistant types of *Septoria*, so hopes were sky high as farmers ordered bottle after bottle of the much-wanted compound.

Earlier that day, we had been judging the growth stage of a wheat crop on a field belonging to one of the farmers. The wheat had been sown on the 20th of September the previous year, and after an icy spring with poor growth conditions, the plants were now racing to reach upwards. Per warned that the farmers had to pay incredibly good attention to growth now, as he had just visited another farmer whose crop had spurted from stadium 32 to 37 in just 4 days. The assessment of the stadium was crucial. "Why?" Per asked. "Fanebladssprøjtning!", they replied. Fanebladssprøjtning, or spraying the top leaf, is critical to fighting *Septoria*. Per explained that the top leaf was the most crucial part of a wheat plant as it contributes most to core filling, meaning that the top leaf "should not be left unprotected very long after emergence," he said.

The top leaf would likely emerge somewhere between the 1st of May and the 1st of June when the crop reached stadium 39, which was why the farmers had to pay particular attention exactly now. As he said, it was now possible to identify *Septoria* on the bottom leaves of many plants, and the infection would spread under humid conditions. Both water splashes and wind could spread the fungal spores, and considering the uncontrollability of both, the farmers had to be extremely timely and spray *exactly* when the crop reached stadium 39: when the top leaf had fully unfolded.

Per repeated the rule of thumb; after the first rainfall, the farmers should count 21 days and then proceed to chemical combat, as *Septoria* had a latency period of approximately 3 weeks. Now it was late May, and the conditions were ideal for the spread of the fungi. As Per said, "Septoria is developing very quickly right now—all of May has been wet and cold, and since Friday it has been warm and sunny, and it looks like it will continue into the next 7-10 days. The wheat is reaching stage 39 and must

[2] Balaya was banned in summer 2025 as a result of tightened national regulation, resulting in a ban of 23 pesticides known to contain TFA, which is an ultrashort chemical connection of PFAS that has been increasingly identified in groundwater surveys conducted by GEUS. https://mst.dk/nyheder/2025/juli/miljoestyrelsen-forbyder-23-pesticidmidler

be sprayed with Balaya at stadium 40 *at the latest*. So, you need to move quickly." Per added that further south, he had already encountered wheat crops that had passed stadium 40. His message seemed clear: The farmers needed to act before it was too late. Per reminded the farmers that many compounds were not allowed as soon as the crop had reached stage 39.

Interestingly, the farmers were suddenly quick to underestimate the growth stage of the crop. A lengthy discussion about the challenges of adhering to conduct began. Some mentioned that since it had been raining endlessly, the soil was still extremely wet, making it difficult to treat in a timely manner. Unfortunately, the weather forecast promised even more rain. Clearly, they *had* to treat against the damaging *Septoria* to avoid propagation and yield loss. Yet, in accordance with *godt landmandsskab* and principles of *ordentlighed*, they should also avoid driving in wet soil to cause compaction and refrain from spraying after stage 39. Like one farmer, Kasper, had said, "*Ordentlighed* is about taking care of your soil. We are tenants of the land we cultivate. And if you drive on your field when it is wet, you compact it completely. Nothing can thrive in that." Yet, ultimately, Per, in a very "between the eight of us" manner, advised the farmers to spray. The so-called "fanebladssprøjtning" overruled all other concerns, breaching principles of *ordentlighed,* as well as the long-term health of the soil. He told them to simply note the date of treatment, and not the stadium of growth in their spraying journal (this practice has been reworked as of August 1st 2025, so farmers now must note the stadium, see (Miljøstyrelsen 2025)).

The urgency in Per's instructions was exacerbated by how chemical companies frame *Septoria*. On their website, BASF writes that *Septoria* is "…the most feared and loss-making fungal disease in wheat which is found in all fields", and the fungi is said to be responsible for 75% of all potential yield loss in wheat. It occurs already in the autumn and can develop epidemically in the spring when it spreads into the crop. As such, *Septoria* is framed as a great matter of risk, and Balaya was framed as the solution—the antagonist, *Septoria,* and the protagonist, Balaya. In nearly every ERFA meeting I participated in, Balaya was mentioned, and farmers even joked that the increase in wagon prices was because of the overly optimistic yield expectations related to Balaya. If it was a direct cause of Balaya's release, is difficult to conclude. Yet, *Septoria* was a pertinent focus among farmers that season, and it somehow seemed the visibility of *Septoria* increased—both materially and discursively—with the release of Balaya.

In agricultural magazines, *planteværn* (plant protection) is a central theme, whether in agrochemical or technological marketing, in advisory columns, or in articles showing the most recent results from the national field trials. In *Landbrugsavisen,* for instance, a column is reserved for advisors where they warn against seasonal pests, the right timing for treatment, the right pesticide combination, and if they consider treatment economically profitable (Bundgaard 2022). Articles warning against diseases are often sponsored by large agrochemical companies like Bayer, Syngenta, and BASF. On Facebook, too, a group run by a nationally known advisor, Ghita, serves as a kind of fortune-telling site, sharing news about newly detected attacks, often from Southern Denmark, and warning farmers and local advisors to be on the forefront of upcoming pests. Similarly, the sponsored articles in *Landbrugsavisen* will stress the need to be 'ahead' of the fungi attacks, such as the article "Timing and dosage is key in the battle against *Septoria*" (BASF 2022), sponsored by the chemical producer BASF. By stressing the importance of timing, the chemical producers implicitly emphasise the slipperiness of agronomic risks, promising a solution to the uncertainties these represent to farmers. Furthermore, they promise yield improvements, profits, and truly productive crops.

On the website for Nufarm, for instance, an herbicide campaign uses the headline "Stop the thief!" (Nufarm 2020), underscoring how weeds will "steal" essential resources from the main crop in sneaky ways if pesticides are not used. Here, weeds are cast as in *need* of management to be controlled. On the other hand, companies that make crop pests visible as stealthy and risky (unsurprisingly) also offer solutions to contain and control them. For instance, Bayer has developed what they call "timing tools"—digital tools to optimise chemical combat against weeds, tailored for their own products, such as the compound Matena Duo. By plotting in their ZIP code, farmers can see if it is time to spray based on weather data.

Paradoxically, when I asked the advisor, Per, about the scope and spread of agronomic issues such as Septoria and light leaf spot, and why they seemed to have increased, he was himself a bit perplexed about the situation. He compared the current situation, where light leaf spot was sprayed against *every* season, to how it was 10 years ago. Back then, the frequency of treatment was perhaps every fifth year. Asking him why, he replied, "Perhaps because you hadn't seen it back then—you didn't have the tools to notice it and accepted the yield for what it was". What Per's comment alludes to is how the relationship between visibility and invisibility is not neutral but highly

mediated by different technologies. On one hand, agronomic risks are mediated and negotiated in ways that make them *emerge* as slippery, out-of-control, messy, and highly invisible entities.

Making agronomic risks tangible and actionable is supported by scientific knowledge, for instance, in plant pathology, in research on monitoring, warning, and decision support (Axelsen et al. 2020, El Jarroudi et al. 2020), as explored further in the next chapter. Warning systems, as well as Per's instructions, effectively render weeds, pests, and diseases manageable and containable to such an extent that they seem impossible to ignore. With all the alarm created around fungal attacks such as *Septoria* and light leaf spot, it was perhaps unsurprising when one of the new farmers in the group, Sten, said that he would "take full precautions" in his rapeseed field when Per asked him what he would do if he were to grow rapeseed for the first time.

Here we can see how, following John Law and Marienne Lien (2013, 365), agronomic risks such as *Septoria* "come to *be* in a relational, multiple, fluid, and more or less unordered and indeterminate (set of) specific and provisional practices". It is difficult to separate the course of events and the hierarchies of knowledge, determining what kind of risk *Septoria* "really" is. How did *Septoria* become such a problem? Was it the release of Balaya? Was it that farmers had higher yield expectations? Or that farm advisors like Per had become so much better at noticing *Septoria?* Perhaps it is not so important—the point to draw from all this is that diseases, like Septoria, are rendered slippery and that this very slipperiness has social consequences.

Several scholars have suggested that framing crop pests as a threat only to farmer income is insufficient in truly grasping what is at stake when farmers fight their weeds (Schuster 2021, Ofstehage 2022, Robbins 2007, Burton 2004). They have demonstrated how weed eradication addresses issues such as professional identity (Ofstehage 2022, Burton 2004), insurance policies (Schuster 2021), and the construction of cultural subjects in a national context (Robbins 2007). Following these approaches, the following sections explore how the very slipperiness of agronomic risks is enacted as the medium through which to negotiate morality, *ordentlighed*, and good farming. ERFA meetings become sites for doing so, constituting what we can see as "moral laboratories" (Mattingly 2014). I will now turn to the *weedscapes* of Danish conventional farming, borrowing the term from Caroline Schuster (2021), to explore how certain zones of the field become moral sites for negotiating good farming.

The Moral Economy of Risk: *Weedscapes*, and the Distribution of Responsibility

As we entered the field, Per remarked on the presence of grass weeds in the *forager*, a term referring to the two meters bordering the field. Per, the farm advisor and head of the ERFA group, had the crucial task of ensuring that weeds did not cross into the field and also determining how to handle them, not if, but *when* they did. "Grass weeds are the worst," everyone agreed, with Italian Ryegrass being a prime example. Per dug out a couple of grass clumps from the soil and shook them to expose the roots for examination. "Look at this bastard right here," he said in a condemning tone, pointing at the grass while making eye contact with everyone. The roots were approximately 5 cm long, and the aboveground part of the plant had sprouted 7–8 shoots spreading outward. Italian ryegrass, in particular, was considered highly problematic due to growing resistance to some of the most essential compounds in battling it: ALS inhibitors. Because of this, farmers referred to it as a "problem-weed." Resistant weeds, the so-called "root-weeds", and grass weeds more broadly, were troublesome because of their ability to persist in the soil, germinate—in their own words—"aggressively", and incur high treatment costs. The field's owner was convinced the weeds had arrived with a grain mix sourced from a nearby farm. Per's eyebrows furrowed as he added, "This could become very expensive, and it's precisely why we must be extra vigilant about our edges." The perception of field edges as in need of vigilant attention was echoed among farmers, like Flemming, who explained, "My infection risk is at the edges [*kanterne*, i.e., the outer edge of a field]. So, when we spray the fields, our man [i.e., the worker driving the field sprayer] likely drives an extra trip around the field along the edges, using just the outer 3-4 nozzles on the sprayer."

Caroline Schuster (2021, 594) introduces the term *weedscapes* which her interlocutors use to refer to the peripheral zones of the field. Schuster, writing from the context of Paraguay, shows how weedscapes become sites of financial speculation in the context of insurance finance. As such, understanding uncultivated peripheral zones and bordering fields as vulnerable sites of management imbued with extra risk is evident across different farming communities. In Denmark, roadside verges are particularly interesting in this context.

In Denmark, most verges are owned by the Danish Road Directorate. Roadside verges demarcate the space between public roads and privately owned farmland and thus demarcate not only the formal boundary between private and public property rights, but the symbolic boundary of collective versus individual responsibility. I suggest this "in-between" position is what makes them particularly controversial in terms of the distribution of responsibility—in this case, responsibility for reducing risk associated with weeds. In 2009, the Danish Agricultural Seed Association managed to get support in a complaint over the lack of mowing along fields with seed grass (Smitt 2009). The argument from the association was that "the rules for seed certification and the single payment scheme state that neighbours of seed grass fields must keep their own areas mowed if there is a risk of cross-pollination in the seed grass field" (Ibid, my translation). The certification rules require a distance of 50 meters between cross-pollinating pollen sources and the seed grass field. Not only to avoid cross-pollination, but also to prevent the invasion of species such as barren and soft brome, annual meadow grass, and couch grass, since these unwanted species often spread from roadside verges. The seed section argued that these rules concerning "neighbours" naturally applied to others than farmers, which for the state are the Danish Road Directorate and the country's municipalities (Smitt 2009). The view received support from the Ministry of Transport, which placed responsibility for weed management on the Danish Road Directorate and the municipalities. This meant that in individual cases, where it was estimated that there was a risk of cross-pollination, farmers could request the directorate to mow the roadside verges.

As in the Paraguayan context, we see how roadside verges become sites for financial speculation: a calculation of potential economic risks associated with species diversity. Furthermore, through legal procedures, they become formalised sites for negotiating responsibility. Responsibility here is displaced onto municipalities and the state, showing how moral and financial risks spill beyond the farm. This echoes Gluckman's (1968) view of gossip/scandal as a way of negotiating collective obligations where responsibility is diffuse. Yet, besides these more formalised and juridical negotiations, field edges would oftentimes become the subject of wild speculation during the ERFA meeting. I will suggest that these speculations do not simply present us with a series of arbitrary guesses, but with an informal moral practice of distributing responsibility. Speculation, in this context, gains a moral dimension.

Speculation and the Informal Distribution of (Moral) Responsibility

Per still held the chunk of grass weed in his hands as speculations and denunciations passed the space between us. Flemming speculated how weeds came in with the newly established bike path because the area around the path was uncut. The others agreed, confirming how they also felt confident that weeds came in from the hedgerows and roadside verges. The farmers, especially Carl, complained loudly about the verges. The problem, he said, was that the municipality did not mow the edges before August. Carl thought it was a "forbandet svineri" (damned mess), as it posed a significant risk to farmers' yield and financial viability, and was a "spild af ressourcer" (waste of resources), echoing the controversies mentioned in the previous section. Yet, the municipality was not the only subject of blame. Finn blamed the farming machines, particularly the hay bailer, and how it "dragged seeds everywhere."

Here, it is important to mention the widespread use of so-called "maskinstationer" or machinery rings in Danish farming. Official sector accounts from DST show that Danish farms spend billions of DKK annually on such services (DST, 2023). It should be noted, however, that no official statistics report the exact share of farms that purchase contracting services. Yet, the majority of farmers I encountered during fieldwork used either contracting services or were engaged in more informal machinery-sharing arrangements (i.e., private arrangements made between colleagues). These labour arrangements mean that operational responsibilities are distributed among farmers and machinery ring labourers. In that sense, blaming the hay bailer is not only a judgment towards the machine and its functions, but can also be indirectly directed to the broader professional farming community. The farmers would frequently complain about the standards when outsourcing labour, and I never heard farmers say that they used contract labour because the teenagers driving the tractors did a better job. Instead, they used them because it was cost-efficient compared to investing in specialised equipment (such as precision technology). Thus, it was framed as a compromise that sometimes caused the suspension of *godt landmandsskab* because the (often) young drivers did not necessarily carry with them a sense of neighbourly responsibility—neither in terms of driving slowly, cleaning the road, nor, importantly, cleaning the machinery.

It is, of course, difficult, if not impossible, to state anything conclusive about who is "in fact" the true sinner when it comes to the distribution of weeds. I also heard several other theories, for instance, that birds carried the seeds and that the local mill

did not clean them thoroughly enough. I want to suggest that assigning blame may, in fact, not be the point of these speculations either. As anthropological studies of gossip and speculation remind us, such practices are not reducible to idle talk or faulty diagnosis. Max Gluckman (1963) showed how gossip and scandal operate as social sanctions, disciplining behaviour and sustaining collective norms, while Robert Paine (1967) emphasised gossip's strategic function as a way of circulating responsibility in contexts where certainty is elusive. In the Danish ERFA meetings, speculation about weed origins works in a similar register: less about establishing empirical truth than about managing the moral landscape of farming.

In the introductory example, 'cleanliness' and field-watching function not only as a technical assessment but as a moral one: neat fields become proof of orderliness, while untidy fields risk professional sanction. Speculations like Carl's circulate blame in ways that rarely resolve causality but sustain collective vigilance. As Paine (1967) suggests, gossip is strategic: here it ensures *ordentlighed* by making every actor—farmers, contractors, municipalities—potentially accountable. Thus, field cleanliness and pest management often become intertwined with social and moral metrics anchored in professional and economic responsibilities.

Social Sanctions and Moral Stewardship

The social sanctions would sometimes go quite far. Ole, an organic farmer I had spoken to previously, had recalled a confrontation with an angry neighbour who accused him of spreading weeds with an unclean hay baler. Cases were known where farmers had been subjected to compensation demands from neighbours because of unhandled weed problems. In 1981, for instance, a farmer had omitted treating wild oats in his fields, and thus wild oats travelled to his neighbour's field. The neighbour, who was a certified seed producer, suffered significant losses due to the weed infestation. This led to a trial that ended in a settlement, where the farmer responsible for the infestation was required to pay DKK 40,000 in compensation. I was also told about instances where farmers had to pay up to as much as DKK 600,000 in economic compensation for a neighbour's losses. As the story was told, it was clear that it issued a warning: be careful or leap into the crushing reality of moral and financial condemnation. While hardly verifiable as true stories, stories like the one above magnify the potential wastefulness of weeds beyond the scope of resource efficiency into destructive

neighbourly relationships, social disintegration, and professional devastation. In that sense, collegial field surveillance can be understood as a form of moral stewardship, defining the good and bad colleague and neighbour.

Returning to Schuster (2021), the example with Carl's judgements from the car pushes the role of weeds further, showing that weedscapes are not sites of financial speculation, but also sites of moral speculation. The speculative mode does not resolve uncertainty; it inhabits it, orienting action when certainty is impossible and uncertainty an inevitable part of farming. What matters is that speculation produces moral bearings: even in the absence of definitive knowledge, it affirms vigilance, it reaffirms *ordentlighed*, and it makes clear that "good farmers" must act responsibly, if only by spraying the field edges an extra time. From here, we can see how everyday speculation links to broader structural challenges. Per's warnings that grass weeds were becoming increasingly 'stubborn' in the sense that resistance to agrochemicals in some grass weed species, like Italian Ryegrass, was now identified all across the country, is indeed a very real challenge for farmers. Combined with increasingly restrictive regulation on pesticides—meaning that new products rarely enter the Danish market—these challenges become larger, structural sources of uncertainty. Farmers' complaints about careless municipal mowing or inattentive young drivers in contracting services bleed into uncertainties about "stubborn" grass weeds and the tightening of chemical regulations. The point of these narratives is not simply where the weeds come from, but how they become harder to control in an environment of shrinking chemical repertoires and unstable weather.

In this way, speculation and gossip do not stand apart from the biological or regulatory uncertainties of agronomy—they are both continuous with and a reaction to them. In other words, the moral dimension of speculation connects directly to the broader slipperiness of risk in contemporary agriculture. Just as ryegrass mutates beyond control, so too do narratives about its origins proliferate without conclusion. Both forms of slipperiness—ecological and social—are negotiated through speculation as a moral practice, one that sustains professional legitimacy in an otherwise unstable terrain. Resistant weeds evade established herbicides; new regulations withdraw familiar chemical tools; unstable weather disrupts the timing of treatments. In each case, responsibility is dispersed beyond the individual farmer, yet still experienced as a heavy personal burden. Speculation thus provides a language for grappling with these entanglements: a way of redistributing responsibility across a heterogeneous

field of actors while simultaneously reaffirming one's own *ordentlighed* and *ansvarlighed* (responsibility).

An essential part of what it means to be a responsible and sustainable farmer, as we have already learned, is to be resource-efficient. Crop pests, weeds, and diseases are inevitably tied to resource waste and economic loss, meaning that they can be framed as threatening not only financial concerns, but also concerns about sustainability and resource use. Through these dynamics, I suggest that sustainability is being internalised as an individual responsibility that farmers can adopt through effective crop management practices. Here, sustainability becomes tied to effective crop management, cleanliness, and the social and moral efforts needed to maintain high yields with a minimum of waste. Sustainability operates not through structural changes, but through intensified individual engagement: through the constant vigilance, repetition, and responsibility required to maintain 'cleanliness' amid regulatory, climatic, and social volatility. Yet, weeds, herbicide resistance, and disease proliferation are structural issues shaped as much by field size as by practice. In research on herbicide resistance, there is broad agreement that resistance is closely linked to the size and scale of farming (Hawkins et al. 2019, Ofosu et al. 2023). That is, larger fields → less crop variation → less agrochemical variation → more agrochemical resistance. As such, they are challenges that can hardly be comprehended without considering the longue durée in which pesticide-supported large-scale farming has become the dominant agroecosystem.

When farmers articulate risk management as a moral problem to the good sustainable farmer, it necessarily places responsibility for structural issues—such as herbicide resistance—onto the farmers, obfuscating this structural dimension. While Ole, the organic farmer, recognised good managerial conduct as an essential component, he attributed the issue to the expansion of property sizes and greater distances between fields. Like he said, "In the past, weeds were hand-weeded and contained within one's property. Now, we have fields maybe 5 kilometres from our farm and need machinery to cover these large distances, and it necessarily means we end up dragging stuff around." Yet, even if Ole knew that increased weed management was linked to farm size, his reaction was still an internalisation of these structural issues, such as cleaning the hay baler suggests.

One way to approach this tension between longue durée ecological processes and crop management strategies in the "here and now" is through the different

temporalities inherent to the concept of sustainability. The remainder of this chapter sets out to do so.

The Timeliness of Being a Good Farmer: Risk Management and the Temporalities of Sustainability

Opposed to the longue durée of ecological and landscape transformations, the agricultural production cycle is roughly one year. Most of the year is spent investing and growing; the rest is spent harvesting, cleaning, and preparing for the coming season. Being a good farmer is often about making the right decisions at the right time. Being timely is when you succeed in going into the field just when the temperature, humidity, and wind speed are just right. It is to spray just when the rape pollen beetle goes from beneficial insect to pest, and driving only when the soil is dry enough to carry the weight of heavy machinery to avoid damaging the soil.

As we have seen in this chapter, locating the most optimal time for an herbicide treatment is a scientific discipline in itself, something agrochemical companies and farm advisors dedicate much to learn about to provide farmers with the most optimal advice. Fungicide advertisements remind farmers that "timing is more important than ever" and that delays will mean losses. An article in Landbrugsavisen (BASF 2022) sponsored by the chemical producer BASF, stresses the urgency of acting quickly and timely in what they frame as "kampen mod *Septoria*" (the battle against *Septoria*). They write that, "Almost regardless of the weather, septoria is an unavoidable threat in the field that can cause major problems and significantly reduce yields if not controlled. Therefore, the right timing and dosage of pesticides are crucial in the fungal strategy." (Ibid.) Here, *Septoria* is presented as a threat that can only be controlled through a careful and timely strategy. Another article, also sponsored by BASF, focus specifically on the "fanebladssprøjtning" (also previously mentioned by Per), and instructively states that "The flag leaf should not be left unprotected for long after emergence," reminding farmers that the flag leaf is the part of the plant that contributes most to core filling (BASF n.d.), reinforcing the idea that hesitation is a risk that farmers cannot afford to take. They reiterate this in the causal logic offered in the following: "Septoria spreads during the stretching growth with water splashing from leaf to leaf upwards in the plant and by physical leaf contact when it is windy. We have had some wind and rain in the last few weeks. […] If you first see symptoms on the upper leaves, the fungus is already established and is forming new spores. This

already leads to yield losses." (Ibid). There is indeed little room for hesitation when diseases spread invisibly before symptoms even appear. Crop time, we learn, is urgent and characterised by significant risk.

While acting on the present, agronomic risk is deeply future-oriented: pests, weeds, and diseases are framed threats that will materialise if not contained today. Through agrochemicals, precision tools, moral sanctioning, and regulatory protocols, farmers act in the present to pre-empt and control uncertain futures. Especially the economic future. Yet, considering the statement that "almost regardless of the weather, septoria is an unavoidable threat," this future-making seems to rest on an illusion of control that is never complete, yet sustains the everyday pragmatics of farming. Looking towards the longue durée, risks like *Septoria* can be seen as unavoidable and in need of intervention not only because of their pathogenic properties, but because these risks are themselves the cumulative outcome of a longue durée of agricultural transformation: the structural adjustments, chemical intensification, and technological infrastructures that have produced the very conditions in which risks like *Septoria* now proliferate. From this perspective, the future of risk is also the past reasserting itself.

One way to conceptually discuss this multiplicity of temporalities is through the "triple bottom line" framework of sustainability (Elkington 1998). Briefly, the triple bottom line refers to the different dimensions of sustainable development, which balances three dimensions: the economic, environmental, and social. While economic sustainability can be framed in immediate terms—input costs, yields, and the bottom line of the current season—ecological sustainability unfolds on slower scales, or the *longue durée*: the regeneration of soils or the restoration of biodiversity cannot be immediately achieved in the present but necessarily needs a long-term framework.

As we saw in the case of the "fanebladssprøjtning", farmers navigate these temporal registers under the pressure of resource efficiency, which foregrounds the immediacy of economic viability and climate goals at the expense of ecological futures. Thus, while managing crop risks can help farmers minimise resource loss and ensure an economically viable production in the present, it undermines long-term ecological *bæredygtighed*—and sometimes at the expense of *ordentlighed*, as when yields are being prioritised over being a "tenant" of the soil. This suggests that good farming is itself challenged by these competing temporalities.

Risk as Relational and Moral Practice

Weeds, pests, and diseases are not only agronomic risks to Danish farmers—they are central to how moral order, professional legitimacy, and agricultural identities are produced and maintained. As this chapter has shown, risk does not reside in the biological entities themselves. Instead, it is constructed, negotiated, and distributed through everyday practices. From car-window inspections and surveillance to marketing campaigns, threats become visible because of how they are rendered legible and actionable within particular epistemic and institutional frameworks. By tracing how farmers discuss, perceive, and act upon crop threats, we see how risk is not only an economic, managerial concern but a profoundly moral one. The fight against a weed or fungus is not only a fight for yield, but also the farmers' professional standing, their sense of care, responsibility, and community membership. In this way, managing risk becomes a relational obligation to the land, one's neighbours, and the agricultural system at large. Furthermore, risk management becomes a central site where agrarian ethics and industrial logic of good farming coalesce—the proper and industrious farmer is he who cleans his fields, is vigilant about his borders, and makes sure to gain most from his land. *Ordentlighed* becomes a matter of risk management. As we saw in the previous chapter, *ordentlighed* is an essential social component in understanding farmers' framing and understanding of sustainability. For sustainability to be "proper," it must comply with farmers' ideas of good farming, their professional identity, and what they consider "rational" agronomic practices.

Yet, as we have seen, this moral framing obscures broader structural dynamics, such as the scale of conventional agriculture. The growing reliance on agrochemicals is entangled with economic pressures and industry-driven narratives of visibility and urgency. While agrochemical use is often framed as protection—and as a responsible strategy to enhance yields and resource efficiency—it deflects attention away from systemic reasons for pest proliferation. Risk, in this sense, becomes individualised even as it emerges from collective and industrial conditions.

The following chapter departs from the concept of risk but directs attention to pesticides. Yet, here it is the absence of risk that characterises farmers' attitudes. The chapter investigates how agrochemical management is seen by farmers as a legitimate, proper, and even sustainable strategy.

Chapter Five
Toxic Farming

"Farming today is more complex than ever before. The unpredictability of the weather, control of pests and weeds, market price fluctuations, and scarcity of natural resources, all in a world heading toward 9 billion people. These challenges require BASF to continue its commitment to developing innovative solutions for growers, supporting them in their efforts to nourish a growing planet. As an industry leader with a broad portfolio of fungicides, insecticides, herbicides, and seed treatments, BASF helps farmers to increase the yields and the quality of their crops sustainably."

BASF (2025d)

"I think in terms of language ideology to account for habits of mind, language, building, and regulation in industrial order that privilege production, products, property, and boundaries [...] It is an essentialist, functionalist logic that privileges what goes on inside bodies, products, and fencelines, orienting research, business, and law. It assumes that things are what they are intended to be—that they are their essence—and nothing more: Chemical plants produce chemical products for use (and sale), without polluting emissions. Pesticides kill insects, but pose no harm to other bodies and ecologies. Production is protected; pollution is externalized. The perspective is overwhelmingly positive. The focus is on what works."

Kim Fortun (2014, 313)



Figure 11: "Kemirummet". An essential part of every conventional farm is used to store agrochemicals—pesticides, fungicides, herbicides, micronutrients, and macronutrients.

From Epistemic Vulnerability to Certainty

As we saw in the previous chapter, crop pests and weeds are controlled—and indeed, killed—by means of agrochemical strategies by farmers and farmworkers who incorporate spraying into their daily or weekly routine within the rest of farming operations. In Danish professional farming terminology, weed and disease management is referred to as "planteværn" (plant protection). The term "at værne" means to safeguard, or to shield, protect, and defend. Contrary to critics that deem spraying polluting and devastating to the environment (Hansen 2019), professional and scientific language frame chemical pest management as an act of protection (Nistrup et al. 2020). In this logic, agrochemical management is framed not as the killing of insects but as "the protection of crops". This framing evokes an image of a heroic safeguard, equipped with chemicals, defending their fields against intrusions by warding off pests, insects, weeds, and diseases. In many ways, this image is not entirely wrong, and I was stunned by farmers' repetitive framing of agrochemicals as a protective measure without any mention of potential associated human or ecological health risks. Trivial, mundane, and far from a dramatic act of killing. Departing from my own puzzlement about farmers' casual attitudes to agrochemicals, this chapter explores the role and negotiation of agrochemicals in conventional arable farming

contexts, asking how pesticides can be understood as part of the good, sustainable farmer.

To understand the role of pesticides not only as necessary, but as morally compatible with sustainability in conventional farming, I take inspiration from three concepts: *labor of confusion* (Auyero and Swistun 2008), *communities of complicity* (Steinmüller 2013), and *industrial language ideology* (Fortun 2014). While the concepts are unrelated from the outset, together they help unpack the relationship between industry discourse about pesticides on the one hand and farmers' lived experiences and negotiations of pesticides on the other. The first concept, *labour of confusion*, refers in the work by Javier Auyero and Deborah Swistun (2008, 360) to "The multiple, contradictory, and incongruous actions [...] which had a decisive effect in creating shared (mis)understandings" in knowing the risks and externalities produced by industrial toxics. As such, they depart from the assumption that not knowing is a source of epistemic vulnerability that needs to be remediated.

However, in the case of conventional agriculture, it is not so much confusion and epistemic vulnerability that define farmers' pesticide narratives and risk perception, but certainty, containment, and safety. Examining how these narratives are formed and sustained, I rework the concept *labor of confusion* to *labour of certainty* to draw attention to the discursive work by agrochemical industries and regulatory bodies to maintain a narrative about pesticides as necessary and safe. To explore this *labour of certainty* through language, discourse, regulation, and marketing efforts, I draw on Kim Fortun's (2014) concept of *industrial language ideology* cited on the first page of this chapter. Based on logics of containment and vitalism, this language ideology supports the continued use of pesticides under the banner of innovation, efficiency, and safety.

Rather than openly debating the risks of agrochemical use versus the risk of failing harvest, farmers often downplay or ironically dismiss health concerns. The collective, social negotiations of agrochemicals are analysed through Hans Steinmüller's (2013) concept of *communities of complicity,* defined as "communities of those 'in the know', those who share an experiential horizon and an intimate knowledge" (2013, 224). I use ERFA-groups as examples of *communities of complicity* that serve to collectively maintain an ethical position of 'safe and professional use' as well as defending pesticides in the name of resource efficiency. Steinmüller's concept relates closely to what Michael Herzfeld (2016) calls 'cultural intimacy', namely the

tension produced when people become self-aware that what is important to them (pesticides, nitrogenous fertiliser, and so on) is seen as a moral default to outsiders. The negotiation of such feelings and perceptions is what Steinmüller calls *communities of complicity*. In Steinmüller's work, communities of complicity are defined less by what they explicitly share and more by that which is left unsaid. In the case of conventional farming, the concept serves to analyse both what is unsaid, but also that which is being explicitly named and known. I suggest that certainty and legibility—instead of uncertainty and epistemic vulnerability (Murphy 2006, Shattuck 2021b)—serve as equally important grounds from which to understand agrochemical transgressions in farmers' everyday lives.

The central argument offered by this chapter is that pesticides are sustained as morally compatible with "sustainable" farming through a *labour of certainty* enacted by industry, regulation, and farming communities. The following empirical vignette serves to exemplify how certainty and trivialisation are performed in everyday practice, setting the stage for later analysis of industry discourse and regulation.

Jack and the Feed Barrels

I was sitting inside a tractor cabin, tightly sealed, experiencing the spraying of a barley field from a safe distance. I had been assigned to follow Jack, one of Erling's workers, that day, and Jack was driving the sprayer. Spraying was Jack's thing. I had tonnes of questions about spraying: If Jack was concerned about being in daily contact with pesticides, if he too thought it aligned with sustainable farming—if so, in what way—and so on. I clearly remember Jack's blue rubber gloves as he filled the tank with 8000 litres of water, boron, and what I learned was a type of clear fertiliser mixed with Folicur, a fungicide containing the active ingredient *tebuconazole*. It took just about 20 minutes to fill the tank. Jack did not tell me about the active ingredient, but at the time, I had integrated a habit of writing down the names of pesticides for later research, as it often felt too technical and awkward to ask direct questions about agrochemicals. In situations like these, pesticides figured simply as a trivial part of farming. And as we shall see, routines, triviality, and silencing are effective strategies to avoid confronting uncomfortable questions and ethical issues.

Jack came from a town not so far away. He did not live there anymore, but in one of Erling's properties, an old school that he had bought and renovated. Before he came to Erling's farm, he had been working on an organic cattle farm on Funen, where he

had worked both in the barns and in the field, mainly in the field. In fact, Jack had been schooled in organic farming, and then, "just like that," turned away from it to spend 15 years spraying pesticides in fields. Asking him about it, Jack did not see any contradiction between what he did before and now. "It is not so much about the principles, but that both systems offer interesting possibilities and ways to farm", he said. Besides that, he did not see any contradiction between sustainability and spraying either. As echoed so many times before, Jack saw sustainability as something that had to do with "utilising the potentials of farmland" (*at udnytte potentialet i jorden*), and pesticides played a central role in realising these potentials. He thought the political requirements for 4% fallow lands were "a poor idea". Instead, he thought it would be much wiser to take out land from the Alps, or from Africa, places where, according to Jack, "farmers don't know how to handle the chemistry properly anyway". According to Jack, these farmers should "leave cultivation to Danish farmers who have the right tools and the right soils to farm *på en ordentlig made* [properly]". From how Jack talked about spraying, a clear message came across: Spraying was in no way a problem in itself, and Danish farmers had the tools (i.e., precision tools), skills, and conditions to use pesticides in *på en ordentlig made* that fostered safe use and sustainable farming.

Time and again, we drove over feed barrels that had been placed in the fields to nourish the local wildlife. I offered to move them out of the way. "No, no, I'll just lift the sprayer over them," Jack said. Hares darted across the field as we passed. Birds—raptors and little tits—rose suddenly from the barley. It almost looked like they were escaping the land itself as the sprayer approached. At least that was the conclusion I made in silence. I could not help but think of the nests hidden beneath the crops. Instinctively, it felt deeply wrong to spray amidst feed barrels intended for wild animals, and it felt at odds with arguments about "safe" technology and efficient utilisation of farmland. This juxtaposition—spraying fungicides while carefully stepping over feed barrels for wildlife—captures how the labour of certainty operates in practice. The tools, routines, and professional discourse allow farmers to fold such contradictions into a narrative of rational, *ordentlig,* and safe farming. Rather than provoking doubt, these moments are domesticated into the logic of certainty: Danish farmers can use pesticides responsibly even as the boundaries between "safe use" and ecological harm blur in the field itself.

I was reminded of Chresten, a conventional farmer, and his vivid characterisation of the field as a "buffet" for the game. Chresten had told me that spray lines were the only place for birds like larks—a little brown sparrow-like bird common to the Danish countryside—to eat and live in the intensively cultivated farmland. Compared to the grain field, which itself was completely devoid of weeds, insects, and places to land, and thus no good place for birds, the spraying lines—perhaps a meter or two wide—would offer an opportunity for grasses and insects to live momentarily, and thus for larks to feed. Was he actually framing spraying lines as a good thing for larks? I could not help but think about how neither larks nor game were given the option to decide for themselves if they would feed from an organic or conventional field, and could not stop speculating about pesticide residues in the bodies of larks. Jack admitted that dealing with the animals in the field was one of the hardest parts of the job. Especially when a hare was accidentally run over. I asked him if it happened often. "Sometimes it does." He added that sometimes a hidden fawn, curled up in the tall grass, would be struck too. I sensed a quiet discomfort in his voice, but the sprayer kept spraying in the lines assigned by the GPS.

Whether or not Danish farmers are, in fact, as suggested by Jack, "safe" users of agrochemicals is beyond the scope of this dissertation and beyond my professional capacity to determine. What I can say is that pesticides were rarely questioned among farmers but almost always regarded as a natural part of resource-efficient farming. However, in public discourse as well as in a few individual farmers' stories, pesticides appear potentially harmful to bodies and environments, raising questions about narratives concerning efficiency, proper handling, safe use, and containment.

Chemical Ambivalence—or Harm?

When I returned to my small apartment on Erling's property, I made a quick search. I learned that the pesticide in Jack's sprayer tank, Folicur, was a so-called systemic fungicide. According to Middeldatabasen.dk (a database on pesticides in Denmark operated by SEGES), the active ingredient, tebuconazole, is intended to inhibit the synthesis of ergosterol in fungi. Explaining it simply, ergosterol is an essential component in fungi that helps in maintaining cell membrane structure, function, fluidity, and permeability. As such, inhibiting the synthesis of ergosterol severely damages the fungi's ability to flourish, spread, and survive. At the same time, the effect only targets fungi and not animals, which minimises risks and, presumably, makes the

compound ideal for spraying in agriculture. Because of these characteristics, azole-based fungicides are among the most used pesticide groups in Danish agriculture today, essential for combating fungal diseases like *knoldbægersvamp* (*Sclerotinia sclerotiorum*) and *Septoria* (*Zymoseptoria tritici*) (Hegedus and Rimmer 2005, Arendrup et al. 2024). And apparently, farmers and large animals were not in *direct* danger.

However, azole-based fungicides have become subject to much debate in the past decade because of their ability to cause hormonal disruptions (Kjærstad 2007), but also due to causing azole-resistance in fungal infections in humans, who are treated for severe fungal infections (Arendrup et al. 2024). Several studies on azole resistance show that the most commonly used azoles in agriculture resemble the molecular structure of those used in medicine for treatment of human infections, leading experts to suspect that the agricultural use of azole-based fungicides is directly linked to resistance in human cells (Jørgensen et al. 2021, Arendrup et al. 2024). As such, while azole fungicides do not *directly* harm humans and animals, their *indirect* effects are in fact quite severe, much like the use of antibiotics in pig production threatens the future efficacy of antibiotics as human medicine (Blanchette 2019, Landecker 2016). Furthermore, the plant pathogens that azole-based fungicides are designed to combat have been shown to develop resistance, making them increasingly difficult to control.

Knowledge like this has led to growing public concern and negatively charged discourses over pesticide use, especially from environmental organisations like DN, as well as from health professionals concerned with the long-term effects. Considering the relatively strong evidence base and public concern over agrochemical use, it seems necessary to ask how farmers and their industries, despite this knowledge, have succeeded in maintaining a narrative about pesticides as "safely used"? And further, how pesticides have maintained such a central role in conventional farming, even in visions of sustainability?

To answer these questions, the following section directs attention to *labour of certainty,* defined in this context as the regulatory, legislative, discursive, and political work carried out by industry actors to make knowledge about pesticides certain, to frame pesticides as safe, and farmers as safe users. This labour can be seen as shaped by what Fortun (2014, 313) coins an *industrial language ideology*, defined as "an essentialist, functionalist logic that privileges what goes on inside bodies, products, and fencelines, orienting research, business, and law. It assumes that things are what

they are intended to be—that they are their essence—and nothing more: Chemical plants produce chemical products for use (and sale), without polluting emissions. Pesticides kill insects but pose no harm to other bodies and ecologies. Production is protected; pollution is externalized. The perspective is overwhelmingly positive. The focus is on what works." Through Fortun's notion of language ideology, I draw attention to corporate discourse and oxymorons (Benson and Kirsch 2010), that together with regulation comprise what Fortun (2014, 325) coins "conceptual haze". To understand why ambivalence is so often downplayed in practice, we must turn to the structural supports of certainty—to the regulatory and discursive systems that have made it possible for pesticides to enter farmers' worlds as scientifically sound.

The Labours of Certainty

The introduction of pesticides dates back to the beginning of the 19th century, when the Danish state founded the first experimental stations under *Statens Plantepatologiske Forsøg* (i.e., a state-funded testing station in plant pathology), whose primary purpose was to test the efficacy of new compounds on "skadevolderen" (i.e., the crop perpetrator) (Jørgensen and Nielsen 2013, 26). Back then, the first pesticides were described and recommended in books published by the testing facility, known as *Den Grønne Bog,* or The Green Book, which included recommendations to use nicotine against pests (Ibid. 23).

In a short review of the history of agrochemical experiments in Denmark written by researchers Lise Nistrup Jørgensen and Bent Nielsen (2013), a clear picture of close collaboration between state and industry emerges. In 1930, a collaboration agreement was established between the agrochemical industry and *Landbrugsministeriet* (the Ministry of Agriculture), coinciding with the systematisation of trials for fungicides and insecticides, which were placed under the responsibility of *Oplysningstjenesten* (the Information Service).

In 1937, the first trade association for agrochemicals was founded as *Foreningen af Fabrikanter og Importører af Plantebeskyttelsesmidler* (The Trade Association for Manufacturers and Importers of Plant Protection), later known as *Dansk Planteværn* (Plant Protection Denmark), and most recently as *CropLife Denmark*. Through the trade association, the industry sought to enhance the market position of the agrochemical sector. In 1938, the collaborative efforts led to the establishment of a formalised 'official recognition' label of pesticides, signalling pesticides that had been

approved for good efficacy by the state's research and testing facility. The recognition was to be used by companies when applying for authorisation and when advertising their products. As such, the official recognition served as a legitimising authority that scientifically proved the effectiveness of a compound. The first recognition list was published in 1938, featuring 54 insecticides and fungicides.



Figure 12: Official recognition label. (From: Jørgensen and Nielsen 2013, 26).

After World War II, the industrialisation and chemical manufacturing of pesticides took off, and so too did the testing. In 1955, *Institut for Ukrudtsbekæmpelse* (the Weed Control Department) moved to a place with better space and testing conditions, yet was relocated again in 1972 to Flakkebjerg, the recent location for the testing unit (Ibid. 24). In 1956, one year after the expansion of the test station, the first pesticide statistic was released, showing 1,523 tons of active substances sold. In 1984, the sale of pesticides had quintupled compared to the first statistics, from 1,523 to 8,049 tons. The years from 1960 to 1980 were characterised by a restructuring of the various research institutes. Due to successful collaborations and marketing efforts, fungicide sales grew fivefold from 1980 to 1984. Additionally, the "discovery" of new, super-effective fungicides—particularly the group of fungicides called "triazoles"—contributed to this growth.

Growing public concerns about the associated risks and environmental harms of pesticide use began to echo throughout the public debate during the 1980s, forcing policymakers to tighten regulations. Yet, testing not only the effectiveness but also the environmental impact of pesticides was not systematically introduced in Denmark before 1991, with the implementation of the EU Directive 91/414/EEC. This directive required that all pesticides be included on a positive list and that existing products be reassessed. The requirements for efficacy evaluation were tightened, and additional documentation was needed in accordance with the so-called GEP rules (Good Experimental Practice). In 1996, the testing unit achieved GEP certification, which was

a prerequisite for providing trial data in connection with EU approvals. This involved following the guidelines of the EPPO (European and Mediterranean Plant Protection Organisation) as the foundation for trial work (Jørgensen and Nielsen 2013, 27).

In response to growing environmental concerns, Denmark implemented stricter regulations, culminating in the 1997 Pesticide Action Plan, aimed to significantly reduce pesticide use through a combination of regulation, farmer education, and the promotion of IPM (Integrated Pest Management) (Rådgivningscenter 1996). As we shall see, the politics of pesticide use in Denmark can be read as a site of negotiation between various stakeholders—farmers, environmentalists, government officials, and agricultural corporations—each with their own vision for the future of Danish agriculture, something that still echoes in today's debates on pesticides.

Fortun (2014, 311) suggests that late industrialism is characterised by the "increasingly intricate interlacing of commercial interests in what counts as scientific knowledge" and "the sobering and funny role of language and language ideology in the making of the world." The brief history of how pesticides entered Danish fields strongly suggests that the intertwinement we see today did not emerge spontaneously. Instead, Danish pesticides, it seems, have always been interlaced in a mix of commercial interests and scientific knowledge. The following section explores further how scientific knowledge and certainty about pesticides changed in a combination of changing scientific methods and a "vitalist" language ideology.

From Pesticides to Plant Protection Products

With the regulatory shifts and growing environmental consciousness sketched above, the agrochemical manufacturers and trade associations underwent significant rebranding efforts, which I argue played a central role in containing and making "safe" pesticide use.

Notably, in 1988, the EPPO decided to use the term "plant protection products" instead of "pesticides". This is significant for the Danish case because it resurfaced in national debates and discussions about the discursive dimension of pesticide marketing, corporate oxymorons, industry interests, and influence in a time of heightened attention to environmental issues. A good example is the strategic name shift of the industry organisation *Dansk Agrokemisk Forening* to *Dansk Planteværn*.

Dansk Planteværn was founded in 1937 as *Foreningen af Fabrikanter og Importører af Plantebeskyttelsesmidler*, meaning 'The Trade Association for

Manufacturers and Importers of Plant Protection'. In 1975, the association changed its name to Dansk Agrokemisk Forening, meaning 'Danish Agrochemical Association', and again in 1997 to Dansk Planteværn, which gave way to fierce critiques and debates between green associations and representatives from the industry association, as representatives from DN accused the industry of violating branding guidelines.

According to Benson and Kirsh (2010), corporate oxymorons are a central part of modern capitalism. Slogans like *'safe cigarettes'* or *'sustainable mining,'* or name shifts like the one carried out by Dansk Planteværn, are in this framing seen as attempts to manage or neutralise critique. Fortun (2014) further argues that corporate oxymorons are central to the industrial language ideology. In this sense, shifts like the one above can be seen as attempts to create a conceptual haze that conceals transgressions and potential harms, instead reframing toxics as "vital" (318-319), promising a strong, secure, and sustainable future.

In an opinion piece published in December 1997 in the Danish left-wing newspaper Information, Poul Henrik Harritz, spokesperson from DN, writes: "*Dansk Agrokemisk Forening* – that name clearly signalled that this was about the production and sale of pesticides for combating insects, fungi, and weeds in Danish agriculture. *Dansk Planteværn* is completely misleading and manipulative when the main purpose is to kill. Remove the bothersome weeds, kill the insects, and suppress biological biodiversity so that only the crops chosen by the farmer are allowed to thrive." (Harritz 1997)

According to Harritz, the rebranding aligned with a general rebranding trend among archaic and 'outdated' industries to assert themselves as 'good'. The head of *Dansk Planteværn*, Per Kristensen, replied to Harritz in another opinion piece stating that it was not their rebranding but rather Harritz's critique that was misleading. Rather than becoming outdated, Dansk Planteværn, he wrote, "use our influence in committee work to *ensure that the concept of sustainability* in the future form of production also includes *the economic dimension*." This illustrates the continuous work of refining agrochemicals and adjusting their perception to align with societal expectations. And even more importantly, the concept of 'sustainability' enters the debate, framed by Kristensen to encompass pesticides through the idea that sustainability is also an economic concept. Here we see glimpses of the work done to formulate a vision of sustainability that encompasses agrochemicals. Returning to Fortun's definition of the industrial language ideology, the framing effectively contains

pesticide effects within the logic of containment. As she writes (2014, 313), "Pesticides kill insects, but pose no harm to other bodies and ecologies. Production is protected; pollution is externalised. The perspective is overwhelmingly positive. The focus is on what works." Pesticides are understood first and foremost as tools ensuring the effectiveness and safety of the central object of concern: The industrial crop.

Today, the significance of pesticides in directly supporting the sustainability agenda has been emphasised even more. As the agrochemical producer BASF states in their 2023 report, "Humankind is facing enormous challenges in order to preserve a world worth living in for future generations. The climate is changing, natural resources are becoming scarcer, pressure on ecosystems is increasing and our growing world population needs to be fed. More and more urgently than ever, solutions are needed for a sustainable future. Chemistry plays a key role here. In almost all areas of life, it can pave the way to greater sustainability and accelerate the transformation needed to achieve this. Our innovative products, solutions and technologies help to improve the quality of life and protect the environment as well as the climate. We achieve this by using raw materials more efficiently, reducing waste and enabling the production of healthy and affordable food as well as climate-smart mobility." (BASF 2023)

While the statements are formulated in very broad terms, they underscore a prevailing tendency to link agrochemical use with not only economic stability and farmer income, but also central in ensuring resource-efficiency, waste reduction, and an overall "greater sustainability". Again, we see the kind of toxic vitalism described by Fortun (2014), where corporations strategically and densely list what they do and contribute to, but "with no mention of hazards or externalities." As she notes, "All movement is forward, positive." (319).

In studies of toxics, many have already documented how laws and policies governing industrial activities are often filled with technical jargon, loopholes, and shifting accountability—a strategy that Javier Auyero and Debora Swistun call "labor of confusion" (2008, 360)—making it difficult to hold corporations or governments responsible for negative impacts. In the context of pesticide regulation, the rebranding of "pesticides" as "plant protection products" can indeed be seen as *labor of confusion*. By renaming pesticides as "plant protection products," industry actors enlist language itself in sustaining the vision of the farmer as both professional and sustainable.

Yet, such rebranding does not simply obscure harms but actively recasts pesticides as a moral good: protective rather than destructive, vital rather than toxic—

and they feed directly into how farmers like Henrik and David interpret pesticides as legitimate. The next sections explore the role of science in farmers' perceptions of agrochemicals and argue that farmers' attitudes must be understood not only in relation to arbitrary language use by the industry, but also in relation to the protection of the professional farming community. This exemplifies what I call the *labour of certainty*. Here, we see how industrial systems are structured not only to keep information hidden, but also to expose it through principles of transparency, scientific documentation, and safe use conduct (Patil Shirish and Bhalerao 2013, Sridhar et al. 2023).

Sound Science

In Denmark, the regulation and approval of so-called plant protection products follow the EU Regulation (EC) No. 1107/2009, together with a guidance document on tiered risk assessment for plant protection products performed by EFSA, the European Food Safety Agency (EFSA 2013). These form the basis of the environmental regulatory "risk assessment", which is mandatory for the authorisation of active substances in the EU (Stehle and Schulz 2015). However, most data used for EFSA's risk assessments come from studies submitted by pesticide manufacturers themselves, echoing Fortun's (2014) characterisation of late industrialism as characterised by an intertwinement of science and corporate interests. A good example of how this works in practice is a campaign by BASF marketing Balaya in 2021.

The campaign was accompanied by YouTube videos, among them one from the national testing units in Flakkebjerg (2021), where BASF, together with Aarhus University, ran a field trial to test the efficacy of their new product on different varieties of wheat. In the video, Senior Principal Scientist from BASF, Rosie Bryson, speaks of the "excellent" trials led by Danish professor, Lise Jørgensen. Jørgensen explains that they do "lots of field trials where we see how we can manage diseases using cultural factors, varieties, as well as fungicides, biologicals, and different substances". The objective of the field trials, Bryson explains, is to have "independent people" carrying out trials in different geographies with different varieties and disease pressures to document the performance of Revysol, the active ingredient in Balaya—an "innovative fungicidal active ingredient for crop protection from the triazole group" designed to "outperform" (BASF 2025c).

Jørgensen highlights the importance of shifting between fungicides as their effect will decrease after some years, stressing that treatments must be carried out in a more "intelligent" way. She mentions using varieties, cultural practices, and crop rotations to minimise disease pressure and to get a "good and sustainable crop protection". Interestingly, she does not directly mention fungicides here; yet, at the end of the video, we do get the impression that Balaya can, in fact, help farmers not only protect their crops but also become more sustainable by shifting substances, lowering the risk of diseases, and securing production efficiency. From the perspective of the chemical producers, herbicide resistance is a problem of too few available active ingredients, not a structural issue linked to monoculture. Instead, Balaya helps to address a crucial problem, contributing not only to farm efficiency but also to the overall sustainability of large-scale production by minimising disease pressure and enhancing yields.

As such, the focus of the campaign is truly only on "what works" (Fortun 2014, 313). According to Fortun, strategies like these should be read as attempts to defy externalities and secure containment by defining the "science of interpretation" for chemical assessment (Ibid. 320). That companies fund research should perhaps lead to greater concern about bias and lack of complete transparency. However, the farmers would rarely question the testing systems, but rather what they saw as politically motivated campaigns questioning controversial pesticides like Roundup, despite a lack of "sound scientific evidence".

As Henrik, a conventional farmer, expressed, "The debate on Roundup is completely devoid of evidence-based arguments." Henrik questioned why "young female politicians" were yelling that Roundup should be banned, and why Roundup, among so many other compounds, had been chosen as the enemy. "Is it because it seeps into the groundwater? No, it's not. Is it because it harms health? No, no scientific evidence has decided that. In the scientific arena [*den videnskabelige afdeling*], they have decided on some boxes and categories on how to evaluate a pesticide. Roundup does not fail on any of these points. There is nothing in Roundup that is more dangerous than the other pesticides," Henrik continued, stressing that since "videnskaben" (science) had approved of it, the matter should be settled. He explained, "I think it is fair if you tighten the rules, but then the same procedure should be done with the rest of the compounds. If they can't pass the test, they should be banned. But when we have scientists who we have paid a lot of money to make safe ways to approve

it (Roundup), I don't understand why a parliament should be able to sit there and make bans." He added and concluded, "It is symbolic and emotional."



Figure 13: Frontpage of the consumer magazine Samvirke. It says "Pesticides are EVERYDAY FOOD" and contains a feature on pesticide residues in food. Several Danish farmer felt attacked by the campaign.

Henrik's defence exemplifies how farmers mobilise 'sound science' not just as evidence but as a moral shield. Science here becomes a guarantor of legitimacy, allowing farmers to position themselves on the side of reason, discipline, and *faglighed*, while relegating critics to the realm of emotion and irrationality. In this sense, appeals to science work less as a neutral reference to facts and more as a discursive performance of certainty, sustaining farmer identity and authority in the face of public contestation. From this perspective, agrochemicals can remain an acceptable part of the good Danish farmer, not despite tight regulation, but rather *because* of it. His continuous reference to "videnskab" (science), "videnskabsfolk" (scientists), and "videnskabelig evidens" (scientific evidence) and so forth shows how his perception of glyphosate as a harmless substance is nested in a discourse of scientific certainty: If subject to sound science, pesticides must be safe and thus should not be subject to feelings and emotions.

Enforcing notions of trust, sound science, and certainty in relation to regulatory testing systems, farmers are not only confirming that corporate strategies to create trust work—they are strategically reinforcing a logic of containment that serves to protect their farming community. Yet, amidst the certainty, there is an active ignorance at play too, or what Dilley and Kirsh (2015) call "non-knowledge". Farmers would often say something similar to Henrik. Like Karsten, who said, "it isn't my responsibility to keep track of what is harmful or not" in a conversation about pesticide residues, a subject that time and again receives much media attention. During fieldwork, farmers would mention a specific feature in the Danish consumer magazine Samvirke (Figure 13) that they thought had "crossed the line" and had left many farmers feeling attacked by the public. Yet, in feeling so, farmers actively rejected the burden of responsibility by taking a stance as non-knowers. By shifting the burden of knowledge to "science", responsibility is also being distributed. Thus, non-knowledge is "an agent in its own right that actively works against the strategies of other social actors" such as farm critics (Dilley and Kirsh 2015, 3).

I now turn to the social contexts of which agrochemicals are part, exploring the strategies used to maintain—and sometimes question—the industrial logic in everyday discourse and use. Returning to Steinmüller (2013), I suggest that social groups like ERFA-groups can be seen as *communities of complicity* where modes of ambivalence, humour, irony, and exaggeration serve to maintain the industrial logic of pesticides.

Together, they comprise central points in what I have come to think of as *moral survival*. Here, agrochemical risk perceptions and negotiations function as entries to explore what it means to survive—economically *and* morally—inside an agricultural system shaped by competing demands. I suggest that the industrial language ideology—including corporate oxymorons and toxic vitalism—serves to maintain the very legitimacy of a Danish agricultural industry grounded in a logic of resource efficiency. Resource efficiency relies on this industrial logic to exist and thrive. In the coming sections, empirical examples from ERFA meetings and casual conversations provide the entry point to explore how perceptions of uncertainty and risk are relationally "anchored" (Auyero and Swistun 2004, 360) in communities of complicity.

Communities of Complicity: Rebottling, Over-spraying and Drinking Agrochemicals

Working primarily amongst conventional farmers, agrochemicals were a central component, and some crops were treated several times during the growth season. A wheat field, for instance, is typically sprayed twice in the fall for weeds, and when spring comes, it is sprayed three to four times against insect and fungal attacks. Other crops, such as specialty crops like spinach and potatoes, are typically sprayed up to 18 times during the growing season. The sprayers range between 24, 36, or 42 meters in width, and a GPS typically ensures that the distance between the spray lines on the field is precisely the same. These are the lines I would see, and that anyone visiting Denmark would see, when I passed fields on my journey through the Danish landscape. But unlike many anthropological studies of toxicity, where the matter of concern is grounded in people's experiences of uncertainty, risk, and harms related to toxic exposure (Shapiro 2015, Wylie, Shapiro, and Liboiron 2017, Blanchette 2019, Davies 2018, Bond 2021), concerns over agrochemical toxicity and harm were largely absent or left in the past.

"In the old days", I was told, people would spray entire fields with airplanes, spray in the summer heat when evaporation was at its highest, spray out the entire flower beds by the roadside, and repeatedly use the cheapest compounds they could get. But the past belonged to "bondeknoldene," the irrational bumpkins, and to a time before the weight of environmental harms had surfaced public attention and installed strict agrochemical regulation and enhanced educational efforts in handling and

storage. Today it was different, I was told. Today, agrochemical use was safer, if not safe, compared to the early post-war times when it was akin to the wild west, and Danish farmers had significantly decreased agrochemical use thanks to innovation, harmonised approval systems across EU member states, as well as strict national regulations. While strict regulation was most often met with resentment, as we saw in Henrik's case, farmers largely praised the innovative capacities of the agricultural sector that made it possible to keep both pesticide compounds and a reasonable fertiliser quota thanks to the successful development and implementation of precision technology. Precision technology paired with a science-backed approval system and strictly sealed tractor cabins was seen as enabling the 'safe use' of agrochemicals. As such, farmers' perceptions of agrochemicals were not immediately characterised by a sense of risk or harm. Instead, agrochemicals largely figured as a necessity: not a necessary evil, but a necessary *good*.

One day, when I was driving around with David, a young farm worker in his 20s, the conversation landed on the use of agrochemicals. David himself had worked in agriculture on different farms since he was 13, and now he worked at a conventionally driven farm not so far from where he grew up. We were talking about restrictions, and I had asked him about the potential challenges experienced by farmers when an agrochemical was no longer available due to regulations. Roundup and Reglone, two compounds used to kill herbaceous weeds and desiccate potatoes, respectively, had recently been subject to debates about whether they should be allowed. Reglone, containing the active ingredient diquat, was in fact subject to a general ban by the EU. Still, trade associations like *Danske Kartofler* had managed time and again to successfully apply for dispensation by documenting "safe use". But if Reglone was actually to be banned, he told me that farmers would face "severe losses".

When restrictions were announced, David told me, farmers would usually stock up on the given chemical before the ban came into effect, rebottling it in old containers. David laughed. "And if they happen to have a few banned bottles on the shelves, they will likely mix it with the manure". Apparently, the manure tank was used for disposing of a lot of things that were otherwise difficult to dispose of. I found the practice of rebottling and mixing despite official bans quite shocking. I was genuinely struggling to make sense of the farmers' laissez-faire attitude to these bans, as my first impulse was that the ban reflected a *real risk* posed by their continued use. Considering what

I thought of as quite severe transgressions in pesticide handling and use, David seemed surprisingly calm and even found it a bit silly.

David explained that disposing of agrochemicals was "insanely expensive". Thus, farmers faced the prospect of losing both agrochemical resources *and* money, and they would presumably go pretty far to avoid that. As such, it would seem as if the farmers yet again acted out of pure economic interest. However, a more striking feature of the laissez-faire attitude emerged that was less about financial loss, and more about the politics of knowledge—who has the claims to truth? For instance, when I asked David if the farmers were not concerned about the potential risks involved in keeping chemicals that the Danish EPA had classified as potentially harmful, he replied by implicitly questioning the foundation for the decision in the first place. He said, "Denmark has one of the strictest regulations on chemicals, and many of the chemicals we are not allowed to use here, farmers all over Europe can use. And why is that?"

Implicit in David's question "why is that" lies a general attitude broadly represented by farmers that the Danish regulatory system is *too* tight, basing its bans not only on scientific evidence, but on people's fears and feelings, a feature that many farmers considered increasingly problematic in Danish politics. David rightly pointed to the fact that Danish agrochemical regulations are indeed stringent—besides being subject to one of the world's most ambitious chemical regulations under the EU framework REACH, Danish farmers are subject to even stricter national enforcement pushed through in part by environmental organisations and associations. I had often heard farmers compare Danish regulations with those of other EU countries, as Henrik did, complaining about their restricted access, which they linked to a lack of competitive power. As a result, many Danish farmers had entered types of "venture" farm enterprises, buying land in Eastern European countries like Poland, Latvia, and Romania to farm without the annoying Danish restrictions.

When farmers narrate these strategies—buying land elsewhere, rebottling, and mixing—they are framed as pragmatic, and perhaps a bit silly. Most strikingly, this attitude of non-danger was expressed by David when he said that "If you ask the farmers, most will say that they are willing to drink the chemicals." This is, of course, not to be taken literally, and I never saw farmers actually drinking agrochemicals. However, I did experience more than once that farmers would say that if the ministry had approved a compound, they would take it as harmless, echoing Henrik's attitude. The willingness to 'drink' agrochemicals—or at least their claim to do so—can thus be

seen as part of a complicit performance to confirm the narrative of pesticides as "safe", silencing and ridiculing national health concerns as based not on facts but emotions.

In the following, we meet Dennis, one of David's colleagues, and a farm worker whose experience of agrochemical transgression serves as the basis for further discussing the industrial logic of containment and locating potential for negotiation.

Negotiating Containment and Transgression

While at most times agrochemicals figured as a benign necessity to conventional crop production, something that was mixed in a tank and safely graduated to fields by farmers from a locked-up cabin instructed by a pre-programmed GPS sprayer, agrochemicals at other times disturbed the industrial haze—the narrative of containment and safety. I was told about one of these times by Dennis, a farm worker in his 30s who worked in the field on Erling's farm. Dennis was going to spread potassium in a potato field. It needed 'patent potassium,' as he called it, which was an extra expensive potassium supplement that didn't contain sulphur. Sulphur, apparently, lowered the starch percentage in the field, so the expensive, sulphur-free potassium was preferred.

Dennis was going to fill the fertiliser spreader with potassium, and David was helping with a front-end loader. Gigantic 750kg sacks were lifted from the barn floor to the fertiliser container, and every time a sack was emptied, a cloud of dust rose into the air. The dust landed like a fine blanket everywhere, blending into the greyish, thick, and finely powdered dust from the feed tank, which hung in cobwebs and painted the feed tank grey. Sacks of AlphaSoy stood up against the walls around the tank, a feed supplement for the pigs. While I stayed as close to the barn exit as possible to avoid inhaling the unidentifiable dust, neither Dennis nor David was wearing protective equipment as the thick dust sealed the air. Perhaps I was being overly conscious, but I had a feeling similar to some days in the middle of newly sprayed rapeseed fields, and it did not sit right with me. I wondered how it sat with Dennis and David.

Dennis had graduated as a farm manager in 2011—since then, he had worked on various farms, including in Australia, where he had worked continuously for two years at one point. He had then returned, year after year, as a seasonal worker, helping in the fields. "In Australia, the water comes from above," Dennis said. According to Dennis, this meant that you did not need to worry so much about what you put in the ground, including chemicals. "There is basically no groundwater," he said, "and yet



Figure 14: Dennis and Davis loading a farm machine with nutrients

they are still able to have children." Dennis concluded that perhaps the restrictions on chemicals were a bit exaggerated. A bit too strict and a bit too pointless, he suggested. At the same time, Dennis had sometimes become concerned when he could smell the

chemicals when working on the Australian farms. When he smelled them, he sometimes became aware that they were potentially harmful. “I didn’t know why,” he said. “It just felt instinctively wrong,” and he had experienced an instinctive and unexpected need to put on gloves and a mask.

While the situation in Australia was perhaps more extreme due to fewer restrictions and a more careless handling of chemicals, he mentioned feeling a similar urge to put on a mask when he loaded the seed drill with pre-treated seeds. When he poured in the seed, a cloud of dust would rise, and Dennis had identified—without feeling sure about it—that there might be a connection between inhaling the dust and a range of symptoms he had subsequently experienced. His breathing had worsened, and his nose had run. Now they no longer used the agent at the farm he worked on, but Dennis could still recognise the urge to put on a mask and gloves when he handled specific agents.

As already mentioned, toxic exposure and risk perception have mainly been addressed through tropes of intangibility, epistemic vulnerability, and the challenge of evidence (Auyero and Swistun 2008, Murphy 2006, Shattuck 2021b). For instance, historian and STS scholar Michelle Murphy (2008) argues that the very intangibility of chemicals creates an epistemological gap, which in turn makes room for industries to deny or downplay harm. As she notes, “while synthetic molecular relations are clearly the result of activities which generate capital, they also tend to be ‘externalized’ material effects of production and consumption practices—that is, effects that are purposively posited as existing outside the accountability of corporations, and in the context of neoliberal governments, outside the scope of regulation.” (697)

Seen from this perspective, Dennis’s story and his experiences with potassium dust, treated seeds, and other chemical agents exemplify epistemic vulnerability and uncertainty, highlighting his vulnerability as a worker. However, as suggested, it also shows that while perceptions of unease, risk, and potential harm are far from absent, they are actively downplayed, especially in social community contexts.

Thus, toxic exposures are both pervasive and normalised: integrated into daily routines to the point of being ignored or downplayed, reflected in Dennis’ inconsistencies in wearing protective equipment. While he recognises that something feels wrong, his embeddedness in the farming world seems to make it difficult to articulate that feeling or act differently. His experience can be seen as an example of

how the labour of certainty works socially: it ensures that fleeting recognitions of harm do not destabilise the collective identity of the professional, responsible farmer.

If Dennis' experience can be said to "stir ethical consideration and potential intervention" (Shapiro 2015, 369), it is a consideration aligned with community survival, prompting him to silence his concerns. As such, transparency and visibility do not always translate into accountability or desires to know.

Conclusion: From *Labor of Confusion* to *Labours of Certainty*

Agricultural pollution, like nutrient discharges or PFAS from pesticides in drinking water samples, remains a pressing political subject (Regeringen 2024). While significant progress has been made, both in terms of reducing discharges and making pollution visible through research (Nielsen et al. 2020), challenges remain, particularly in addressing diffuse agricultural pollution. Pollution from widespread agricultural activities is 'diffuse' as it is hardly traceable to a single, identifiable source (Jacobsen, Anker, and Baaner 2017, Mellander et al. 2018, Sharma 2020).

The diffuse character of agricultural pollution has led some scholars, such as Annabel Sharma, to characterise the problem of diffuse pollution as *wicked* (Sharma 2020), borrowing the term from Horst and Webber (1973). 'Wicked' problems are those that continue to persist despite policy intervention. Unlike point-source pollution, diffuse pollution is challenging to monitor and manage due to its dispersed nature and dependence on factors like weather, soil type, and farming practices. The factors that transport pollutants into rivers, lakes, and coastal waters are unstable, and with climate change, they are unlikely to become more stable.

Considering the inherent "diffuseness" of agrochemical pollution, the logic of "safe use" does not seem very convincing. Yet, the very diffuseness of pollution reinforces the need for certainty. Because harms cannot easily be traced to specific actions or actors, they are displaced into the background, while "safe use" becomes foregrounded as proof of *faglighed*. This displacement protects not only production but also the moral community of industrial farmers, whose legitimacy rests on the promise that efficiency and sustainability can coexist through careful management of chemicals. In this way, the discourse of safe use functions less as a guarantee of environmental protection than as a defence of farming's moral and professional legitimacy. From industry rebranding pesticides as "plant protection products," to regulatory frameworks that legitimate their use, to farmers' appeals to "sound science"

as a moral shield, the *labour of certainty* is distributed across institutions, discourse, and everyday practice. Jack's indifference to contradiction, Henrik's invocation of science, Dennis' hesitant silence, and the invisibility of diffuse pollution all demonstrate how certainty is manufactured, defended, and lived.

In making this case, I extend Auyero and Swistun's (2008) notion of the *labor of confusion*. Where confusion unsettles knowledge and breeds doubt, certainty stabilises it and protects legitimacy. Both require institutional labour, but in the Danish context, it is certainty—not confusion—that allows pesticides to appear safe, professional, and morally compatible with sustainability. Similarly, I develop Steinmüller's idea of *communities of complicity*. Here, complicity does not only entail silence about wrongdoing, but also collective affirmation of safety and even the silencing of one's own embodied doubts. This reworking shows how complicity can sustain industrial farming identities even in the face of evident contradictions and harms.

The contribution of this chapter, then, is twofold. Conceptually, it introduces the *labour of certainty* as a way to understand how agrochemical practices are stabilised and legitimised. Empirically, it demonstrates how Danish farmers sustain pesticides as morally compatible with sustainability by performing *faglighed*, resource-efficiency, and safe use, even as chemical residues might accumulate in their fields, bodies, and ecosystems.

This labour of certainty forms the ground from which new technologies—such as precision agriculture—emerge as the next solutionist promise of sustainability. In this framing, achieving sustainability is a technical feat related to optimisation and precision. The implications hereof are explored in the following chapter. It shifts orientation from agrochemicals to technologies, tracing how precision technologies extend the same industrial logic and reframe chemical intensification as environmentally responsible and technologically advanced.

Chapter Six
Sustainability through Precision



Figure 15: Banner in the hallway at Plantekongres from CropLife Denmark saying "Solutions for Agriculture" picturing a male holding a tablet

"There is something disturbingly beautiful about precision, even when we know it fails us. A century ago, people stood awestruck at the terrible precision of the factory; today it is the precision of the computer. Precision has mesmerized not just engineers but all kinds of designers, scholars, and observers."
Anna Tsing, *On Nonscalability: The Living World is not Amenable to Precision-Nested Scales,* 2019, 143

"I think the biggest distinction will be between those farmers who are forward-thinking, those who are constantly investigating and taking action, following developments—and of course always being critical—and are always open to new ones."
Peter, a conventional farmer, 2020.

Precision Agriculture as Digital Sustainability Infrastructure

This chapter explores precision agriculture (PA) as a digital sustainability infrastructure—at once a technological promise and an infrastructural mode of governing. On one hand, PA operates as a speculative vision, shaped by the material, political, and moral logics of its time (Anand, Gupta, and Appel 2018). On the other hand, it functions as an instrument of governance that renders sustainability actionable through calculability, legibility, and documentation (Scott 1998, Gibson 2019), which some have called "data-driven sustainability" (Hatanaka et al. 2022).

Jane Gibson (2019, 162) notes how advances in digital technologies have caused a whole new digital infrastructure to emerge. Building on scholars like Gibson and others (Murray Li 2018, Appel 2019, Bear 2017) who attend to how infrastructures are embedded in "proliferative, powerful, and systemic" capitalist formations (Appel 2019, 4), I examine how PA stabilises a particular version of sustainability aligned with Danish national growth strategies, science-based climate targets, and capital-intensive, large-scale conventional farming. In this sense, PA is not merely an "ecomodernist fix" but a form of infrastructural governance, advancing what I call *industrious sustainability*: a normative model in which farmers are expected to perform responsibility through technological adoption, documentation, and optimisation. Here, sustainability becomes legible through audits and documentation (Mc Loughlin 2025, Strathern 2000, Shore and Wright 2015).

On the scale of everyday life, I argue that PA enables a form of industrious sustainability wherein environmental care is mediated through calculative,

anticipatory, and evidentiary systems, shaping the moral economy of what it means to farm well and responsibly. As such, this chapter asks: How does precision agriculture function not only as a technological fix, but as an infrastructural mode of governing sustainability in Danish agriculture?

The Future: Crisis, Hope, and Technological Promises

The collectivising force of the unofficial national hymn at first seemed abruptly disturbed by the introductory warning of the chairman's annual account: "Energy crisis, food crisis, inflation, climate crisis… All the crises that started with Putin's brutal invasion of Ukraine, and now the question of how they all affect agriculture as an industry, as well as farmers' private finances." But despite the grim tone, the chairman Torben was clear: *We can make a difference. We are not part of the problem. No, we are part of the solution!* Torben highlighted farmers' resilience, innovation, and capacity to adapt, pointing to the successful 2022 harvest as evidence. "Agriculture *can* help to solve the climate crisis, *if only we are allowed*." As he exclaimed, "Give us the opportunity!" A clear message to politicians, the regulatory system, and the bureaucracy had been delivered. The audience responded with nods of agreement: *give us the opportunity, and we will contribute to the green transition.*

During 2022, the market had gone wild, and in January 2023, most farmers were simply waiting for the inflation to manifest in their own finances. *Energy prices are fertiliser prices*, as the chairman said, heralding a year with higher prices for inputs, fertiliser, pesticides, diesel, and drying, as well as an increase in interest rates, which would hit the heavily indebted farmers the hardest. In this context, many farmers were interested in reducing their input—it was "good for the environment and good for the wallet", an oft-repeated sentence among farmers.

Torben highlighted the government's action plan, *Aftale om Grøn Omstilling af Landbruget* (2021), as something positive that the industry should welcome. Opposed to the perceived "non-sense regulation" of the groundwater packages, Torben saw the revised agreement as "a professional strategy," where regulation was based on "development and not de-development," which was reflected in an ambitious development track focused on the technological development of pyrolysis and biochar, and on further implementation of precision agriculture technologies. "*Lad fagligheden* vinde [Let professionalism win]," he proclaimed in a loud and highly assertive manner.

According to Torben, "faglighed" was illustrated by L&F's own strategy for 2030. Here, a key element in reducing environmental impacts and increasing sustainability was *precision agriculture*. Torben praised the farmers' preliminary uptake and use of the technology and highlighted the successful negotiations between L&F and the government as an essential driver of PA implementation, as negotiations had resulted in a deal where the documented use of precision technology would alleviate parts of the controversial catch crop regulation, as stated in *Gødskningsloven*. The benefits of PA technologies seemed almost inexhaustible as Torben listed several ways it contributed to meeting farmer challenges: reducing pesticide use, optimising inputs to achieve optimal yield, and importantly enabling the documentation of "all the good things farmers *already* do to address *klima* and *miljø* (climate and environment)".

Others would likely call it technological optimism, but according to Torben, precision agriculture was a "professional" strategy—a science-backed strategy to reduce inputs and make Danish farming more sustainable. *Faglighed* in this context, as we shall see, is not only about having the right competences. Instead, it is a moral claim to legitimacy. Considering the doomsday forecast in Torben's speech, the congress sessions offered nothing but solutions. They gave the impression that technological advancements and innovations would secure Denmark's productive history, even in the face of growing uncertainties and environmental demands.

National Imageries

Torben's speech from Plant Congress 2023 reflects the certainty with which digital precision technology is posited as a rational strategy for sustainable farming. Being a congress arranged in collaboration between public universities and private research institutions, Plantekongres serves as a platform for disseminating research results, presenting new promissory technologies, and forming new collaborations that will boost the future economy of the agricultural sector while solving sustainability issues. As such, it can be seen as an opening into the future of Danish agriculture, while echoing the collaborative and innovative efforts of the past, mentioned in *Chapter Two*.

Understanding the role and great embrace of digital technology in the agricultural sector, it is worth noting that Denmark figures among one of the world's most digitalised countries, reflected in the Danish "National Strategy for Digitalisation" (2022) published by the Ministry of Finance. According to the ministry

itself, “Denmark's leading position is the result of innovative businesses and close and committed cooperation across the entire public sector and in close partnership with private partners.” (8). In Danish political imagery, digitalisation offers a future path shaped simultaneously by welfare, growth, and solutions to the green transition. As the Ministry of Finance writes, “we need to use digital tools, data and new technology even more in the future to increase growth, find new solutions in the green transition and develop and strengthen our welfare system.” (Ibid.). Among farmers a similar sentiment was expressed, like Peter who said, “I’m not into computers and it’s not something I’m very good at, but I’m completely aware that it’s the only thing that solves our future challenges, it’s when we use this right and when we develop software and automatic logging of data and artificial intelligence and all that – it’s simply the future! And cameras and everything like that, that’s what’s moving us forward. It has a huge potential!” This resonates with what Anand, Appel, and Gupta (2018) call *the promise of infrastructure*—a speculative form of world-making in which technology is mobilised not only to solve concrete problems but to stage future (political) imaginaries of order and resilience. In this case, the resilient Danish farmer who can cope with environmental challenges by investing in digital technologies is staged as the future. But what exactly is precision agriculture, and how may it be considered sustainable?

Precision Agriculture as Sustainability

Precision agriculture is also known as *site-specific crop management*. The International Society of Precision Agriculture defines it as “a management strategy that gathers, processes and analyses temporal, spatial and individual data and combines it with other information to support management decisions according to estimated variability for improved resource use efficiency, productivity, quality, profitability and sustainability of agricultural production” (ISPAG 2025). As such, PA is a farming approach that seeks to optimise production efficiency through the use of advanced technology, such as data analytics, sensors, GPS, weather stations, satellites, drones, and other tools to monitor crop health, pests, soil conditions, and environmental factors at a detailed level. By integrating data, the aim, some say, is to enable farmers to make informed decisions with greater accuracy, for instance by tailoring inputs like water, fertilisers, pesticides, and seeds to the specific needs of each

area which is said not only to improve economic efficiency, but also the sustainability of farming (Zhang, Wang, and Wang 2002, Zhang 2015).

At Plant Congress both in 2023 and 2025, these digital solutions were overwhelmingly present, and the foyer had literally been transformed into an industry tradeshow: a showcase of digital screens, drones, robots, and satellites, each with company representatives handing out logo-candy and flyers.



Figure 16: Hallway entrance. SEGES innovation occupying the entrance with banners and information about their digital solutions, like precision technologies and "decision support" systems

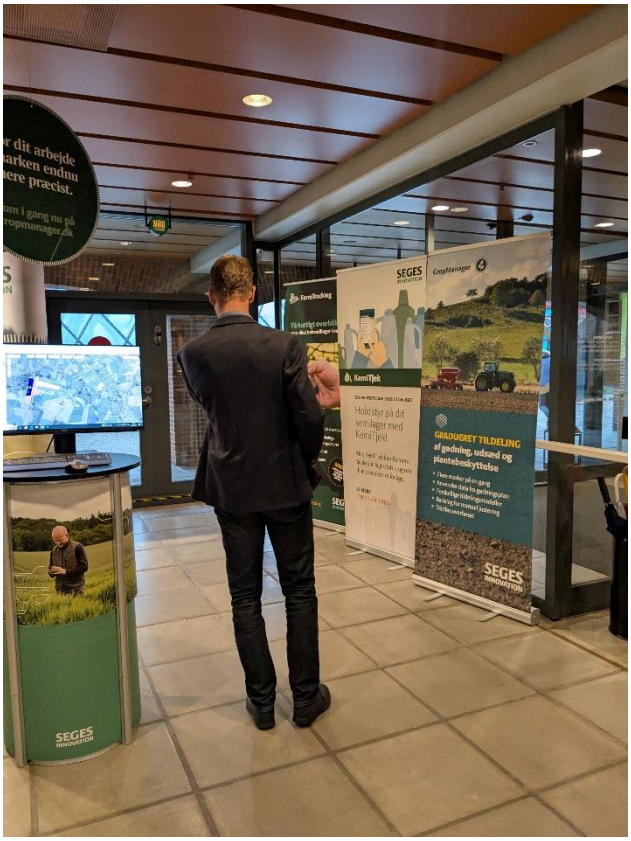


Figure 17: Image from hallway

SEGES Innovation, one of the congress organisers, occupied a large part of the entrance with a sign hanging from the roof saying, “Gør dit arbejde i marken mere præcist” (Make your work in the field more precise) (Figures 16 and 17). On their website, SEGES Innovation is described as “an independent research and innovation company that works for a sustainable and competitive agriculture and food production. We combine scientific insights with digital technologies to put new knowledge into play in the stable, on the field, and in the entire value chain from farm to fork. SEGES Innovation collaborates with universities, government departments,

supply industries, and trade associations both nationally and internationally" (SEGES 2025), and in 2025, they offered 18 different so-called "digital solutions" based on various forms of farm data. Yet, digital services are not limited to innovation centres like SEGES.

Over the course of fieldwork, I had witnessed how more and more agrochemical companies like BASF and BAYER began to market precision technology products, such as sprayers like BASF's "One Smart Spray" marketed under the banner "Så lidt som muligt, men så meget som nødvendigt" (As little as possible but as much as necessary) (BASF 2025b), referring to agrochemical use—a saying I heard repeated several times by both farmers and consultants during erfa-meeting. Right across the hallway from SEGES, CropLife Denmark occupied a large area with tables and a poster (figure 15) that said, *SOLUTIONS for agriculture*, showing a man dressed in a checkered shirt holding an iPad in his hands, gazing out at a barley field with a blue sky above. Before January 2025, the organisation was known as *Dansk Planteværn* (Danish Crop Protection). Now, they signalled not only the protection of crops: They were bringing the very vitality of life to crops and also digital *solutions* to the Danish farmers. As an industry organisation, they partner with companies like Bayer and Syngenta, leveraging precision technology to brand their sustainability efforts. On their website, they write how digital technologies "can contribute to optimising the use of conventional pesticides [...] contributing to a more sustainable use of conventional pesticides in farming" (Croplife 2025). As we saw in the previous chapter, precision technologies are also offered as decision-support tools to help farmers act timely against fungal outbreaks like Septoria and to determine when to use a pesticide according to humidity, temperature, and so on.

Undoubtedly, companies like BASF and Bayer see PA as a business opportunity with the increased uptake of PA technology. A 2019 publication by DST (Lundø and Larsen 2019) showed that nearly every fourth farmer used precision technology, yet precision technology was applied to only 57% of farmland. In 2024, these numbers had increased to cover 81% of Danish farmland (DST 2024c), yet with only a narrow range of technologies used—most commonly the sectioned sprayer—suggested an untapped potential in technological uptake. It should be no surprise then that PA technologies are marketed heavily, often through visual advertisements of glancing agricultural machinery and a farmer effortlessly operating the machinery.

The significant uptake of PA fits well with the farmers I encountered during fieldwork. Here, the vast majority had implemented precision tools, and with few exceptions, they considered PA "the future": A scientifically grounded and rational strategy to meet and document sustainability targets through "less input, more output". Like Peter, who saw it as a "smart" way to decrease pesticides: "Pouring it [pesticides] over the entire field, as we do today, where 10% of the field might have a real need—that might not be so sustainable. But let's say the pesticides are of a high standard and are not harmful to health, and can be reduced by 80% using technology, then I think we are really sustainable. Then the discussion should be, is that not sustainable?" While the closing sentence is posed as a question, Peter seemed to have the answer: it was sustainable! In this case, sustainability is again framed as being about the relationship between inputs and outputs to improve resource efficiency. Yet it says very little about the amounts of fertiliser that are still being applied to sustain yields like Peter's. Nevertheless, most farmers were highly supportive of PA, praising in particular the fact that it was "vidensbaseret" (based on science).

At Plant Congress this opportunism was unwavering, and there seemed to be few problems that PA could not solve—from pollution to climate change—leading farmers' representatives to argue that instead of phasing out the intensive livestock production, the Danish farmers should, in fact, lead the green transition *with* their livestock, but aided with specialised knowledge, technology and practical know-how on how to make product units with a low carbon footprint. A similar sentiment was expressed by Peter, who suggested that instead of the emotional scare campaigns against pesticide use, it would be sounder to produce "smartly" with pesticides, and precision agriculture made that possible. Like he said, "If you actually use some pest control products and pesticides that make your field perform optimally—so that you don't have a 30% yield drop because you don't have a product that can remove some unwanted insects—then I would actually say that then you actually have sustainable production, because you have done everything you can to ensure optimum with the known technology, by reducing your pesticides to the absolute minimum." Importantly, then, PA is used as a way to combine otherwise hardly compatible visions: the highly efficient, industrial farm and an environmentally friendly and sustainable future.

Jakob is in many ways a paradigmatic figure of the 'smart farmer'—someone whose professional legitimacy and sustainable identity are performed through his

technological proficiency. He exemplifies the ideal of a good farmer that precision agriculture helps cultivate.

Jakob

In the local area, Jakob was considered *the guy* of "less input, more output," and one of the forerunners of the successful integration of PA technologies. He was part of the young and successful generation of farmers in the area, and the farmers who had sent me his way described him as "future-oriented," as a "pioneer" in successful agricultural digitalisation. Before I met him, it would be no exaggeration to say that he had gained an almost mythic character in my field. In general, I would hear a lot about other farmers, so in that sense it was not extraordinary, but there was something special about the way people spoke of Jakob. In advance of our meeting, I did a Google search, and Jakob was featured in several articles in *Landbrugsavisen* and *Maskinbladet,* praised for his exceptional skills in technological management. Erling had stressed how he could "really teach me something about sustainability in conventional agriculture".



Figure 18: Inside the cabin of a tractor with the digital field map displayed on the right

When I finally met him, it was through the window of a wide-legged self-propelled sprayer with thin wheels and a gigantic cab in the front. It was bright green, and the shiny cabin was almost floating above the road.

Jakob was smart, that was what everyone kept telling me, and apparently, this made him able to utilise the technology in ways that went beyond simple fertiliser allocation. Jakob told me that using the data correctly, he would know "exactly what went into the field, and exactly what came out." He exemplified, "So, let's say I'm using fewer seeds in one field and more in another, and I see that they get the same results. Then I will know that I most likely wasted seeds on the latter. But not necessarily, because if you know not just the seed amount, but know the exact combination between crop variety, fertiliser, soil type, nutrients, and herbicide application, the data can tell me if it was the seed amount or if it was because the field with more seeds was, in fact, lacking specific nutrients. Or maybe a third. So, knowing all this allows me to make smarter decisions in the next season." Jakob thought it was unwise not to use the technology. Like he said, "We should get better at using the available tools to improve our yield. I think that's *godt landmandsskab*. When you think about all the environmental restrictions and demands for a more sustainable production, the industry has a responsibility to do better, and I really think this [i.e., precision agriculture] is part of the solution." Jakob emphasised that documentation was crucial in this regard. He said, "The data I collect to make these decisions may become really useful because we need to document that we are actually using resources more efficiently, we can't just say so."

Jakob's description illustrates how being a good farmer increasingly relies on the ability to master the relationship between input and output, and how algorithmic and data-based technologies have become essential in doing so.

Documented Professionalism

Importantly, in the above description, Jakob ties the use of precision agriculture with more environmental demands from politicians and from society. During fieldwork in 2020, rumours warned that the forthcoming agricultural deal of 2021 would centre on the reduction of GHG emissions, but no one knew for sure. However, the uncertainty was clearly felt in the industry and among farmers like Peter. He said, "Now, for instance, we have these 'Paragraph 3' areas on the sketch board, and also the 70% reduction. And it's not just farmers but also credit institutions and banks who know

about these political ideas, right? So, it is this instability that affects us when politicians want to intervene in our industry. It affects our ability to run the business." From the felt uncertainty of Peter, documentation becomes a tool to secure legitimacy and responsibility in the face of environmental scrutiny. As he said, "vi er et jagtet folkefærd" (we are a haunted people). According to Peter, this was one of the reasons behind the increased bureaucracy surrounding farming. Here, digital solutions indeed offered a way to leverage the burden of bureaucratic logging and to demonstrate that farmers were, in fact, producing in a sustainable way.

At Plant Congress, SEGES offered a glimpse of their digital solution *ESGreenTool,* described as "A digital solution designed to assist farmers in documenting their sustainability initiatives and identifying areas for reducing carbon emissions", which was placed closest to the hallway, making it virtually impossible not to notice. The tool comprised two main components: *ESGreenTool Climate* and *ESGreenTool Report,* which together enabled farmers to both calculate the carbon footprint of their entire farm, to identify effective strategies for reducing emissions, and to document their efforts and 'commitment' to sustainable practices in negotiations with stakeholders such as banks or business partners. These documentation strategies have become increasingly crucial for being a good farmer today, as societal and political demands continue to rise.

Societal demands are primarily defined in terms of national science-based targets, like the 70% reduction of GHGs before 2030 (Finansministeriet and Ministeriet for Fødevarer 2021), the government's pesticide plan for reducing pesticides, "Sprøjtemiddelstrategi 2022-2026" (Miljøministeriet 2022), and the societal pressure exercised by public awareness of pesticide residues in water (Boding Hansen 2022). From the perspective of these divergent ways of problematising agriculture, precision agriculture becomes a form of "documented" professionalism, legitimacy, and responsibility. This reflects tendencies from other contexts where technological adaptation is employed as a strategy to address crises, such as climate change (Passarelli et al. 2023). At a governance level, documentation has indeed become a key governing tool in Danish agriculture, linked to science-based targets, CAP compliance, and climate metrics (Jensen et al. 2012, Larsen and Powell 2013). This is also evident in the ESGreenTool, where documentation becomes a significant currency in the sustainability economy, particularly in relation to bank loans. Here, PA is offered not only as a management decision tool but also as a documentation tool

that enables farmers to document their climate impacts and reduced use of herbicides and fuel. As such, precision agriculture allows sustainability to be measurable through a triple bottom line approach. Yet, the triple bottom line, encompassing economic, environmental, and social dimensions, is itself layered with multiple timelines at play.

Of importance to farmers and the farming sector's approach to sustainability is the layers of "environmental sustainability". This refers not only to climate targets, but also to ecological concerns such as biodiversity, soil fertility, and pollution. In practice, however, climate has become the dominant frame, primarily because it can be quantified, benchmarked, and translated into political goals and audits. Concerns such as biodiversity loss or pesticide residues are less easily measured and therefore risk being sidelined, even if farmers recognise them in their everyday practice. This narrowing of environmental sustainability reflects the broader audit logic: what can be counted and reported gains prominence, while slower ecological processes remain in the background. Thus, sustainability is not just about which goals are pursued, but also about which ecological futures are made visible or invisible through policy and reporting frameworks.

Technologies such as sensors, algorithms, and data-driven decision support systems enable farmers to reduce inputs, maximise outputs, and minimise deviations. Here, environmental sustainability is something that can be mapped, standardised, and made generalisable. This is what we may perhaps best understand as evidence-based sustainability—measurable, comparable, and, not least, scalable. Because the Danish state relies on farmers' ability to document sustainability, enabling the country to meet its sustainability targets through so-called "science-based targets", this is considered a crucial strategy (Jensen et al. 2012). This resembles what some scholars have come to term "audit cultures" (Strathern 2000, Shore and Wright 2015).

Audit cultures are characterised by how countries, universities, and companies are measured and rated (Miller 2001), a phenomenon that has intensified as governments and other organisations have sought to mobilise their assets to compete more successfully in the global knowledge economy. As Strathern (2000, 1) has noted, audits have come to embody a new form of ethics where moral and financial concerns intersect, what Shore and Wright (2015) call an "ethics of accountability." In a Danish agricultural context, Eimear McLoughlin (2025) elaborates on the ways that veterinary epistemic regimes have been captured by audit rationalities and how this impacts moral practices of care. Similarly, PA can be seen as an audit rationality that

instrumentalises environmental care and responsibility. Yet, a pertinent question in this context is whether sustainability—a concept that is necessarily oriented to the future—can in fact be documented "here and now", as the PA technologies promise? And how do demands for generalisable forms of sustainability shape environmental accountability? The remainder of this chapter will seek to answer these questions.

Uncertainty, Temporality, and Farming the Future in the Present

Sustainability, as framed in science-based targets, is inherently future-oriented: the 70 % reduction goal is set for 2030, pesticide strategies unfold in multi-year increments, and regenerative agriculture promises benefits that may only materialise over decades. Yet, like agrochemical crop management (as we saw in Chapter Four), documentation practices compress this temporal horizon into the immediacy of "here and now." With tools like ESGreenTool, farmers are required to provide real-time proof of their sustainability efforts, creating evidence for practices whose actual environmental impact will only be known in the long term (Lohrum, Graversgaard, and Kjeldsen 2021). In other words, the political demand for measurable sustainability collapses the uncertain and open-ended temporality of farming and ecological change into calculable, present-oriented metrics.

Many farmers I spoke with expressed frustration with the temporariness of agricultural policies and how ongoing political negotiations made it difficult for them to make future investments, as they had no idea what direction the next coalition would take. Peter, who was a conventional pig and crop producer, explained this dilemma to me through the example of pig production. This highly controversial production form has often been the subject of debate among environmental movements, politicians, the farming industry, and the public (Hansen 2019, Bøgh Sørensen 2025). I asked him what he thought pig production would look like in 50 years, and he replied:

> 50 years? I don't think it makes sense to speak of 50 years, I think you need to begin with maybe 5 or 10. Development happens at such a rapid pace. Constantly, we need to change the shape of our barn, the indoor conditions, the ventilation systems, and the slurry canals. We need to change to meet new demands. If you can't do that, you're out of the game. We just experience that these things are happening at an even more rapid pace now, you know, it's *all* the time.

From Peter's experience of ongoing political changes, sustainability politics has become yet another "demand" to comply with. Still, a challenge to complying with these demands is the competing timelines of politics and sustainability. While I will provide a detailed account of the Danish political system, some central characteristics of modern Danish politics are useful to mention.

In Denmark, a new parliament is elected every four years, where (sometimes) new political parties form a ruling coalition. First, this pattern means that political priorities (those that will receive the largest share of the financial budget) are renegotiated every four years. What usually happens within the timespan of four years is that political action plans and reforms are subjected to debate and negotiation before agreement on new political targets is reached and implemented through necessary regulation and/or subsidy opportunities. Implementation itself is messy, as new legislation and regulatory frameworks never quite fit the reality in which they are put to work, causing even more debate, negotiation, and critique from industries and the public.

Peter is not the only one suggesting that the pace of politics has increased. In a recent book, "Lad det gå langsomt" (Lauritzen 2023) by former politician and tax minister Karsten Lauritzen, he criticises what he calls an 'unhealthy' fast-paced political culture and warns against the race for votes that today informs many political processes. Lauritzen suggests that fast-paced politics is what causes 'whopsi-solutions', sloppy legislation, and growing political discontent and mistrust among the voters. As the title suggests ("Let it go slowly"), he calls for slowness, thoughtfulness, and long-term thinking.

Farmers like Peter experience that their current practices are constantly judged against uncertain and shifting future targets, which remain politically contested and subject to ongoing scientific recalibration. Precision agriculture thus becomes a way of aligning agricultural practice with a bureaucratic temporality of monitoring and reporting that does not necessarily correspond with ecological rhythms or the slower temporalities of soil, water, and biodiversity, but instead with their own and the Danish government's current need to perform. Yet, farmers would often describe agricultural change as "turning a tank ship around". We can see the image. Against this, the fast-paced one-year cycle of financial and documentation goals clashes with what farmers believe it truly takes to turn the big ship around: *time*.

This temporal dissonance was also evident at the 2025 Plant Congress, where the language of scalability and standardisation in digital tools was juxtaposed with regenerative agriculture. This paradigm emphasises gradual ecological restoration and resilience, foregrounding a different temporal horizon—one of repair and long-term care (Puig de la Bellacasa 2017). The contrast between these approaches highlights a broader struggle in contemporary agriculture—between immediately documentable sustainability and forms of value that resist immediate measurement.

Unscalable Sustainability: Regenerative Visions

Regenerative agriculture was a major theme at Plant Congress 2025. While several times it was stressed that regenerative agriculture in a Danish context is vaguely defined, it was nonetheless characterised by representatives from SEGES, politicians, and farm advisors as a "paradigm shift" in understanding field interactions, focusing on what was phrased as "connections and root causes" (forbindelser og grundlæggende årsager) instead of symptoms. This was emphasised by a soil researcher from KU who stated that soil is not just a growing medium, but a living ecosystem that must be looked after and nurtured. Consequently, he suggested thinking in terms of soil health rather than soil fertility. Interestingly, a representative from SEGES defined regenerative agriculture through a model that not only accounts for economic and agronomic aspects, but also for social and cultural dimensions. Here, farmers A and B were compared on a value axis with several parameters taken into account: quality of life, local environment, meaningful work, and not just parameters such as yield and bottom line. Regenerative agriculture's emphasis on long-term, site-specific, and relational care disrupts the logic of 'precision-nested scales' (Tsing 2019). It resists being slotted into a system where environmental care must be calculable, comparable, and exportable. Yet, this is also what makes it "unfit" for the Danish sustainability paradigm.

While the "paradigm shift" presented by regenerative agriculture is compelling and even hopeful, limitations in terms of reaching and documenting "science-based targets" using conventional scientific methods were highlighted as a central concern. It was mentioned how the complex connections characterising the regenerative paradigm require long-term experiments, which were described as "costly". Some stated how conventional science could not keep up, and how there is a need for an increasing focus on "living labs" (i.e., using "real-life farms" instead of field trials to

conduct research). Yet, living labs were problematised by the chair of L&F, Jens Elbæk, as being difficult to transfer to other farms, arguably because the regenerative system does not lend itself easily to systematisation, datafication, and calculation, making comparisons challenging.

In a closing panel titled "Regenerative agriculture – what then?" it seemed that no one had truly reached an agreement. Representatives from L&F continued to emphasise that regenerative agriculture only made sense if you could maintain yields, since there was no additional price to be obtained from buyers. A soil scientist continued to emphasise that not only were high yields significant, but also the quality of the crop and the other health benefits of growing regeneratively. The soil scientist referred to the thinking from the "One Health" paradigm, which is a holistic approach to health, recognising that the health of the soil also affects human health. Yet, evident from the congress days, regenerative agriculture—and the future of sustainable farming more broadly—was debated, explored, and understood in terms of scalable, calculable, and measurable solutions. Furthermore, "maintaining yields" remained a taken-for-granted normative framework for the successful regenerative production system. In this way, the system closes in on itself. It prevents alternative understandings from gaining a foothold—such as the idea that quality of life, health, and meaningful work should be included as indicators of success, as proposed in a holistic model of regenerative agriculture. From the perspective of resource-efficiency, regenerative agriculture appears as an unruly, even wicked form of sustainability. Hardly containable, hardly measurable, hardly comparable, hardly translatable, hardly scalable, and hardly profitable. Returning to the question of documentation and scalable solutions fit for growth, Jens Elbæk, one of the representatives from L&F, emphasised the challenge of combining the local and global perspective: That the definition of regenerative agriculture to be exported—and scaled—had to "tale sammen med" (i.e., to be compatible with) international standards. Here, he said, "questions of documentation are central". Here we see again the importance of "scalability" in sustainable solutions—the ability to "export" solutions, necessitating the translation of results into science-based evidence that can directly serve the targets of the Danish state.

From the audience, regenerative farming was also questioned from an "ethical" viewpoint, voiced by a participant who asked whether we could "allow ourselves" as a population that crop yields would fall as a consequence of ecological concerns. Like he

said, “Maybe we get a little cleaner water around here, but what about all those who need to be fed?” The question points to a central premise and self-narrative in the agricultural industry, namely that its “responsibility” lies in feeding a growing population through resource-efficient use of available resources. Besides that, conversations about environmental responsibility were completely absent from discussions about regenerative agriculture and its possibilities and limitations. This attests to the dynamic that when sustainability and good farming are measured in terms of climate efficiency and immediate profits, regenerative agriculture stands no chance. As one panellist noted, “the positive effects may not appear until many years later”. In other words, regenerative agriculture is at odds with the pace dictated by conventional production and scientific documentation systems.

Pushing Buttons: The Smart Farmer and Uneven Licence to Produce

Compared to regenerative agriculture, precision technology offers exactly this. Calculative, scalable, rational, and measurable sustainability integrated in intelligent grids. Yet, as Anna Tsing (2019, 145) points out, scaling is no neat process that happens by default—it is demanding, consuming, and requires a lot of human effort. Like defining the unit of analysis, making a field legible to a GPS reader by dividing it into colour sections. Considering all the effort that goes into making things scalable is also what makes Tsing conclude that scalability is no natural feature of nature—it is fundamentally a human project, although it is dependent on non-human labour in the process.

Thinking with scale and precision, a similar observation is possible to make in relation to precision agriculture. While smooth from the outside, the world inside the neat, precise, and “automatised” farm operations reveals a much “muddier” endeavour in which software must be updated, new field maps purchased, and new technology acquired before getting outdated to keep up with the latest forecast of “the future”. As a promissory technology (Anand, Gupta, and Appel 2018), digital PA management offers a solution to multiple crises at once, as Torben Hansen’s speech illustrates, and provides privileged access to be a professional future farmer through documented sustainability. Like Peter said, “I think the biggest distinction will be between those farmers who are forward-thinking, those who are constantly investigating and taking action, following developments—and of course always being critical—and are always

open to new ones." Yet, access to the precision of the computed technology is always dependent on human effort.

Returning to Jakob's description of using data "smart" reminded me of the many times I had sat in the cabin of Erling's tractor, which was operated by a similar GPS. The difference was that Erling definitely did not know how to use the technology "smart". On our several drives in his fields, whether ploughing or harrowing, Erling had struggled to use the otherwise "smart" self-driving function on his GPS that was supposed to allow him to talk to me while the tractor did the job, presumably, with more precision than what was available to human beings like Erling. The GPS was quite simple. Inside the tractor, a tablet was installed that contained GPS data of all Erling's fields. The GPS installed on the tablet was connected to the steering system on the tractor, which was supposed to make the tractor able to drive in direct, precise lines across the field without overlapping with lines that had already been tilled or sprayed. Erling's job was to make a simple operation: type in an A-B line, and then push a button that would steer the tractor onto the line.

However, the operation of pushing the button challenged Erling. When he pushed it, the response from the tractor was delayed because Erling had already taken his hands off the steering wheel, meaning that the tractor was driving outside the track line. Due to the delay and the off-track driving, Erling would push it again, and the self-driving function would turn off, meaning that the tractor kept driving off the A-B line. The button pushing would sometimes go on for the entire drive, and in the end, Erling would have to take extra turns on the field because some spots were left untreated due to the on-off track driving. Obviously, pushing the button was not rocket science, and for many other farmers it would not have posed the same challenge as it did to Erling, who sometimes ended up turning the whole thing off because he got so frustrated about what he considered a 'defect' in the workings of the GPS.

"It is smart, yes, but it is also a hassle," he said when we sat in the tractor, and the GPS still did not follow his orders. Erling also found it frustrating that the technology was so difficult to repair. "We spend a lot of time on these kinds of technology challenges," he said, and continued, "if the technology of the sowing machine breaks down, Dennis cannot go anywhere at all before it has been fixed because the functions of the machine are so dependent on the technology. We become very, very dependent on it." Not only were the reparations time-consuming, but they were also costly, with some spare parts amounting to as much as 20,000 DKK. The

software needed updating, as well as new field maps. Recently, Erling and his son, Kasper, had a big discussion about acquiring a new sprayer, which eventually Kasper won. Erling called his own technology complaints "old people talk", as he knew that technological development was the future. As he said, "Today it is about finding someone who can drive the tractor for a very long time, but in the future, it's about finding a very skilled technician. These robot-farms will not be for everyone". The situation between Erling and Kasper suggests that industrial sustainability may also privilege particular masculinities and generational identities, something explored by Ofstehage (2022), but that I will not investigate further in this dissertation.

A crucial observation is that agricultural sustainability becomes an asset of the industry, as well as being subject to its own definitions of sustainability. Like Erling says, they become "very, very dependent" on the technology, but without possessing the skills to repair, install, or update. Instead, farmers need to purchase software from research institutions like SEGES, as well as from large agrochemical commercial companies like Bayer and BASF. I clearly remember Erling loudly complaining once about how the field charts had been outdated to fit the GPS because generating new maps was so costly. And like he said, "the fields are exactly the same!" In this sense, digital sustainability introduces new forms of technological dependency by de-skilling farmers.

This dynamic echoes Wolf and Wood's (1997) early critique, which posits that precision farming commodifies decision-making and displaces local, situated knowledge in favour of capital-intensive models of agricultural rationality. Or as Gibson (2019) writes in a more recent study, "The effect is to deskill the grower, and devalue the knowledge and work he performed, or continues to perform, in the absence of labor-displacing automation" (136). This necessarily creates an uneven distribution of sustainability "skill". In other words, the industry and commercial actors such as SEGES and Bayer are, in a way, gatekeepers to accessing professional legitimacy—their "licence to produce"—as their legitimacy as farmers is dependent on industry definitions, technological innovations, and access. For example, illustrated by SEGES's platforms, such as *ESGreenTool*, where sustainability becomes something that is documented in negotiations with banks or partners. This renders sustainability a bargaining resource, rather than a practice, reinforcing the commercialisation and commodification of sustainability documented elsewhere (Pye 2018, Ioris 2018, Friedmann, Buttel, and McMichael 2005). As such, the state-industry infrastructure

stabilising PA technology as part of a digital infrastructure of sustainability not only defines what sustainability can be, but also who has access to be seen as legitimate, sustainable producers. Thus, sustainability is only made accessible to those able to utilise technology in the right way, creating a rift between the "smart" farmers like Jakob who can be allowed to exist in the future, and the "outdated" and not-so-smart farmers like Erling, who apparently deserves no place in the future of farming because his ways of practicing sustainability does not lend itself to documentation and climate metrics. Yet, as Erling puts it, good agricultural practice is not necessarily about "inputs and outputs", but also about leaving stripes for the birds, tending fences, and thinking about the whole landscape—something PA cannot necessarily see.

Sustainability: A Future for Whom?

Inspired by James Scott's concept of "legibility" (1998), we can see PA as a technology that makes farmland readable for specific rationales—particularly those of state and market-oriented interests. However, this reading overlooks other aspects of sustainability, such as biodiversity, soil microbiology, and democratic access, as well as ecological concerns like chemical drift. The sustainability that PA embeds is therefore increasingly about being responsible for what technology can measure and show, what we may understand as an "audit sustainability," rather than what may exist outside the sensory reach of the system. It raises questions about who and what is made legible through the PA gaze, and what forms of care are at risk of disappearing.

Some farmers, like Erling, worried about the implications of PA. Erling stressed how farmers had forgotten to leave a stripe or two for the birds in the middle of the field, and there was a lack of incentive to do so. Today, farmers could easily get a subsidy for a new GPS sprayer, while applying for a biotope was much more complicated. But as Erling said, "GPSs are made for crop management, not nature conservation". He worried about how some of the things he cared about—the forest, the biotopes, the leeward fence—would fit a farm structured by advanced technology and GPS systems. Like he said, "One of the problems is that our fields are so dense and well-tended [velplejede]". The well-tended fields were all over Salling. Sharp, clean and neat plots planted with cereals, rapeseed, grass, spinach and potatoes, timely tended to with fertiliser, micronutrients and agrochemicals, and according to Erling, PA technologies only exacerbated this tendency to focus on cultivation.

Erling worried that the new generation, heavily reliant on PA, lacks incentives to preserve non-productive landscape elements such as forests, hedgerows, and biotopes. Like he said, "nature conservation is already lacking in the mentality of the new generation of farmers." According to Erling, the technology-fixated young farmers were not guided to care for nature conservation—something Andrew Ofstehage (2022) has also suggested in the context of US farmers, where the meaning and value of farm work, and the identity of farmers change as farmers become business managers and tech-operators. While it is uncertain to state anything about how PA will affect the new generation of farmers, viewing PA technology adaptation as a sustainability strategy has implications for who has access to becoming sustainable and what sustainability means.

First, large-scale farmers have privileged access to document sustainability. This is supported by statistics showing that users of precision technology in 2021 owned twice as much farmland as non-users (DST 2021). Peter attributed this to the fact that subsidies for field sprayers were often given to the largest farms, as the GPS sprayer would here have the most considerable effect. Like he said, "What happens often is that the large, industrialised farms take the money…You often assess, 'How much environment do we get in total for this project?'—and it could be a field sprayer—and they want to have as much effect as possible. And the more effect you get per application, the greater it is. That's how it is. We got a subsidy to buy the field sprayer we have now, and it was because we have 600 hectares that we qualified to get it, but why should the small farmer not also get the chance? I get all the new technology, and he just gets pushed further and further behind, him with the 50-100 hectares."

The most common reason for not using precision technology was, in 2019, the high entry costs (Lundø and Larsen 2019). Peter's comment reveals a central aspect of PA technology, namely that while it may not be possible to identify a direct cause-effect relationship between PA and the rationalised, large-scale farm structure that Erling complained about, it seems necessary to consider the following: *if* PA technology is truly the future, and *if* PA technologies, as stressed by Peter is available mainly to large-scale farmers, this means that the sustainable future is only accessible to some: The large-scale industrial farmers like Peter. This aligns with an observation by Gibson (2019) who writes, "While one must neither dismiss nor trivialise the important benefits of efficient resource use and reduced waste and environmental contamination promised by the latest agricultural technologies, an inescapable observation is that

delivery occurs within the industrial production paradigm" (166). What Gibson's comment also reveals is that the industrial production paradigm *becomes* sustainable through technology. Thus, sustainability is simultaneously limited to a group of exceptionally competent farmers who are interested in technology on a large scale—while, at the same time, sustainability is potentially enabled on *all* farms through the implementation of technology, which hardly changes the structural conditions that are repeatedly identified as problematic, not only for biodiversity and the environment, but for the diversity, robustness and viability of agricultural production (Rønningen, Renwick, and Burton 2012, Almås and Campbell 2012).

By making sustainability dependent on technology, data, and documentation, a reduced understanding of sustainability is institutionalised. In this sense, precision agriculture is not merely a response to climate pressure — it is a response that defines what sustainability is, who is qualified to deliver it, and which forms of environmental care count. The "infrastructuralisation" of sustainability through technology, data, and documentation foregrounds at once a deeply selective future—one where sustainability is accessible only to those able to adopt and capitalise on the tools of precision—but also a possible future where sustainability is available to all, but with no substantial changes in production.

Chapter Seven
Making Soil Matter



Figure 19: One of the farmers in the "Reduced Tillage" group sticking the so-called "penetrometer" into the ground



Figure 11: Farm advisor holding earthworms in her hand while telling the farmers about different kinds of worms and their benefits for soil health

Soil Matter

This chapter is based on fieldwork with Danish farmers experimenting with reduced tillage. It explores the possibilities for soil health to enter into dialogue about what it means to be a good and sustainable farmer. That is, how soils come to matter to conventional farmers, not as a medium for crop growth, but as a lively organism whose health deserves attention and care. The chapter title can be read in two ways: first, as describing the processes by which soil gains value as something that should be cared about. Second, the very biological process by which farmers attempt to make more soil organic matter: that is, restoring the valuable topsoil layer, which has been identified as being in critically poor condition worldwide, while also being a "critical zone" for earth life and sustainable food production (FAO 2019, 2022, Salazar et al. 2020). As Salazar et. al. (2020, 2) write, "The critical zone enables all the processes that make the terrestrial surface of the globe habitable for humans, plants, animals, fungi and their millions of diverse life forms." And indeed, restoring soil health is considered a matter of great concern to both policymakers, soil researchers (Pulido-Moncada et al. 2025, Frelih-Larsen, Hinzmann, and Ittner 2018, Tsiafouli et al. 2015), and social science scholars (Krzywoszynska and Marchesi 2020, Salazar et al. 2020, Puig de la Bellacasa 2017). Yet, considering the first meaning of the chapter title, this chapter explores how this "critical zone" is articulated in farming worlds. As we shall see, soils emerge as a "critical zone" in more than one way.

In industrial agriculture, soil is often treated as a matter of fact: a nutrient matrix to be optimised, tilled, or improved for the sake of crops. I am not the first one to observe this: that soil in modern, often industrial, productivist and capitalist agriculture, is first and foremost articulated as a medium for growth (Jayaraman 2021, Tsiafouli et al. 2015), mirroring what has been identified as a prevailing emphasis on visible materiality and quantity in industrial contexts (Adam 1998, Puig de la Bellacasa 2017). With crop health being the primary goal, soil condition has historically been judged from above—from the appearance of crop yield. Yet, as I show throughout this chapter, soil emerges as something different. Analytically, the chapter approaches soil not as a passive backdrop to agricultural production, but as a *matter of concern*, in the sense articulated by Bruno Latour (2004). Latour distinguishes between *matters of fact,* which presume stabilised, objective truths, and *matters of concern*, which acknowledge the heterogeneous and contested networks that give things like soil health its meaning and force. Following Mol's (2002) articulation of "ontological

politics," I explore how soils "come into being—and disappear—with the practices in which they are manipulated" (2002, 5). By tracing how farmers engage in reduced tillage practices in a community setting, I explore how soil shifts from the inert ground on which to optimise resource efficiency to a "critical zone" of negotiating what soil is and how to properly and sustainably manage soil.

I clearly remember an instance when Kalle, one of the practitioners of reduced tillage, said, "We may all agree that the soil is great, but what does it matter? The bank doesn't care if we have potting soil in our fields or not; they care about our *bundlinje* (bottom line)". Kalle's comment was a response to Per, the farming counsellor responsible for reduced tillage in the local farming consultant house. Minutes before, he had just pulled a stick out of the ground. But before getting into detail about Per, the stick, and the potting soil, let us sit with Kalle's words for a moment: "The bank doesn't care if we have potting soil in our fields" (*Banken er jo ligeglad med, om vi har pottemuld i vores marker*). The quote exemplifies how soils become a critical zone for negotiating one's *faglighed* and licence to produce, and stages a central conflict central to soil: that it is difficult to quantify and translate its value, and that caring for soil is not an individual act but requires collaboration across different stakeholders and temporalities.

To explore these conflicts, the chapter is grounded in the work of a range of social scientists engaging with soil, such as María Puig de la Bellacasa (2017), whose work among soil scientists informs discussions of care and temporality, as well as Anna Krzywoszynska (2016, 2020, 2019b), whose work informs discussions of knowledge and ontological politics. Knowing and caring for crops and soil are two distinctively different practices with different temporal rhythms, and thus very different implications for the environment and for sustainability. Kalle's struggle to take seriously the value of soil serves to illustrate the "ethico-political troubles of caring obligations in the more than human worlds marked by technoscience" (169), questioning alongside others (Krzywoszynska 2020, Münster 2021) if soil engagements necessarily create "a concomitant political agenda for mutualism" (Münster 2021, 312).

As such, conventional farmers' attempts at knowing soil, counsellors' attempts at making soil a matter of concern, and their shared efforts at making time for soil sustainability are at the centre of this chapter. The chapter presents a troubled vision

of sustainability that encompasses more than just resource efficiency, while also highlighting its persistence.

"The Future is Plough-Free"

Before my second round of fieldwork in 2021, I had primarily observed the relationship between farmers and fields through their attention to crops. When I joined an ERFA group of practitioners experimenting with reduced tillage back in spring 2021, it was my first experimental and sensory encounter with what was *below* the ground, except for when I helped dig down drains. I got the impression that for many of the farmers in this ERFA group, it was their first time too. Not in the sense that soils had not been present at all: of course, they had. As the organic matter in which plants grow. As the perfectly tilled bed for seeds. As the susceptible epicentre of weed proliferation. Yet, this group of farmers was suddenly pushing spears into the ground, comparing root development instead of crop development, and they were asked to pay attention to soil structure, earthworms, and colour variations.

It was the end of May 2021, and I was once again standing in front of my car in the driveway to a farm, this time owned by a conventional farmer, Henrik, who was part of the ERFA-group "Reduced Tillage" working on the integration of Conservation Agriculture (CA) principles. Per, the farming advisor, was standing in front of his car, and his apprentice, Mona, was standing beside him. As the eight farmers arrived, everyone slowly positioned themselves in front of their cars, forming a half-circle while silently waiting for Per to start the meeting. The farmers were all in their 50s and 60s, dressed in practical work clothes and knee-high rubber boots, and, contrary to me, they all seemed surprisingly ok with the silence. The group of farmers standing in the driveway on this day in May shared an interest in reduced tillage and CA principles. The ERFA group functioned as a social space to exchange challenges and solutions, failures and successes, facilitated by Per and Mona. Besides an interest in field management with less tillage, the farmers also shared an interest in coping with weeds without the plough. In that sense, the group did not stand out in any particular way to the 'regular' ERFA groups I had been following. The challenge of "keeping weeds out of this system"—referring specifically to the CA system—seemed to be why the farmers were here and why Per and Mona were here. It was indeed why I was there.

Knowing the moral and professional troubles that came with weeds, I was curious to understand how the farmers dealt with weeds in the "reduced tillage" group. I knew

that ploughing, one of the most extensive forms of tillage, was seen as an essential component in combating weeds among regular conventional farmers. Furthermore, a well-tilled field bed seemed important to most farmers' professional identity. Thus, I was curious—in a very hopeful way—about why farmers would convert to a production system that seemed to struggle more with messy and weedy fields. In a sense, I guess I hoped that some "greater good" was serving as the engine for their transition—like a deep-felt concern about soil health, earthworms, microbial communities, fermentation, or the like. I had read about these things in multispecies ethnographic accounts—vivid descriptions of more-than-human liveliness (Ahl and Skovgaard 2020), the vital importance of more-than-human collaboration for survival (Tsing et al. 2017), and the need for attention to see these things in the first place (Krzywoszynska 2019a, Van Dooren, Kirksey, and Münster 2016, Cypher, Bubandt, and Andersen 2022)—but never truly encountered among the conventional farmers. Maybe now was the time? Before answering this, I will briefly introduce reduced tillage and how it is positioned as "part of the solution".

Reduced tillage and soil management, or *reduceret jordbearbejdning* in Danish, is one of the central principles of Conservation Agriculture (CA). CA connects three interlinked principles, namely: 1) no or minimum mechanical soil disturbance, 2) biomass mulch soil cover, and 3) crop species diversification, in conjunction with other complementary agricultural practices of integrated crop and production management (Kassam, Friedrich, and Derpsch 2019, 29). In recent years, CA has been advanced by FAO as an effective approach to addressing the environmental challenges associated with industrial agriculture (FAO 2023).

In the Danish context, the organisation *Foreningen for Reduceret Jordbearbejdning* (FRDK), aligning with FAO guidelines, claims that "The future of farming is plough-free". They present a clear example of how reduced tillage is being framed as "part of the solution", understood as a proper response to the environmental challenges associated with industrial agriculture, including greenhouse gas emissions, soil degradation, and biodiversity loss. As they state on their website, "We are facing a major climate challenge. Reduced tillage methods are part of the solution." (FRDK 2025, my translation).

FRDK connects reduced tillage to broader ecological benefits, including the reduction of nutrient runoff and improvements in farmland biodiversity. According to the organisation, "We reduce nutrient leaching, improve biodiversity for the benefit of

insects, birds, and farmland wildlife." This ecological framing positions reduced tillage not only as a climate tool but as a regenerative approach to land and biodiversity. Importantly, FRDK also stresses the economic viability of reduced tillage. As they assert, "And as if that weren't enough, the farmer also earns more money by leaving the plough in the shed." By lowering input costs and improving soil health over time, reduced tillage is portrayed as both a sustainable and financially sound agricultural method. Beyond these rhetorical claims, FRDK is actively involved in promoting knowledge-sharing and capacity-building among Danish farmers. They describe their mission as working "for healthy, living soil with a focus on high expertise, biodiversity, no-till farming, conservation agriculture (CA), regenerative agriculture, and sound economics." All the claims put together, they write, "That's why we have no doubt: The future of farming is plough-free."

FRDK's discourse illustrates how reduced tillage is positioned not simply as a technical practice, but as a comprehensive response to environmental, agronomic, and economic challenges. Yet, while reduced tillage may enable all these benefits, implementing it is a process of contradictions, barriers, and value conflicts.

Digging

We began by standing in a circle in the middle of Henrik's barley field, one meter between us as recommended by the health authorities during COVID. The farm advisor Per was carrying a shovel, a knife, and two long spears with a round disc placed on top between the two handles. Henrik is a conventional farmer with 213 ha of land and a pig production with a yearly output of 25,000 fattening pigs. Since 2014, Henrik had been transitioning to no-till, gradually minimising soil treatment on the property, which he later described as a "massive jump from the 10m diving board"—not only in terms of definitively retiring the plough, but also because of teasing comments from neighbours questioning his yield, his diagonal sowing strategy, the leftover residues, and if he was able to manage the weeds. Apparently, his fields now looked different. Although it no longer affected Henrik to the same extent as it had in the beginning, it had still shaped particular expectations he had for his production. He was "going to show them", he said, that he could do without a plough and gain the same yields.

Standing slightly outside the circle of farmers on the barley field, I was curiously observing as Per demonstrated how to use the strange spear he had carried with him. In a matter of seconds, Per had effortlessly pushed the stick all the way down into the

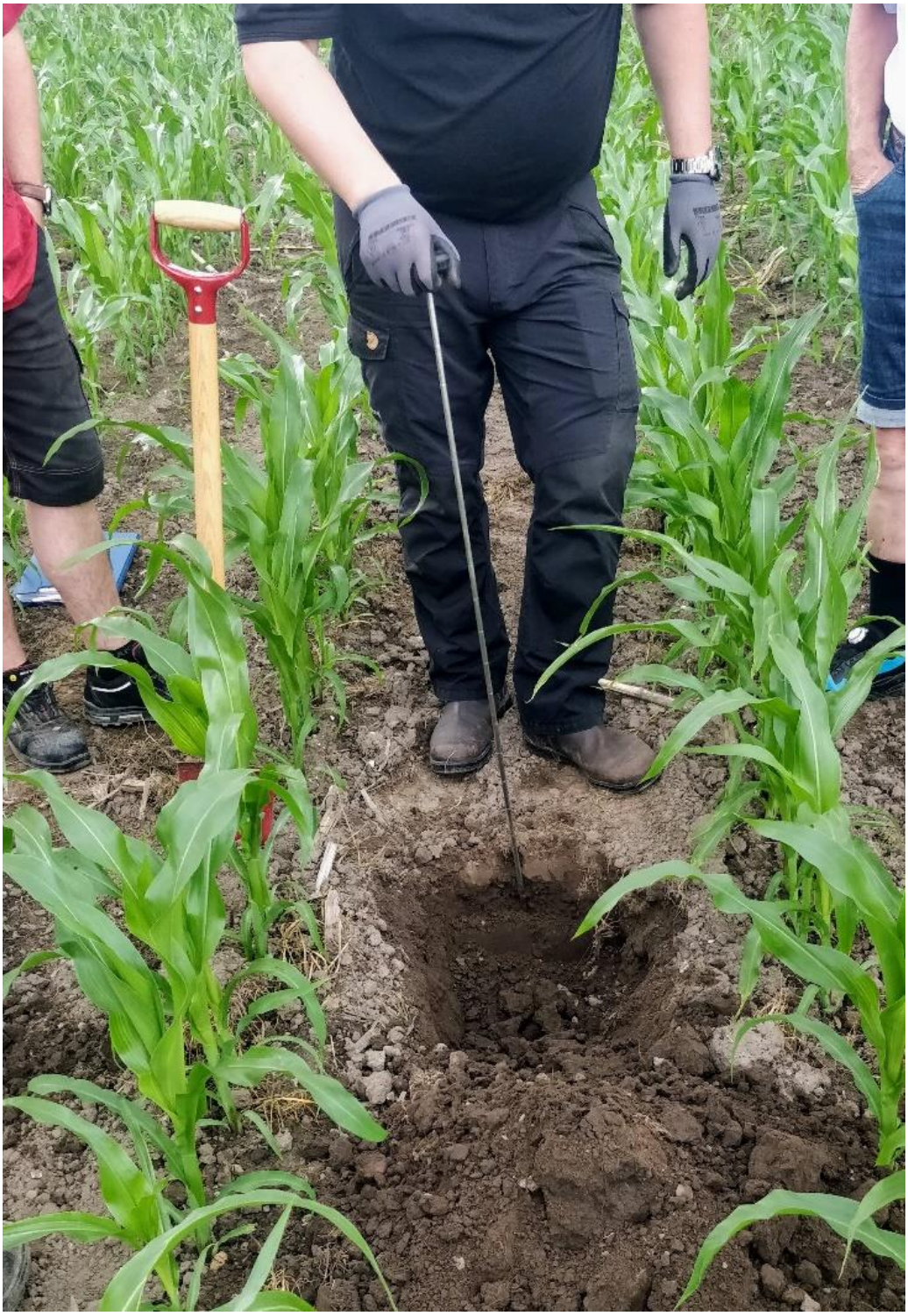


Figure 21: Per and the farmers circling a hole in a maize field which was first measured using the penetrometer and the "dug deeper" to explore the actual conditions underneath

soil. He pointed to the measuring disc on the top, instructing the farmers: “If it reaches the red area, it means you’re pushing too hard”. He placed his index finger and thumb around the spear right at the soil surface and pulled it up. Then he measured the distance from his fingers to the bottom of the spear. Roughly 30 cm. Per made it clear

that the stick would only show precise results if they pressed it gently and did not force anything. Otherwise, they would push it further down than it actually should, and it would give the impression that the soil was in better condition than it was. Per demonstrated once again, and both the farmers and I now stood in a tight circle around Per to observe the disc as the arrow reached the orange area, and stayed there, even as the stick ran all the way down from the topsoil to the subsoil. It seemed like we had all forgotten about the spread of COVID for a second. The effortless way in which the stick ran through the layers beneath us was mesmerising, and evidence of a much more porous, moist, and healthy soil. Nods of acknowledgement were sent in Henrik's direction. Shortly after, another farmer, Jørn, was walking around with a shovel, digging up barley plants. He held one plant in his hand, shook it, and looked carefully at the roots to see if they *were* in fact growing deeper into the seemingly porous soil.

This whole endeavour of root digging and spear pushing was new and strange. I later learned that the spear had a name; it was called a *penetrometer*. And as it turned out, the spear served many more functions than merely being an instrument to measure the porosity of soils. Although with varying degrees of success, it served to bridge some of the professional conflicts that emerged when farmers transitioned to CA. Because even though reduced tillage, as forwarded by FRDK and FAO, is a seemingly complete strategy to address what seems like *all* the challenges associated with industrial agriculture, the retirement of the plough was not without friction.





Figure 22 and figure 23: (left and right): Per demonstrating how to use the 'penetrometer' to examine the soil. Plant residues are visible on the topsoil in compliance with CA principles yet disturbing to some farmers ideas about orderliness.

Frictions in Soil

Henrik was clearly proud of his soil improvements, and he enthusiastically exclaimed that the soil had "raised itself" 25 cm since he had stopped tilling, a comment that made the others laugh. Asking one of the farmers, Kalle, about this amusement, he said, "It's not that I don't believe him, but it's not like the raised soil is going to pour gold." Kalle was new to reduced tillage, and he did not seem entirely convinced by it yet. While the agronomic benefits were perhaps tangible, Kalle was asking for something else. Kalle did not consider potting soil a desired trait if it did not translate directly into an asset that could improve his economic bottom line. So, when Per asked the farmers to take turns pushing the penetrometer into the soil, Kalle responded by repeating an oft-mentioned disclaimer, "You cannot think green when you have red numbers on the bottom line".

Kalle's comment reflects a common approach among farmers where any change in production should be made only if it is "rational"—that is, if it is grounded in scientific, evidence-based results in terms of resource efficiency, complies with the economic logics of the market, and in some way helps ensure a viable production. Kalle feared that weeds would become a larger problem in the long run if Glyphosate (the active substance in Roundup) were to be taken away, and he feared that CA practitioners would not be competitive in terms of protein content and other vital parameters in their grain, compared to their colleagues. To Kalle, this was a matter of legitimacy and "licence to produce" too. He said, "If we can't manage the weeds, we can't justify retiring the plough simply to get potting soil". Kalle's comment reflects the perception of resource efficiency as farmers' *raison d'être*—that they are responsible for utilising the potential of the soil fully to be legitimate, good farmers.

During the first couple of years of transitioning, as Per told me, pests and weeds could often be a bigger challenge, because seeds and crop residues were left on top instead of being buried. This is reflected in statistics showing that farmers practising CA generally use 20% more glyphosate, and in sector surveys suggesting that CA would

be “put to the grave” without glyphosate (Petersen et al. 2021, Melchiorsen 2022). Those who tried to do both—minimise soil disturbance *and* pesticide use—were not particularly successful. As Henrik said, “I think those who can do without Roundup use a lot more harrow. Some in the group have tried to refrain from it, for instance Poul who has only sprayed the outer edge of the field, but consequently we do see a lot of problematic weeds [problemukrudt].” Yet, the deep dependence on glyphosate is also what has caused critics to label CA as ultimately “unsustainable” from the perspective of ecological long-term sustainability and securing clean drinking water in the future (Bregendahl 2025).

Weeds are to be taken seriously, indeed, and Kalle’s comment reflects a very real concern that farmers and advisors cannot ignore for the sake of soil health—not with how economic rewards are earned today. Yet, how to manage weeds can be a heated subject. Per, for instance, encouraged the farmers to sow in spring instead of fall, as this could lower the weed pressure. Instead of doing shallow soil management, he urged them to refrain from it altogether and leave the seeds on the topsoil layer. Like he said, “If you stir the soil around, you’re packing the weed seeds underneath. If you don’t, you’ll only have the problem at the surface, where it’s much easier to handle. In the first couple of years, it may be worse than it usually is, but it’ll get better with time”.

While Per’s advice cohered with principles of CA, it did not seem to cohere with Kalle’s ideas of professional and rational farming. He mentioned his obligations to the mill where he, by contract, was obliged to deliver a certain quality of cereal, and at a specific time, stressing the temporal frictions of short-term economic needs and the patience Per asked for. Kalle also noted the fragility of the system’s deep dependence on glyphosate. Right now, the CA farmers could still handle weeds because they had glyphosate available. Yet, everyone knew that glyphosate was a hot topic in environmental politics, what Kalle, and previously Henrik too, had called a “trophy chemical used to make symbolic political decisions to please the public,” and that it was in their custody on borrowed time—it could be a matter of a few years before it would no longer be available. Losing glyphosate was critical, as nearly everyone agreed that without it, there would be no such thing as reduced tillage. They wouldn’t have the means, economically or timewise, to mechanically manage weeds, at least “not on areas of this size,” as another farmer, Peter, said. And if they could not handle the weeds, they could not “afford” caring for the soil either. In this framing, caring for soil

is a luxury that can only be sought when there are no "red numbers on the bottom line". So was this about caring for soil at all?

"Care" for Soil?

During the routine coffee, beer, and cake session following each ERFA meeting, I asked the group of farmers why they had decided to practice reduced tillage.

Henrik had decided to omit ploughing because the job simply wasn't done well enough. He told me that the farm workers, including himself, had been extremely busy back then (before turning to CA), partly because he only had winter crops, which meant that all sowing had to be done within the same time window. Consequently, "everything was done with one arm", as he said. The others voiced a similar reasoning: It was about economic benefits, and to some extent also agronomic benefits in terms of increasing soil productivity. In contrast, environmental benefits were perceived mainly as a secondary positive add-on to the primary benefits of reduced tillage.

Out of the eight farmers, none of them had decided to do less tillage out of environmental concerns. Instead, decisions were prompted by practical issues and economic dimensions—fuel costs for the extra driving, saving labour costs for the man ploughing, or about the ploughing simply not being of good enough quality, creating an uneven field that could negatively influence sowing and crop yield. From this perspective, the plough becomes an inefficient excess, and CA a rational economic strategy, resonating with FAO (2023) guidelines on CA that highlight how it results in "Higher efficiency in the sense of more output for a lower input". The omission of ploughing is framed not as a matter of soil care (Puig de la Bellacasa 2017) or environmental sustainability, but as a rational business strategy to save time, labour, and fuel costs. Thus, while researchers and policymakers underscore the ecological benefits, the farmers I spoke with—surprisingly—made no direct connection between reduced tillage and ecological care. Instead, they emphasised the importance of economic viability, *faglighed*, and resource efficiency.

Some scholars have been occupied with how soil engagements may translate into social theory or "an alternative path in the politics of living with care in more than human worlds" (Puig de la Bellacasa 2017, 130, see also Latour 2016). Yet, as Münster suggests (2024, 213), "The ontological effects of microbial engagements with the naturecultures of the farm can have unexpected or at the least open-ended ethicopolitical outcomes". Indeed, the relations between farmers, farm advisors,

science, and industry demand, from within which particular conceptualisations and practices of soils emerge—their ontological politics (Mol 2001)—seem to illustrate more messy accounts of soil value. How these messy accounts come to be is precisely what Krzywoszynska and Marchesi (2020) ask us to pay attention to when they suggest that researchers "acknowledge symmetrically the emergent biophysical agency of soil ecosystems, their sociocultural constitution, and the dynamic interactions between those factors" (194).

Returning to the quote by Kalle, "The bank doesn't care if we have potting soil in our fields" (*Banken er jo ligeglad med, om vi har pottemuld i vores marker*), this quote serves as an important entry to the tensions between economic viability and soil care. In the specific quote, "doesn't care" is a translation of the Danish word *ligeglad*. To be *ligeglad* is to be 'indifferent': to be uninterested in something, unmoved by something, or not to respect something. In this case, to be uninterested in, unmoved by, and not to respect soils. Kalle's words were spoken shortly after Henrik, in a moment of joy, had proudly demonstrated the porosity of his soil, claiming that his soils had "raised themselves" after he had begun practising CA methods. That is, in a moment where Henrik and the other farmers were in fact moved by the soil, interested in its composition, and where the status and well-being of the soil was not something to be indifferent to. Perhaps this is why Kalle's words, even long after the meeting finished, still seemed to haunt me. They felt brutal and disruptive to the momentary joy—and indeed a sense of newfound professional pride—that had shortly given life and meaning to soil care.

Arguably, his words, perhaps realistically and pragmatically, reflected the reality of modern full-time farmers, where money and the bottom line talk. A reality where banks are largely indifferent to, or *ligeglade med,* soil health and soil care unless it results in financial returns. They show that soil care does not emerge as a direct result of engagement, recognition, and attention, but that this attention must be sustained in the face of systemic disregard by a system where the sensible is defined by economic calculability.

In the previous chapter, I explored the conditions that help us understand why and how soil becomes something to be subordinated, or *ligeglad* about. Namely, the need for a documentable and measurable sustainability that more or less directly lends itself to economic translation. The need to "perform" economically is embedded in legal and moral obligations, as expressed by Per. As Per told me, he was legally obliged

to make sure that the farmers' economy remained healthy, as he could potentially be legally charged if he advised a farmer to do something that caused them significant yield losses. "Many of the solutions I offer are indeed not the most environmentally friendly or politically correct because I must make sure that the farmers are first and foremost able to pay their bills *now*", he said, followed by a story about a colleague who got sued for giving the wrong weed management advice. It was unclear how the lawsuit ended, but it also did not seem to be the point. As Per explained, his feeling of professional legitimacy in the local community was shaken by the event, regardless. Yet, while we see a continuous disregard of soil's intrinsic value, it happens on the grounds of questioning. Kalle's question, "What does it matter?" posed in the very first section of this chapter, is hopeful in the sense of posing an open-ended question. While Kalle offers his own answer—namely, that the bank does not care—I will suggest that the conventional farmers and their newly found interest in soil still carries potential for a somewhat hopeful reconfiguration of good farming in the context of farm sustainability.

A central point here is that economic viability as one's main objective does not exclude new ways to know soil, talk about soil, and understand soil life. This happens not necessarily *beyond* crop yield concerns, but alongside them. Henrik's excitement about the raised soils, the group's fascination with the penetrometer, and how the meetings gave way for discussions about resilience (e.g. comparisons to ploughing farmers whose topsoil was blowing off while theirs was staying in place) reveals that soils had begun to emerge not as mere substrates, but as *matters of concern* (Latour 2004) to discussions about sustainable farming too. Their attention to soil porosity, root structure, and worm activity exemplifies how soil can be reassembled as an object of sustainability, yet one that is difficult to ascribe economic value immediately. As mentioned in the introduction and the previous chapter, one of the central conflicts in regenerative farming and soil health restoration is that the sustainability and value of soil are seemingly difficult to assess. Things such as biodiversity and soil carbon are assumed to be challenging to measure, making soil health a particularly vulnerable site that has historically been sidelined in favour of crops. Bridging this "gap" between aboveground and belowground is the subject of the next section.

Knowing Soils: Quantifiability, Visibility, and the Stick

Jørn gently pushed the penetrometer down until the arrow hit the red area. He measured. The depth of the porous layers was approximately 35 cm, underneath which we encountered an impenetrable, oxidised layer of clay. Per dug up a big chunk of soil, and the farmers grabbed a handful each, squeezing and examining its structure. Hard chunks of clay blended with more porous grains. Per instructed us to look down into the hole in the ground, trying to notice the place where the soil structure changed. While unsure what exactly we were looking for, everyone seemed to agree that a specific colour change indicating a shift in layers had to be it. While no specific, measurable knowledge was extracted from the digging and stick pushing, it stimulated important conversations. For instance, Per mentioned that in Løkken, there was a demand for farmers to adopt conservation agriculture to prevent sand blasting (*sandflugt*). Around the table, Henrik mentioned the phenomenon of desertification in the USA, which prompted a conversation about the local fields. "Locally, we see it too after an April without rain", one of them said, saying that it had even been necessary for the municipality to dig sand away from the roads near one of the local towns. "In that sense, we are helping the municipality too," Henrik said.

In *Timescapes of Modernity* (1998), Barbara Adam suggests that temporality is intrinsically linked to questions of visibility. Industrial time, she suggests, shapes our objects of attention in such a way that "Emphasis is placed on visible materiality at the expense of that which is latent, immanent and hidden from view: the bulk below the surface remains inaccessible." (11). In soil health, the competing temporalities between short-term productive gains and long-term restoration processes are particularly evident. In the context of soils, this emphasis on the immediate visibility has been pointed to as a central challenge to soil health. As argued by Frelih-Chrestensen, Hinzman, and Ittner (2018), it is difficult for farmers to recognise the risk of soil compaction because management decisions and results have mostly taken place aboveground, decoupled from what happens underground (1-2). This is also what we saw in the previous chapters—here, crops, weeds, diseases, and sensors define what is the object of concern and intervention. As noted by Frelih-Chrestensen et al. (2018), "In practice, farmers' interaction with the soil tends to focus on the topsoil, which is the medium with which they interact (e.g., through tilling or ploughing in

conventional farming systems). The topsoil is also where the effects of management decisions are most clearly seen." (1).



Figure 24: Farmers touching soil we have dug up from the rapeseed field

During ERFA meetings, I observed how assessments of whether a plant is thriving or suffering are mostly immediately accessible. One can tell if a crop is

growing faster or stronger than the same crop on another field by attending to observable realities of colours and stem lengths, and GPS images decoding colour variations in crops reveal if a field is plagued by weeds, infested with fungi, or lacking nutrients or water. These measurables make immediate assessment of success or failure possible. In other words, crops are immediately observable markers of success or failure exactly because they are possible to *know*. When I say that crops are possible to know, I mean two things. First—as stated above—that crops are immediately assessable by using the senses of seeing. Second, this assessment is linked very closely with an evaluation of economic value: That is, crops are not simply known as plants, but as a commodity, informed and shaped by sound scientific know-how about how to enhance their value.

As such, the privilege of visibility linked to crops is only a privilege because it is coupled with skill—farmers know how to "read" the crops and make informed management decisions on behalf of them. Considering that farmers are used to the immediate effects of their management decisions, soil is a temporal abstraction in the sense that farmers cannot reap the fruits of their efforts before long after decisions have been made. Conversely, soil tends only to become an issue for farmers and farm advisers when it becomes compacted and when waterlogged subsoil layers *decrease yields*. So, how to learn about soils in the same way farmers learn about crops? How to make soils matter in the same way that crops matter?

After the meeting, I asked Per about the penetrometer and how the porous soil benefited the farmers, referring to Kalle's judgment that it was hard to translate to the bottom line. Per made it clear that as an advisor with economic responsibility, he could not promote good soil structure as a goal in itself. Initially, Per had to stick with the logic of 'soil improvement for crop yield' to guide and engage the farmers. And keeping them engaged was a key challenge. Per told me that when the reality of weed challenges or comments from neighbours hit, "It can make even the most stubborn farmer bring back the plough in the blink of an eye." Even though an increasing number of farmers adopted CA principles, Per had also seen several farmers return to conventional ploughing, often due to weed challenges. "It's a pity. We sometimes see the same thing happen when farmers transition to organic farming. They get overwhelmed by the sudden weed pressure, and they get super impatient because of deadlines and economic duties. And besides that, you know, they want to do things *ordentligt*. [...] Really, what they need is patience. That's why I always repeat the three years."

Attending to the needs of soils is, as suggested by Puig de la Bellacasa (2017), a matter of attuning to other temporalities than that of productivism. She notes how "care time entails 'making time' to get involved with a diversity of timelines (such as the ones involved in the living soil) that make the web of more than human agencies" (171). As such, soil sustainability necessitates making time to care for soil. Yet, as evident from the above, it also necessitates making soils visible and legible in the first place. The pertinent question seems to be how to make soils matter by "making time" for soil sustainability in a context where performance is measured in terms of resource efficiency, and "potting soil" has no intrinsic value.

The Stick: Making Soil Ontologies

"The challenge with reduced tillage is that it takes time for the soil to get used to it, and most farmers don't have the patience for that; they want to see results immediately because those are what they rely on. […] I keep repeating that it takes three years for them to see results in their yields, but the spear [the penetrometer] is a great way for them to see progress underground, perhaps before they can see it above ground," Per said. Considering the lack of contingency, correlation, rational explanation, and sound science, digging in the ground was part of Per's strategy to keep the farmers engaged. Apparently, it took three years for the soil to "get used to" reduced tillage and for the weed seed bank to decrease, but Per had a strong ambition to keep the farmers engaged until then.

As such, besides the obvious agronomic benefit of having a soil that could potentially retain more water and allow for deeper root development and thus stronger, healthier, and more resilient plants, the point of bringing the penetrometer was less instrumental. Per knew that good soils did not have any immediate economic value, at least not one that was translatable to the financial world of banks and retailers. "In fact," Per said, "[…] the stick has very little to do with gold pouring. It's much more about showing them that things are going on underneath their crops that might in fact be relevant in the longer run. We're hoping that things like this [reduced tillage] may help the farmers to lower their carbon footprint if a CO_2 tax becomes a political and economic reality. Which I think it will be, to be honest. Of course, if that happens, we need methods to measure and document the benefits. However, as I see

it, the best place to begin is to create engagement. So, who knows? Things like sticks and worms may be more important than we think."

Thus, except for the instrumental and quantifiable qualities of the penetrometer, Per had made his own theory: the penetrometer was a tool to "create engagement", as Per said. Outside the meetings, Per told me that while the three years were important in biophysical terms, they were equally important in terms of adjusting the mindset of farmers. I was reminded of a similar phrase I had been told in the context of converting to organic farming, namely, "it only takes one year to *convert* to organic farming, but it takes five to *become* an organic farmer". The penetrometer, then, is a matter of persuading farmers to stick with their decision not to plough, *despite* weed challenges and messy field aesthetics. While the farmers' yield would likely slightly decline due to the new soil conditions and increased weeds in the topsoil, the penetrometer acted as a signifier that the soil was improving 'here and now'. The community setting in which this takes place is important, too.

When I first started following the group, the stick was introduced for the first time. At our first meeting, only Henrik, who was already familiar with reduced tillage, used the stick, while the others looked on. Yet, during the upcoming meeting, more and more farmers became curious, and it reached a point where Per brought two penetrometers so that all farmers could try them before moving on. We had other things to do, of course. What I observed was a group dynamic: as the farmers watched each other do the stick pushing—and even taking it seriously—the engagement spread. What started as laughter about Henrik's "raised soils" slowly settled, if not as a fact, then at least as something to be concerned about. Following Latour (2004), we might see it as an instance of reassembling agrarian *faglighed* around a matter of concern, where soil becomes significant in the contingent and practical negotiations of sustainability in farmers' lives.

Drawing on Puig de la Bellacasa (2017, 95), we can think of stick pushing as a "touching vision": a rupture in the distribution of the legible, that may reconfigure who and what is allowed to count, expanding what a soil is and how it can be known. From this perspective, the act of pushing the penetrometer can be seen as making perceptible forms of "the good" that cannot otherwise be easily absorbed into industrial metrics. As such, the penetrometer is at once an ontological and a temporal tool to suspend, if only for a moment, the resource-efficient logic of the good sustainable farmer.

Arguably, the ontological disruptions of the penetrometer are modest. As we saw, Per would repeatedly stress the agronomic and economic benefits of reduced tillage alongside efforts to orient them to soil health. Thus, Per's conventional agronomic advice is coupled with these more experiential practices of digging and pushing, together producing a messy knowledge-network of sorts in which different ideas about what soil is, how it is best managed, and what kind of value it holds co-exist. This is captured by Puig de la Bellacasa (2015), who argues that while soil regeneration practice "moves away from productionism towards conceptions of soil as living and correlated practices of involvement with soil," these practices are "not disentangled from technoscientific time . . . but [are] committed to making alternative ontologies from within" (706–7).

Yet, the potential for engaging soil as a matter of concern for sustainability does exist amidst financial concerns and audit sustainability assessments, even though the complexity and difficulty of assessing soil challenge conventional models. Kearnes and Rickards (2020, 72) invoke Cochoy's (2008) notion of *qualculation* to explore how hybrid epistemological strategies characterise regenerative agricultural practices. In the context of reduced tillage, soil offers ways to see how conventional values are contested—not outside, but *within* the predicaments and hegemonies of industrial agriculture. Here, it is similarly fruitful to consider *qualculation* to capture that, alongside calculative efforts to produce *quantitative* assessments of the connection between soil health and economic viability, are efforts to recognise the aesthetic and moral *qualities* of healthy soil.

This resonates a point made by Kearnes and Rickards (2020) in the context of carbon farming, where they write that carbon farming "operates in a morally contested context is constitutive of, rather than antithetical to, the construction of *qualculative* knowledge that seeks to produce a verifiable accounting of soil sequestration, whilst at the same time qualifying this enumeration with aesthetic visions of restored landscapes." (82) The final section returns yet again to Henrik. His story suggests that informal knowledge networks are a crucial component in making soils matter, yet not enough for long-term ecological soil sustainability to take root. Here, more formalised and professionalised knowledge networks are key to making soil health a legitimate "professional" concern, and not simply one of "feelings" and "emotions" (Krzywoszynska 2019b)

Reassembling the Good Sustainable Farmer

As Henrik had told me, integrating CA principles like no-till to his farmland had in fact initially been economically motivated, and as such, had little to do with soil health or environmental concerns. However, six years down the road, Henrik was experiencing more than economic savings from the retired plough. He was also seeing unexpected outcomes, including the aforementioned rising soil, as well as a range of other agronomic benefits. Like he said during an interview, "You could write a whole dissertation about all that has changed". While this is not the occasion for doing so, a few things are worth noting.

Firstly, the so-called "bæreevne", or carrying capacity, of Henrik's soil had greatly improved, the outcome being that they were less vulnerable to soil compression caused by heavy machinery, which has been shown to negatively impact root development and yield (Schjønning, Lamandé, and Thorsøe 2019, 11-12). He explained that the soil had simply become "spongier". He said, "Before it was a sponge that had been pressed completely together, now it is more like a normal sponge that absorbs rain and root material. I can spread manure 2-3 weeks earlier than I used to". He added, "I also haven't seen sandblasting on my areas in ages." Sandblasting had been a pressing subject among the ERFA-group members that year, as spring had been unexpectedly cold and windy, causing valuable topsoil to blow from the fields before plant roots had a chance to combine with the soil. Henrik's (and the other CA farmers') fields retained the topsoil better, not only in the case of strong winds but also in heavy rainfalls, which are becoming more frequent due to climate change.

Positive outcomes like these sparked Henrik's curiosity. During an interview, he told me that he had started to do his own research on YouTube, where he had discovered new ways to approach his soils, following both the companies selling machines for CA, but also farm advisors like Søren Ilsøe. When he told me about it, Henrik seemed almost embarrassed about it, on the verge of blushing. At once, he seemed extremely excited about these new ways of farming, but also troubled by how they differed from the conventions of conventional agriculture. Like he said, "It is a huge step, also for one's self-understanding, because everything will suddenly look different". To exemplify this trouble, Henrik had learned about something called "diagonal sowing". I clearly remember when I first saw the diagonally sown field because of how it stood out compared to the square and straight lines on regular fields. Or, in fact, I did not give it much attention before the other farmers in the group

jokingly laughed about the diagonal lines that seemingly disrupted the order of the field.

I got the impression that they found Henrik's experiments silly because they were seemingly unbacked by sound science and instead informed by informal knowledge sharing on YouTube. Situations like these confirmed Henrik's unease about allowing himself to be carried away by his newfound passions. Perhaps this was also why Henrik, in many years, had farmed according to CA principles using only YouTube as his companion. At the same time, Henrik stressed the benefits of having joined the ERFA group, as it forced him actually to go into his fields and explore the soil. Before joining the group, Henrik had received newsletters from the advisory company AgroPro, where he had followed a nationally known farm advisor, Vagn Lundsteen. However, according to Henrik, Vagn's "schedule sprayings" that narrowly focused on achieving the highest possible yield "at whatever cost" had derailed entirely. After joining the ERFA group, he had, in his own words, "become sharper to go into the fields and look at my crops and consider what they actually need instead of spraying according to schedules." As such, small indications of a shift in orientation from yield to soil emerged. Like he said, "This year we have had so much focus on the soil, and the soil spear has really been an eye-opener". I asked Henrik if they usually dug so much, to which he replied, "Yes, but this year we are digging deeper! Usually, we dig as deep as the old ploughing depth, but now we are going even deeper down!" My clear impression was that Per's informal theory—the one about the soil spear as a tool to make visible the value of the farmers' efforts—worked.

When I first asked Henrik what it meant to sow diagonally, and why he had decided to do so despite the collegial taunt, Henrik was somewhat hesitant to share his knowledge. However, he made it clear that he was not as disturbed by the aesthetic changes anymore. Like he said, "It's mostly been the neighbours who've had an issue, commenting on the changes to how it looks." Explaining why he had sown diagonally, he initially responded, "Well, I only have the sowing machine to level the soil, so I need to do it in different directions". As such, he referred to an agronomic function that is scientifically backed and conventionally seen as "good" for achieving a successful yield, as a level field bed helps to ensure even growth. "However," he continued, "there is another theory". I was curious. "If you sow diagonally, you leave squares on the field for the earthworms to expand. And worms are really the only soil treatment I have. The worms squirm and eat underground, then they come above ground, where they

leave their excrement, so essentially, they are recycling nutrients. So, it's that, and there are also benefits for fungi." We never got to talk much about the fungi, yet I was left with a feeling that Henrik could have told me much more about soils if he had dared. Henrik was clearly hesitant to share this knowledge, likely because he knew it was seen as too "fluffy", deviating from conventions that dictate that decisions are only good if they are rational and scientifically backed. These epistemological cracks, sparked, for instance, by YouTube channels, allowed Henrik to know soils differently, echoing Krzywosnovska's (2019b) observation that knowledge about soil is fractioned and emerges in "more participatory, social learning and co-production frameworks" (161). Yet, it was not enough for Henrik to individually acknowledge the value of the soil—his efforts needed acknowledgement from his professional communities too. Here, as we shall see, professional communities—including scientists and industry actors—play a crucial role in forging *faglig stolthed* and confidence.

A couple of months into the reduced tillage group, Henrik hosted a national ERFA meeting on reduced tillage, where he was given the chance to demonstrate the work he had been doing for the past 8 years for professionals working with reduced tillage, both in theory and practice. Scientists and counsellors from large farm advisory companies were present, as were farm advisors from all over the country. When we met in the "regular" ERFA group a couple of days after, Henrik was exhilarated. Passionately, he told me and the rest of the group about the meeting, and how he had got feedback from professionals—people "who actually know what they are talking about", like he said. Importantly, I got the impression that Henrik suddenly felt like an expert himself. Suddenly, he confidently added new knowledge to the group setting, such as suggesting having *at least* 50% spring crops in one's crop rotation to sanitise the fields. Like he said, "We've been doing it wrong the whole time".

Henrik's story suggests that the occupation with soils in a professional setting—like an ERFA meeting with an actual agronomic advisor—is a crucial component in allowing soils to enter the sphere of professionalism, ultimately reconfiguring the good farmer. Considering the high degree to which farmers see themselves and their management strategies as rational and scientifically backed, the world of soils—and importantly, the ecology behind—needs to enter the knowledge economy of agrarian *faglighed* for farmers to proudly improve sustainability by improving their soils. Here, we see how sustainability is assembled in a knowledge network from within, where

scientists and researchers are not only sources of knowledge and information, but also resources for inspiration, justification, and legitimisation.

The broad acknowledgement of soil value may be what allows Henrik to make room for diverse temporalities, such as those of earthworms composting soil. While still dependent on the continuous use of glyphosate, the case suggests that noticing and recognising these emergent entryways to relate differently to a field is central to beginning to imagine other visions of sustainability, precisely because it expands what the good farmer can be. Soil offers new dimensions to what it can mean to be a good farmer. As I have argued, the good is constantly in flux and depends on ideas of *faglighed*. Farmers like Henrik, seeking soil knowledge online and through ERFA groups, are granted access to a world of specialised soil knowledge that requires them to attune their senses and engage their bodies as mediums of knowing. Yet, it is not attention itself, but the professional setting in which it emerges that offers a different vision of the good, sustainable farmer.

CA as Sustainable Farming: Questions and Controversies

As mentioned at the beginning of this chapter, CA has been labelled "part of the solution" for sustainably developing agricultural production, both by international bodies like the FAO and national ones like FRDK. Yet, the status of CA as a "sustainable" farming method is controversial because of its dependence on glyphosate, and because pesticides more broadly are accepted as part of achieving soil sustainability. Yet, as I have argued throughout this dissertation, there is no such thing as a fixed definition of sustainability—only a myriad of actors assembling its meaning. The question of CA as a sustainable practice, despite its pesticide dependence, serves as a great example here.

The topic was revitalised after fieldwork, when the Danish brewery Carlsberg in 2025 entered the debate about the new sustainability paradigm "regenerative agriculture". Carlsberg, one of the world's three leading breweries, had set as a goal for the business that 30 percent of their produce should only come from regenerative farmers in 2030, and 100 percent in 2040 Yet, Carlsberg defined their own six principles for their regenerative producers (Hoffmeyer 2025), which included "5. Minimal input: Fertiliser and pesticides only according to plant needs". The principle gives the impression that farmers commonly used it when the crops did *not* need it, and what their principles would then mean is a break with usual practice. Yet, it simply

seemed to imply that farmers practising CA could now be considered "regenerative farmers". As chair of Organic Denmark, Micharl Kjergaard responded, "It is completely nonsense to write that you may only spray according to need. There is no one who sprays more than according to need". Micharl Kjergaard's central critique of Carlsberg's regenerative strategy was that since 95% of their raw materials were in fact drinking water, they should care more about the long-term sustainability of water by demanding pesticide-free production. "That is why I am very reluctant to accept that their regenerative principles help rebuild the soil when they, at the same time, allow farmers to spray. In this way, they pollute their largest raw material: drinking water. That simply cannot be right," he said (Bregendahl 2025).

Carlsberg's response to the critique was a rejection of "oppositions" between organic and conventional and instead seeing the "potential in the regenerative system, especially regarding enhancing more sustainable methods on a large scale, including production of malting barley", as Simon Boas Hoffmeyer from Carlsberg said. A similar sentiment was expressed by one of the suppliers, Søren Ilsøe, who is also one of the pioneers of CA in Denmark, and the farmer Henrik had sought inspiration from on YouTube and elsewhere. In an article on Økologisk Nu, he explained like this, "Of course I use glyphosate to do total weed control (totalbekæmpelse af ukrudt). The alternative is a lot of mechanical work and, in the worst case, ploughing, and you can argue for and against that. But the effect of regenerative—or I would rather say 'conservation agriculture'—is that you don't need mechanical weed control in the spring. This is an ethical dilemma. But when you do it before sowing, there is no contact with the crop that is growing," he said.

The above exemplifies how soil health, as a sustainability concept, is not a straightforward matter but is characterised by opposing views of what "true" sustainability is. In this context, Carlsberg's six principles serve to illustrate the central argument of this dissertation—that it matters less how "sustainability" is defined in theory than how it is articulated in practice by farmers and industry. Whether CA is, in fact, sustainable is not so important here—the critical point to draw from this is how CA gains status *as* a legitimate sustainable production form through industry involvement, definition, and bargaining power.

Conclusion
Reassembling Sustainability



Figure 12: ERFA-group walking, discussing, and sharing knowledge

Sustainability is one of those terms whose productive potential arises precisely because of its resistance to purification. (Moore 2017, 71)

Industrious Sustainability

This dissertation has traced the intricate entanglements of pesticides, ideas, industry, technology, and the moral economy of industrial farming that shaped sustainability in Danish conventional agriculture from 2020 to 2023: namely, resource efficiency. I have argued that sustainability, in this context, cannot be viewed as an external standard imposed upon farming, nor as a radical departure from existing modes of production. Instead, sustainability emerges as a situated and historically contingent practice entangled with broader ideas about the good life and what it means to be a good farmer. Furthermore, it is embedded in and constrained by the production logics of the agricultural sector. This is what I have termed *industrious sustainability*. It pertains to sustainability being shaped by industrial agricultural rationalities: rooted in ideals of innovation, documentation, resource efficiency, chemical precision, and agronomic risk management.

Through an attentiveness to farmers' everyday lives and the relationships in which they are imbricated—chemical, digital, economic, social, ecological, corporate, political, and industrial—I have shown that sustainability is realised through these relations. Shaped by political ambitions and industry interests, sustainability in conventional agriculture is better understood as a form of "audit" environmental responsibility and business case, than as a change in production processes. Instead of unsettling conventional practices, sustainability is rendered meaningful and legitimate through field tidiness, calibrated yields, and technologically sophisticated monitoring systems. As such, sustainability is not only a normative aspiration (while it is also that), but a moral and material achievement configured within industrial agricultural infrastructures. Understanding and taking seriously this particular configuration of sustainability is crucial to understanding how conventional farming systems persist despite the escalating environmental crises.

The Good Farmer in History

A central aim of this dissertation has been to show that farmers act out of a position of being complicit in creating the mess they seek to mitigate, yet are not individually responsible. Instead, various and overlapping sources of change, rupture, and ruination together shape this position. *Chapter One* examined the uncertainties and potentials that farmers connect to the past, present, and future. Characterised by a longue durée of structural adjustment, it demonstrated how farmers see ruination as

an inevitable condition of survival. The uncertainties underpinning experiences of structural adjustment mean that farmers see utilisation, technological development, resource efficiency, expansion and innovation as necessary components in what it means to exist in the future. Engaging the concept of *affective aesthetics*, we saw how farmers' discomfort with disorderly properties reflected a broader cultural narrative about responsibility, rural identity, and collaborative survival. I argued that Erling's efforts to maintain old buildings, employees, and neighbourly relations while also maintaining viability result in a professional and moral tension. From this position, conventional farmers, such as Erling, act through compromises from positions of being complicit. As this dissertation has shown, Danish conventional farmers are complicit in multiple ways—through agrochemical ties, structural adjustment, and local community life—that often have unfavourable outcomes. Yet, instead of seeing this as a failure altogether, I want to suggest, along the lines of Shotwell (2016), that there "is no return to purity" (4). Instead, Shotwell calls for awareness of complicity through orientations to history, rather than erasures of what has been.

This was the aim of *Chapter Two*. Here, I explored the historical and political contingencies that have made certain farming practices flourish and specific professional identities emerge. The chapter illustrates how the good farmer registers as a cultural construct reassembles time and again as a response to various "developments" and "breakdowns" in the agricultural sector. By tracing changing notions of good farming, the chapter demonstrated how contemporary expressions of "sustainability" in Danish agriculture are entangled with long-standing narratives of industriousness, innovation, and national progress—such as extraordinary yield enabled by technological progress, the independent entrepreneurial spirit of the cooperative movement, rationalisation of farmland, and the cultivation of scientific professionalism. By doing so, it suggested that these narratives shape present-day solutions to the climate crisis, including a privileging of technology-driven, knowledge-intensive forms of production. Paradoxically, the good farmer (understood as resource efficient, specialised, and innovative) emerges both as the problem and the solution, which suggests that there are limits to seeing large-scale efficiency as the future of sustainable agriculture.

Crops Worlds

Deepening our understanding of the large-scale farmers and their production conditions, *Chapter Three* explored the material ecology of the conventional large-scale farm by introducing its central components: the large-scale farm, crops, and the moral economy shaping its operations. The chapter demonstrated how crops like starch and seed potatoes, along with their particular needs, influence how sustainability can be practised. For some conventional large-scale farmers, such as Karsten, we observed how *faglighed* and *godt landmandsskab* were linked to meeting export standards, maintaining cleanliness, and achieving quality assessments. For others, like Chresten, it was about producing grain for his pigs in the most resource-efficient manner. In both cases, the fear of wasting resources—the antithesis to resource efficiency, farmers' "licence to produce"—determines what is considered sustainable practice within their specific production conditions. Essentially, the chapter argued that sustainability is not discursively constructed but materially enacted through farm and crop-specific infrastructures and professional obligations.

If sustainability involves creating liveable futures, this argument implies that crops are *agribiopolitical* in the most direct sense of the term (Hetherington 2020a), as they influence the conditions for these futures. Industrial crops, such as starch and seed potatoes, are well-suited to the ecology of large-scale farming. Without these crops and their acceptable chemical regimes, industrious purposes, and ability to be produced in bulk, the industrial mode of sustainability would be much less feasible. As we observed in the case of Sort Muld, growing vegetables for food consumption involves different practices. Being not only the object of sustainability but also its very expression—by shaping the pace and temporality of sustainability—it is crucial to consider what crops are cultivated and whose needs are met: in other words, what kind of sustainable futures are possible within the current crop regime?

Chapter Four examined further what forms of professionalism and morality crop management implied. It examined how agronomic risks—particularly from pests and weeds—are made visible and actionable in everyday farm life. Through field observations and shared knowledge practices, it demonstrated how farmers navigate agronomic risks not only in agronomic terms but also in moral terms. Here, we saw how the management of risk became a site for negotiating the ideal of the good, sustainable farmer. Crop management becomes a site for demonstrating *ordentlighed* (properness, decency, orderliness), *faglighed* (professionalism), and responsibility.

From car-window inspections to field walks and marketing campaigns, agronomic risks become visible because of how they are rendered legible within particular epistemic regimes and institutional frameworks. Crop threats, rather than simply being managed, are constantly re-narrated and made meaningful within a moral economy of resource efficiency where handling agronomic risks correctly makes one a good farmer and colleague. Yet, the chapter also argued that framing agronomic risks as a moral problem obscures broader structural issues, such as scale and production system.

Chapter Five turned to agrochemicals, asking how substances widely criticised for their ecological impact can still be framed as part of sustainable farming. Here, the concepts of *labour of certainty, communities of complicity* (Steinmüller, 2013), and *industrial language ideology* (Fortun 2014) helped unpack the doubts, frictions, and paradoxes encountered in my field site, and how these are absorbed, normalised, or even denied. It demonstrated how pesticides become morally permissible, not because they are unknown, but because those risks are carefully managed and reframed in relation to "safe use" conduct. Here, we saw how farmers negotiate ecological responsibility through what I coined *labour of certainty*—understood as those practices by which agrochemical use is framed through notions of safety, containment, and certainty. Here, a form of agrochemically sustained sustainability emerged, where agrochemicals are framed as secure, and sometimes even good, in relation to broader societal goals and professional identities.

The Good Farmer and Sustainable Legitimacy

As we saw in *Chapter Two*, longstanding collaboration between the state, science, and agriculture in Denmark has produced a farmer expected not only to feed the nation but also to do so with measurable outcomes and scientific credibility. *Chapter Six* further examined this credibility within the contexts of sustainability and precision agriculture, viewing precision agriculture as a technological system that supports sustainability as a form of "data-driven sustainability" (Hatanaka et al. 2022), which makes ecological responsibility a matter of audits. Rather than offering a neutral solution, these technologies create new conditions and "audit" (Mc Loughlin 2025, Strathern 2000, Shore and Wright 2015) regimes of documentation, essential for being recognised as a good and sustainable farmer. Here, documentation, compliance, and digital literacy are central to this recognition. However, they also generate

exclusions, favouring farmers who can afford and adapt to these systems while making alternative practices less visible or understandable within national visions of sustainable development.

My point is not that technology-driven sustainability is inherently harmful—yet, when only verifiable forms of sustainability are accepted, the complexity of ecological health becomes a key concern. Moreover, when these practices require specialised technological skills, access becomes a significant issue. As demonstrated, smart farming is not equally accessible: the increasing reliance on documentation software makes sustainability dependent on farmers' ability to keep pace with software updates and technological skills, risking their recognition as legitimate sustainable farmers. Ultimately, sustainability relies on farmers' relationships with the technology industry.

Chapter Seven explored what happens when attention is shifted to soil instead of crops. By tracing how farmers engage in reduced tillage practices in a community setting, it showed how soils can change from the inert ground on which to optimise resource efficiency to a "critical zone" of negotiating what good farming actually is. It demonstrated how soils come to matter to conventional farmers, not as a medium for growth, but as a lively organism. Yet, it also illustrated the difficulties of assessing sustainability and the value of soil outside the metrics of regular assessment and good farming measures, as when Kalle struggled to make sense of the value of Henrik's spongy soils. The chapter unpacked some of the ecological compromises that emerge when sustainability needs to be defined through quantifiable carbon metrics, and when yields remain the primary metric.

For instance, we saw how farmers engaging with soil structure could only imagine doing so using pesticides like glyphosate, because of the yield losses that would occur without it. When glyphosate becomes a prerequisite for soil care, we can see the conflicting and contradictory dynamics of sustainability in industrial agriculture. Here, sustainability must be measured in terms of cost efficiency (economic sustainability) and resource efficiency (environmental, but limited to climate-centred sustainability). Furthermore, I demonstrated how chemically supported sustainability gains traction through industry involvement, such as Carlsberg's principles for their regenerative producers, which permit the use of pesticides. From this perspective, soil health as a matter of sustainability emerges not on its own, but through negotiations of what counts as sustainable and at what costs.

Together, Chapters Six and Seven demonstrate how sustainability becomes sensible through techno-scientific regimes that align with a moral economy of resource efficiency. Precision agriculture, for instance, does not merely manage crops; it partitions the perceptual world, allowing only certain forms of care, responsibility, and risk to emerge as valid. Toxicity, soil exhaustion, or social fragmentation often remain imperceptible not because they are unknown, but because they fall outside the dominant sensible order dictated by the idea that resource waste is economically, environmentally, and morally problematic.

From Concepts to Practices

Sustainability as a concept for agricultural development does not seem to vanish in the near future. But what if it does not solve the challenges it is meant to address and does not bring about the desired change?

Escobar (2020, 6) suggests that "We cannot reconstruct the world and create genuinely new worlds using the same categories by which we are destroying it!" Thinking in terms of the so-called "wicked" problems of agro-industrial pollution (Sharma 2020), it seems fair to suggest that this is in fact the case. Some scholars suggest we need other models: Bjørn, Richardson, and Hauschild (2019) suggest that we need an *absolute* sustainability assessment method that can truly account for planetary limits, and Tsing (2017b) proposes to think of sustainability in terms of multispecies flourishing, or *Holocene resurgence*. In many ways, I believe that this is one of the strengths of anthropology: it allows for imaginative ways to create new concepts through which to envision coexistence. Escobar (2020, 6) suggests the idea of *sentipensar*—a mode of *feel/thinking* about the future—or "a matter of making the unthinkable thinkable, and the thinkable believable and possible".

While to some extent I agree with Escobar that thinking about our worlds with the dominant categories that created these crises, like modernity and industrialism, risks reinforcing the same structural patters and dual ontologies that allows farmland to be predominantly treated as separate from its surroundings, I also think we need to continue being curious about the composition, meaning, and practices that surround and keep alive these concepts. Suppose we take for granted what concepts like "modernity", "capitalism", "industrialism", or indeed, "sustainability" mean and entail in people's everyday lives. In that case, we risk distancing ourselves from the practices and meanings that also make these concepts sensible in the first place.

Instead of making new concepts or abandoning sustainability altogether, this dissertation calls for exploring the life of concepts like sustainability through ethnographic attention. Through ethnographic accounts of concepts and how they are enacted, we are better equipped to understand what political concepts do, how they are understood, and how they are enacted. Understanding the epistemological "liveliness" of concepts can also explain why they often fail to bring about intended change. For instance, *Chapter Five* demonstrated how professional interpretations of sustainability render pesticides legitimate in sustainable farming as tools to enhance efficiency. In such contexts, sustainability is less a concept of transformation than a tool for legitimising existing practices. Carlsberg's six principles for regenerative farming served to illustrate the central argument of this dissertation—that it matters less how "sustainability" is defined in theory than how it is articulated in practice by farmers and industry. Whether CA is "in fact" sustainable seemed to matter less than how CA gained status *as* a legitimate sustainable production form through industry involvement, definition, and bargaining power, as well as in professional community settings. This is not a flaw of the concept, but a call to explore further the life concepts gain after they leave the paper.

On the one hand, sustainability is, as Tsing (2017b) writes, a "dream" and in that sense a fabulation of the future. However, as I have shown, in practice, it becomes not only an imaginative model for transforming one's production to more sustainable farming practices. Instead, it becomes adapted to conventional practices. In some cases—like precision farming—sustainability becomes a matter of documenting the efficiency of production to meet market demands for sustainable products with a low carbon footprint. In this equation, even the conventional pig with its questionable animal welfare can be considered sustainable in the sense of being "climate-efficient", as we saw in the Danish Crown campaign. So too can the large-scale fields be planted with just one single crop variety. The social and political negotiations, beliefs, and values underpinning the processes through which specific farm practices "become" sustainable, so to speak, are crucial to understand the relationship between ecological crisis and change.

Allowing Inefficiency

Resource efficiency as the dominant sustainability goal risks narrowing what counts as "good" agriculture to that which aligns with market competitiveness and intensive

production. This model, as demonstrated, prioritises high-yield, chemically supported, and technologically managed agriculture—yet often at the expense of soil health, biodiversity, and the vitality of rural communities (see Scott 1985, van der Ploeg 2008, Münster 2015). Statements like Kalle's, "without glyphosate, there will be no such thing as CA", or Chresten's initial impossibility of imagining "a life completely without fertiliser", point to very concrete limits of imagination. These limits, as I have shown, are conditioned in large part by the very structure of large-scale farming—and less by farmers' subjective ability to be concerned about other things than resource efficiency, clean fields, and yield. So what does it mean to "envision" (Murphy and McDonagh 2016) other modes of sustainability when the horizons of imagination are circumscribed by efficiency? I propose that interrogating the category waste can serve as a productive starting point.

Waste (i.e, understood as *spild,* and not *affald* (garbage)) is best understood as a potential or perceived inefficiency in the production process—for instance, seeds that are unutilised because of weeds, surplus nutrients, or poor management decisions. And as we have seen, waste is predominantly framed as a deficit to be eliminated amongst conventional farmers. Within this framing, the most sustainable form of agriculture is one that maximises output per unit of land while minimising inputs. Such reasoning positions intensive, high-yield farming systems as the telos of sustainability, while organic or regenerative practices appear as inefficient and thus less sustainable because they tolerate "waste" (lower productivity). From this vantage point, conventional agriculture remains the most rational, efficient, and sustainable path.

In political ecology, especially in Marxist discussion of metabolic rift (Foster 2000, Foster 2013, Foster and Burkett 2016), the issue of waste and ecological destruction is connected to capitalism's inherent capability to reproduce itself. While the earth is finite, and while, as Kohei Saito (2023, 17) writes, "it is obvious that there are absolute biophysical limits to capital accumulation," capital remains incapable of limiting itself. Instead, "capital constantly attempts to overcome these limits."

Andrea Genovese and Mario Pansera (2021) offer a lens through which to understand the strategies of capitalism in overcoming the problem of waste, or what they call "diminishing returns" (100). These are, for instance, increasing production volumes or raising the exchange value (and, consequently, the price) of their products, or moving production to countries with cheaper labour. Yet, a key strategy to avoid

diminishing returns remains innovation. As Genovese and Pansera suggest, "innovation is the very engine of capitalist economies and can constantly transform production functions by increasing productivity and maintaining acceptable profits" (2021, 101). In *Porkopolis*, Blanchette (2020) shows how body parts of hogs that had previously been considered 'waste products' are constantly commodified, which creates new forms of labour around the processing and production of the commodity (245). As we have seen in the Danish context, *any* form of waste utilisation is considered "good for the wallet," and also, good for one's professional image in a broader sense. The historical and current utilisation of "inefficient" areas of production, such as nutrients not used, field corners not properly utilised, or agrochemicals spread too widely, attest to this. So does the idea of "sustainable intensification", which essentially rests on the logic of minimising inefficiency.

Yet, innovation is simultaneously questioned as a solution to the current climate crisis (Brieghel et al. 2022, Brichet, Brieghel, and Hastrup 2023). Brieghel et al. (2022), for instance, question the use of additives in cattle feed to decrease methane emissions, if it does not happen simultaneously with reducing livestock populations and their productivity. In conventional farming, the negative impacts of capitalist production, like soil degradation or increasing pests, are solved by innovation, which can similarly be seen as a "renewal" of capitalism. PA provides a clear example as a mode of production that aims to reduce waste in the production cycle by carefully managing the soil's resources and inputs with advanced technology. The use of agrochemicals can be seen as a similar attempt to minimise and control wastage.

While innovation and technology may temporarily alleviate the problem of diminishing returns, this solution remains limited by factors such as energy availability, access to raw materials, social unrest, and environmental degradation. In the words of Kohei Saito, "these 'metabolic shifts' never solve the deep contradictions of capitalist accumulation" (Saito 2023: 14). As such, whether we are discussing early innovations such as agrochemicals and artificial fertiliser, or more novel technological innovations such as pyrolysis or methane reducing cattle feed, we have to do with strategies of waste reduction that are grounded in a capitalist mode of accumulation that will inevitably, it seems, still uses resources that needs to be left for other lives to flourish.

Yet, this version of sustainability, framed as a waste-reducing strategy, seems inherently contradictory; it creates new forms of waste, new ruins, and new rifts

between people and the environment they inhabit. As Saito (2023) suggests, capitalism's constant renewals happen "only to increase its own destructiveness against society and nature." (17). Significantly, capitalism itself is not punished by the contradictions of its mode of production. Instead, capitalism can "shift" its negative consequences elsewhere: to nature, to society, to people. Saito suggests that this ability is precisely what makes capital so elastic and resilient in the face of economic and ecological crises. From this vantage point, we can begin to understand how the antipathy towards waste in Danish farming is linked to capitalist logics—and, perhaps unfortunately, how it is also complicated to change perceptions of waste. It is so precisely because the role of waste as something to be utilised is ingrained in the very economic system that supports agricultural production.

Yet, what happens if waste is instead considered a necessary—and perhaps even desirable—element of sustainable agriculture? Reducing pesticides and nitrogen will inevitably result in some trade-offs in the current large-scale system. Tolerating some degree of waste seems crucial if less intensive production forms—such as regenerative practices and organic farming—are to be recognised as more sustainable alternatives. This requires a shift from economic and climate efficiency to ecological health (such as soil health) as a prerequisite for long-term sustainability.

Whether waste is primarily regarded as a problem to be minimised or as a condition to be accepted is therefore not a neutral question. It is a normative positioning with decisive implications for how sustainability in agriculture is defined and which production systems are legitimised as sustainable. In conclusion, this brings us back to the question of the good farmer and of responsibility in industrial production in times of climate and environmental crises. Envisioning other sustainabilities requires attending to what has been rendered unintelligible or "inefficient" within dominant frameworks, such as the slow work of soil formation, nature care, or maintenance rather than expansion. In this context, attending to practices of "care," "attentiveness," or "more-than-human relationality" (Jones 2019, Van Dooren, Kirksey, and Münster 2016, Puig de la Bellacasa 2017, Haraway 2016, Shapiro, Zakariya, and Roberts 2017) remains a brilliant starting point. While at odds with the capitalist economic model, which does not allow inefficient lives, practices, and beings to exist, doing so seems crucial.

Afterword
Notes on Current Trends and Trajectories

Since the completion of fieldwork, a series of important initiatives and political shifts have taken place in Danish politics that nuance or reinforce the observations made in this dissertation.

One of the most significant developments is the growing prominence of ecological and systemic approaches to sustainable farming. Mainly driven by civil society organisations such as *Danmarks Naturfredningsforening* and *Økologisk Landsforening*, various stakeholders have promoted a shift from feed to food production. The 2023 report *Fra foder til føde II* (2023) proposes a systemic transformation of the agricultural output: reducing livestock numbers, increasing land allocated to nature, and prioritising plant-based food systems. Importantly, the report does not focus on technological solutions to sustain current production forms, but instead suggests fundamental rearrangements to the agroecosystems that support food production. Importantly, it constituted a foundational contribution to the government's agricultural negotiations in the so-called "green tripartite agreement" of 2024.

The culmination of these negotiations was the *Aftale om implementering af et grønt Danmark* (Agreement on the implementation of a green Denmark*)* (Regeringen 2024), which introduced what was framed as a "historic" climate tax on agriculture. Indeed, the agreement suggests a significant shift in Danish agricultural and environmental policy. Whereas earlier frameworks, such as the 2021 Agricultural Agreement, were primarily oriented towards technical climate regulation and placed considerable faith in technological solutions like power-to-X and pyrolysis to pave the way, this agreement introduces a more systemic and even reformist orientation. At its core is the goal that approximately 10% of Denmark's total land area should be transformed into nature and forest by 2045, including the withdrawal of 140,000 hectares of lowland soils from agricultural production, establishing 250,000 hectares of new woodland, and 100,000 hectares of untouched forest. As such, it is not simply a regulation of farming practices, but a reconfiguration of land use at the national scale.

What also distinguishes this agreement is its explicit recognition of environmental and biodiversity goals as political ends in their own right, rather than

secondary effects of climate action. Substantial resources are earmarked for this purpose: around 43 billion DKK for land purchases and conversions to meet the target of at least 20% protected nature; the creation of 21 national nature parks; and 80 million DKK for the restoration of marine ecosystems, such as seabeds and stone reefs in coastal waters. Alongside this, over 12 billion DKK has been allocated to a fund to facilitate land purchases, afforestation, and the restructuring of farms under pressure from new environmental regulations.

Finally, echoing *From food to future II*, the agreement permanently supports plant-based production (through a fund of 420 million DKK) and commits to doubling Denmark's organic farmland by 2030. According to representatives from ØL, the agreement represents a "quantum leap" for green transition and offers organic farmers long-term visibility and improved market stability (Kyed 2024). Taken together, these measures suggest a paradigmatic move: from climate policy understood primarily as emission reduction to a broader ecological reform that positions biodiversity, nature restoration, and food culture as central to Denmark's future. This is indeed an exciting shift. Yet, it still rests on the intensification of remaining agricultural land. What the implications are hereof are, of course, unknown.

Parallel to this, increased attention is directed to regenerative farming practices (FRDK 2021). Interestingly, regenerative agriculture is gaining traction not only in organic sectors but also in conventional sectors. Significantly, Plantekongress in 2025 featured regenerative agriculture as one of its three key themes, a notable move for an otherwise conventional congress that has historically been centred on showcasing new agrochemicals and presenting results from field trials.

In the wake of this, the Danish Conservation Agriculture association FRDK (*Foreningen for Reduceret Jordbearbejdning i Danmark*) has broadened its focus beyond reduced tillage to include explorations of alternative and regenerative farming practices. While it is undoubtedly a step toward more ecologically sound production models, head of FRDK Henrik Terp has emphasised that the goal is not necessarily to eliminate all chemical inputs. As he is cited in an article, "We need to ensure food supply and feed people all over the world while also making sure that production is climate-friendly. It's not climate-friendly if we use twice the amount of diesel to produce half the yield." (Effektivt Landbrug, 2024). The initiative can be read as both a response to the growing awareness that future farming systems may require the

integration of diverse paradigms and practices to remain both productive and ecologically resilient, and also as a response to market demands.

As briefly discussed in Chapters 5 and 7, regenerative agriculture is increasingly sought by many industry players, including Nestlé and Carlsberg, making it an attractive avenue for expanding the perspectives and practices of sustainability in Danish agriculture and incorporating conventional farming methods, such as CA. These efforts are reflected in a comprehensive list of industry documents that aim to define regenerative agriculture within a Danish context, making it as inclusive as possible so that most farmers can access this new and promising market opportunity.

As we saw, regenerative agriculture seems only viable on a large scale if it proves to be a sound business proposition. This aligns with an analysis by Friedmann, Buttel, and McMichael (2005) of what they call the "corporate environmental food regime". They note, "the coalition of environmental, consumer, and fair-trade movements promises not reorganisation of society around the central value of enhancing ecosystem integrity, but green capitalism." (ibid., 231) While the future is impossible to predict, it seems reasonable to suggest that regenerative farming will shift from a focus on process and production to product and marketing, as also illustrated by Guthman (2004, 110-111) in the context of organic farming. If this happens, it will end up alongside many other good ideas as primarily a form of "green capitalism" rather than a societal transformation.

I remember a conversation I had with Jesper Fog Pedersen from *Økologisk Landsforening* (ØL). He had told me that back in 1991, when organic agriculture was formed as a separate production form from conventional agriculture, the new organic farmers were idealists, ecologists, and philanthropists, and they based their organic farming practices on intellectualised, ideological thoughts and academic ideas about holism, coexistence and farming in balance with nature. "There they were, on barren land with all their ideas, initiative, commitment, and this phantasmic idealism and," as Jesper said, "they had no idea what they were going to do."

Yet, Jesper explained that it was the *ideal* that created the path into the soil and shaped the agricultural practice—and not the other way around. It was about how to cultivate the land with the greatest care and not with the greatest yield. Today, he said, "it seems as if it is the other way around", and explained how organic farmers, too, were occupied with yield as shaping their practices. Jesper explained how conventional techniques had gradually found their way into organic agriculture,

undermining the idealistic and ethical telos initially driving the development. Jesper blamed the complicated bureaucracy that had made it increasingly difficult to farm based on intuition and ideals because of economic pressure.

From Jesper's account, it seems there is very little space left for passion or being ethically driven in one's work. Tendencies like these are evident in the 2024 strategy from Landbrug & Fødevarer "Økologi" (2024), which continues to emphasise market growth and productivity gains as key sustainability goals. So, while ecological concerns surrounding biodiversity, soil health, and ecological resilience are at the heart of organic thinking, the rationale of resource efficiency in policy and practice creeps into nearly every practice, especially if it is to be economic viability in large-scale production, and continually asserts the innovative, technologically adept, economically driven, and market-oriented farmer as the solution. This exemplifies what I mean by *industrious sustainability*: a tendency where the industry, corporations, and political organisations define what sustainability can be and who is included in its articulation to make it marketable and economically profitable. Staying attentive to these dynamics is crucial for understanding how industrial interests and economic viability logics co-opt notions initially rooted in ecological ethics.

Abstract (English)

This dissertation in anthropology examines how sustainability is assembled, enacted, and legitimised within Danish conventional agriculture. Rather than treating sustainability as a fixed external standard or a radical departure from industrial farming, the study develops the concept of *industrious sustainability* to capture how it emerges from within agrarian rationalities centred on resource efficiency, chemical precision, technological innovation, and moral ideals of the "good farmer." Drawing on long-term ethnographic fieldwork with large-scale farmers between 2020 and 2023, the dissertation explores how sustainability is not merely discursively defined but materially and morally realised through everyday practices, infrastructures, and professional obligations.

The main argument is that sustainability in this context often functions less as ecological transformation and more as a form of "audit" environmental responsibility and business case, legitimised through field tidiness, documentation, calibrated yields, and compliance with technological monitoring systems. Farmers' engagements with crops, soils, and agrochemicals reveal how agronomic risk management is a key site where professionalism, orderliness, and moral legitimacy are negotiated. Here, the imperative of resource efficiency constitutes what farmers describe as their "licence to produce"—the moral and economic condition for sustaining production, social legitimacy, and access to markets. Yet this licence is inherently fragile: it must be continuously reaffirmed through documentation, compliance, and adaptation to technological and industry standards, leaving farmers vulnerable to exclusion if they fail to keep pace. Paradoxically, pesticides—frequently criticised for their ecological impact—are reframed as indispensable tools for maintaining this licence, sustaining a chemically mediated form of ecological responsibility.

By tracing how ideas of the good farmer are historically tied to narratives of innovation, industriousness, and national progress, the dissertation shows that the same values underpin both the perceived problems and the proposed solutions to contemporary climate challenges. While these practices enable conventional farming systems to persist despite escalating environmental crises, they also narrow the horizon of sustainability to what aligns with resource efficiency. The dissertation argues that this focus on efficiency risks obscuring broader ecological and social concerns, while simultaneously revealing the limits of modernist visions of green transition.

Ultimately, the study calls for sustained ethnographic attention to how concepts like sustainability live and transform in practice. It suggests that understanding sustainability as a moral economy—where resource efficiency, technological progress, and a fragile licence to produce converge—sheds light on why conventional agriculture continues to be seen as both problem and solution in the Anthropocene.

Resume (Dansk)

Denne afhandling undersøger, hvordan bæredygtighed sammensættes og legitimeres i dansk konventionelt landbrug. I stedet for at betragte bæredygtighed som en universel standard eller som et radikalt brud med det industrielle landbrug, udvikler studiet begrebet *industriøs bæredygtighed* for at indfange, hvordan bæredygtighed opstår inden for industrilandbrugets egne rationaliteter centreret omkring ressourceeffektivitet, kemisk præcision, teknologisk innovation og moralske idealer om den "gode landmand". Baseret på længerevarende etnografisk feltarbejde blandt stordriftslandmænd mellem 2020 og 2023 udforsker afhandlingen, hvordan bæredygtighed ikke blot defineres diskursivt, men også realiseres materielt og moralsk gennem hverdagspraksisser, infrastrukturer og professionelle forpligtelser.

Hovedargumentet er, at bæredygtighed i denne kontekst sjældent giver anledning til større økologisk forandring, men i højere grad fremstår som en form for "audit" af miljøansvar og forretningsmodel, legitimeret gennem rene marker, dokumentation, kalibrerede udbytter og overholdelse af teknologiske overvågningssystemer. Landmændenes arbejde med afgrøder, jord og pesticider viser, hvordan agronomisk risikohåndtering er et centralt sted, hvor professionalisme, ordentlighed og moralsk legitimitet forhandles. Her udgør ressourceeffektivitet det, som landmænd beskriver som deres "license to produce"—den moralske og økonomiske betingelse for at opretholde produktion, social legitimitet og markedsadgang. Denne licens er imidlertid skrøbelig: den må konstant genbekræftes gennem dokumentation, regeloverholdelse og tilpasning til teknologiske og industrielle standarder, hvilket gør landmænd sårbare over for eksklusion, hvis de ikke kan følge med. Paradoksalt nok bliver pesticider—ofte kritiseret for deres økologiske konsekvenser—fortolket som uundværlige redskaber til at opretholde denne licens og dermed en kemisk medieret form for økologisk ansvarlighed.

Ved at undersøge, hvordan forestillinger om den gode landmand historisk er knyttet til narrativer om innovation, flid og national fremgang, viser afhandlingen, at de samme værdier ligger til grund for både de oplevede problemer og de foreslåede løsninger på nutidens klimakrise. Disse forestillinger gør det muligt for konventionelt landbrug at bestå trods eskalerende miljøkriser. Afhandlingen argumenterer for, at dette fokus på effektivitet risikerer at forsømme bredere økologiske og sociale hensyn, samtidig med at det tydeliggør grænserne for modernistiske visioner om en grøn omstilling.

Afhandlingen peger derfor på behovet for fortsat etnografisk opmærksomhed på, hvordan begreber som bæredygtighed får liv og transformeres i praksis. Den foreslår, at forståelsen af bæredygtighed som en moralsk økonomi—hvor ressourceeffektivitet, teknologiske fremskridt og en skrøbelig *license to produce* flettes sammen—kan kaste lys over, hvorfor konventionelt landbrug fortsat opfattes som både problem og løsning på tidens kriser.

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