

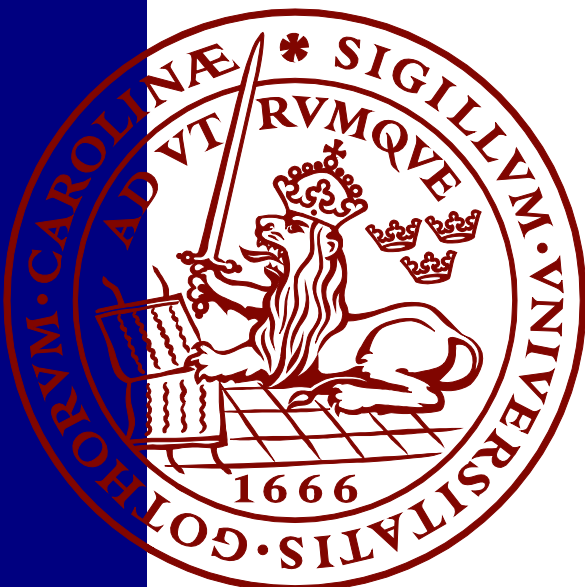
Breaking the treadmill

Real utopias for soil-health-cantered agriculture in Denmark

Anna Bjerre Johansen and Talia Theresa Masino

Master Thesis Series in Environmental Studies and Sustainability Science,
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A thesis submitted in partial fulfillment of the requirements of Lund University
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(30hp/credits)



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Lund University Centre for
Sustainability Studies



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Submitted May 13th, 2024
Supervisor: Wim Carton, LUCSUS, Lund University

Abstract

The future of agriculture depends on healthy soils, but soils are degrading within dominant agricultural systems, also in Denmark. Pioneer farmers seek a sustainable transition towards soil-centered management. However, reinforcing feedback loops in current agriculture is blocking such a transition.

Founded in emancipatory social science and critical utopian action research, this thesis, in collaboration with eleven pioneer farmers across three production systems, envisions a real utopian transformation towards soil-health-centered agriculture, consisting of proposals regarding governance, on-farm practices, and consumer-farmer relations.

The visions show promising, real utopian, transformative potential to break the current treadmills in agricultural management and can be used as a collective organizing tool toward social transformation. Transdisciplinary sustainability research must continue developing collaborative visioning methods to support the agricultural transition.

Keywords: visioning, soil degradation, emancipatory social science, agricultural treadmill theory, critical utopian action research, sustainability science

Wordcount: 11.960

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This thesis was written during an ongoing genocide.

As of 8:59:59 am (CEST) on the morning of May 13th, 2024, 35,469 Palestinians have been murdered by the state of Israel in Gaza, including over 14,500 children. 78,614 have been injured, and at least 10,000 are currently missing.¹

Every university in Gaza has been destroyed.

Lund University remains silent and therefore complicit.

We join students across the world who are collectively amplifying the Palestinian struggle. We condemn the ongoing violence perpetrated by the state of Israel against Palestinian health, freedom, safety, culture, and academia.

We demand that Lund University openly recognizes these atrocities and cuts all ties with the state of Israel. Additionally, it must terminate all cooperation with the weapons industry so as to ensure that Lund University will never again contribute to such violence and war crimes.²

We urge every reader to speak up for human rights and international law and against this genocide.

FROM THE RIVER TO THE SEA
PALESTINE WILL BE FREE

¹ See Al Jazeera *Israel-Gaza war in maps and charts: Live tracker*: <https://www.aljazeera.com/news/longform/2023/10/9/israel-hamas-war-in-maps-and-charts-live-tracker/>
² Demands in alignment with *Lund Students for Palestine*. See: <https://linktr.ee/lundstudentsforpalestine>

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1. Introduction

Healthy soils are a prerequisite for thriving ecosystems. Plant growth, animal habitation, biodiversity, carbon sequestration, resilience to floods and droughts, and agricultural production all depend on the state of our soils (Bindraban et al., 2012; Karlen & Rice, 2017; Lal, 2015). Globally, more than half of arable soils are classified as degraded or severely degraded (UNCCD, 2015). Soil health, defined as “the continued capacity of soil to function as a vital living ecosystem” (USDA, 2024), often refers to soil organic matter (SOM) levels, carbon content, pH levels, water storage, ability to recycle nutrients, and resilience towards stress and unpredictable weather (Bünemann et al., 2018). The continuous decrease in soil health exacerbates soil degradation, contributing to climate change and food insecurity (Rojas et al., 2016). Agricultural intensification and management practices are the main pressures leading to soil degradation (EEA, 2020; Lal, 2015). As Montgomery (2007, p. 3) concludes: “Soil is our most underappreciated, least valued, and yet essential natural resource.”

Envisioning alternative futures is a prominent tool of sustainability science and critical research (Böker, 2017; Harnesk & Isgren, 2022; Wiek & Iwaniec, 2014). Amid the ecological crisis, a clear vision for a better future is vital for crafting strategies to reach it. Although the word utopia stems from the meaning of ‘nowhere,’ we must search for visions we believe can bring us somewhere, namely toward a greener, just future. “Utopianism is a philosophy of hope” (Sargent, 2010, p. 8). ‘Real utopias’ are understood as imaginaries of the future that are thought of as not only desirable but also viable and achievable (Wright, 2013). To research real utopias is to unravel what is possible (Movahed, 2022, p. 2).

In this thesis, we investigate real utopias for soil health in agriculture. We will do so in Denmark, the world's second most agriculturally intensive country, with only Bangladesh surpassing it (DN, 2018, p. 7).

1.1. Background and problem indication

The global agrifood system accounts for 9-14% of global emissions from livestock, fertilizers, and soil emissions (Mbow et al., 2019, p. 439). In Denmark, the sector is at a crossroads. It has not reduced its emission levels in the past 15 years and is expected to be responsible for up to half of all national emissions by 2030 (Langhede et al., 2023). In Danish agriculture, the three most serious threats to soil health are soil compaction due to heavy machinery, a decrease of SOM due to monocultural, annual crop production, and erosion of soils due to wind, water, and tillage (Schjønning et al., 2009,

pp. 7–9). Denmark is a prominent example of how input-based industrial agriculture has become part of both conventional and organic production (Hansen, 2019), with large use of fertilizer, pesticides, energy, and water. This pressures soils and soil ecosystems (DN, 2018). Sixty-five percent of Danish land is currently used for agriculture (Gyldenkærne, 2023). Only 5% of coastal waters are in good ecological condition, and critical levels of pesticide residues are now found in 54% of all freshwater drillings; in 2016, that number was only 20% (Langhede et al., 2023).

Various alternative agricultural practices have emerged in Denmark rooted in organic, regenerative, and conservation agricultural (CA) principles. Conservation agriculture, a conventional production form that entails minimal soil disturbance, diverse crop rotation, and keeping fields covered, has gained popularity in Denmark since 1990 (FRDK, n.d.). Only 2,5 % of Danish land is farmed without any soil disturbance, but 12% is cultivated as no-till, and the numbers are rapidly rising (Engmann, 2019; Nielsen, 2021). Organic farming renounces using synthetic substances like pesticides, fertilizers, and genetically modified organisms. In Denmark, 7% of farmland is grown organically (Ministry of Food, Agriculture and Fisheries, 2021). Regenerative agriculture targets emissions, deteriorating water quality, and biodiversity loss while promoting soil health (Jameson et al., 2024). The term ‘regenerative’ lacks a universally agreed-upon definition and is claimed by producers across conventional and organic systems (Regeneration International, 2023). In this thesis, we use ‘regenerative principles’ to encompass practices such as no-tillage, carbon sequestration, and increasing SOM. However, we use ‘regenerative farmers/farming’ to refer to a group of experimental, organic, small-scale market gardeners focused on improving soil health.

Despite the growing popularity of these alternative practices, their adoption on a large scale remains limited. Guided by emancipatory science (Wright, 2006) and based on moral principles of equality, democracy, and sustainability, we must examine the interwoven structures currently hindering a soil-health-centered agricultural transition, just as we must investigate possible real utopian visions for overcoming them.

In this project, we collaborated with farmers from three different production systems who are all at the forefront of integrating solutions to counter soil degradation and increase the carbon uptake of their fields. We named them ‘soil health pioneers’. Using a critical utopian action research method and aligning with emancipatory social science, we seek to understand how soil health pioneers envision future farm management practices and how they intersect across farming systems, with the normative aim of empowering soil-health-centered farming.

Previous research has explored visions (Gundelach, 2005; Karlsson et al., 2018) and participatory methods (Aare, 2021; Aare et al., 2021) in the Danish agrifood sector. However, to the best of our knowledge, no study has been conducted on action research with pioneer farmers. This thesis aims to bridge this gap by utilizing action research to collaborate transdisciplinarily with soil health pioneers in envisioning a more sustainable, soil-health-centered Danish agricultural system. This is done by creating common visions and strategies based on individual visioning interviews, showing avenues towards more transdisciplinary sustainability science. The common visions and strategies are analyzed to discover their embedded critique of today's agricultural system and investigated for their real utopian transformative potential.

The overarching research question and subquestions guiding the thesis are as follows:

1.2. Research questions

What are the visions and strategies of soil health pioneers in conventional, organic, and regenerative farming systems in Denmark, and how do their visions encompass a critique of the current state of agriculture and formulate a real utopian transformation?

RQ₁ According to soil health pioneers in conventional, organic, and regenerative farming, what are visions and strategies towards soil health in agriculture?

RQ₂ How are these visions and strategies embedded in a value-based critique of the current agricultural sector in Denmark?

RQ₃ How and to what extent do the visions, strategies, and proposals of pioneer farmers show pathways toward a desirable, viable, and achievable real utopia?

RQ₄ How does creating common visions based on individual visioning sessions inspired by critical utopian action research show barriers and avenues for more transdisciplinary sustainability science?

2. Theoretical framework

2.1. Emancipatory social science

This thesis is founded in emancipatory social science, as described by the American sociologist Erik Olin Wright, author of *Envisioning Real Utopias* and *How to be anti-capitalist in the 21st century* (Wright, 2010, 2019). The notion of ‘emancipatory’ identifies its overall moral purpose, “the elimination of oppression, and creation of conditions for human flourishing” (Wright, 2006, p.94).

Emancipatory social science is solution-oriented and seeks to systematically and democratically generate and advance knowledge (Wright, 2006, 2013). Wright's work builds upon critical theory but aims to be more explanatory, methodologically eclectic, and open to ‘realist’ ontologies (Kirby, 2001). It leans towards a critical realist philosophy of science, which we adopt in this thesis.

Wright argues that emancipatory social science must consist of four parts: a specification of moral principles, a systematic critique of the current structures, visions of desirable alternatives, and an understanding of possible pathways for transformation (Wright, 2006). This thesis is built upon these parts, both in theory and methods. The following sections will unfold the theoretical basis.

2.2. Moral principles for evaluating the current agricultural system

Erik Olin Wright's critique is value-based, and moral principles serve as tools to diagnose current social and economic systems and to evaluate alternatives and possible transformations (Buecheler & Bosch, 2023, p. 8). In *Transforming Capitalism through Real Utopias*, Wright seeks emancipatory alternatives to capitalism, pointing out capitalism's deficiencies, such as perpetuating inequality and unsustainable economic growth, and undermining democracy. Wright's work focuses on the three moral principles he sees as fundamentally left behind in a capitalistic system: equality, democracy, and sustainability (Wright, 2013). Our analysis of how the pioneer's visions form a critique of the current agricultural system will follow these principles.

The equality principle demands a socially just society with equal access and opportunity to sufficient social and material conditions for a good life. This principle refers to welfare, well-being, happiness, and people's ability to “realize their potential as human beings” (Wright, 2013, p. 4). Social conditions are as important as material conditions and include “social respect, community, solidarity, and trust” (Wright, 2013, p. 4).

Wright defines democracy as a society where everyone has “equal access to the necessary means to participate meaningfully in decisions about things that affect their lives” (Wright, 2013, p. 5). Underlying this is the value of self-determination, independence, freedom from others, and the ability to make autonomous and collective decisions (Wright, 2013, p. 5).

Inspired by the Brundtland definition, Wright’s sustainability principle is defined as future generations having “access to the social and material conditions to live flourishing lives at least at the same level as the present generation” (Wright, 2013, p. 5). Equality is social justice today, sustainability is social justice for the future (Wright, 2013, p. 5,23).

2.3. Diagnosis and critique

The second step of emancipatory social science is to diagnose and critique the status quo based on the moral principles of equality, democracy, and sustainability, which provide the moral criteria for analyzing any social structure (Wright, 2013, p. 6)

Wright identified mechanisms of social reproduction that maintain the capitalist system through passive normalization of routines and active institutional reinforcement, holding back individual and collective efforts to change (Stuart et al., 2020). Such a comprehensive systems-thinking approach is integral to sustainability science. It forms the basis of our examination of the critique directed at the current Danish agricultural system, as explored in RQ₂. To understand the connections of farming practices to current soil degradation and, more broadly, to ecology, economy, and society, we base our analysis of RQ₂ on the agricultural treadmill theory (ATT). This theory was chosen early in the research process as it fit our preunderstanding of Danish agriculture challenges. This choice was confirmed by findings along the participatory process.

2.3.1. The agricultural treadmill

Willard Cochrane first developed the ATT in the 1960s (Cochrane, 1958). It was the midst of the agricultural revolution, where synthetic fertilizer and new technologies industrialized farming across the globe towards the production systems we see today (Kissel, 2014). The treadmill begins with technological development, resulting in increased capital input and debts as non-risk-averse farmers adopt new technology. The resulting increase in efficiency and output then suppresses food prices, leading to consolidation and increased farm sizes as farmers go bankrupt. The following financial concentration in the farming sector adds to further technological development, closing the self-reinforcing feedback loop of the ATT (see Figure 1).

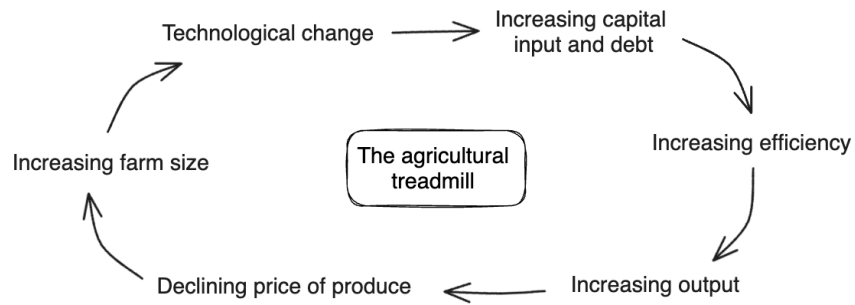


Figure 1. Visualization of the agricultural treadmill from Crews et al. (2018) based on Cochrane (1958).

The theory has broadly remained the same since Cochrane developed it over half a century ago (Olsson, 2021). Newer interpretations have emerged since the 1990s connecting the treadmill more explicitly to ecological, social, and political drivers, but the core element of the financial feedback loop driving an increasingly intensive system has remained (Hansen, 2019, pp. 2–7; Ward, 2008, p. 349). This pressure for intensification makes it highly difficult to change these loops, even with differentiated products, e.g., organic produce (Hansen, 2019, p. 7). The agricultural input trap is the main addition to the original version of the ATT (Clunies-Ross & Hildyard, 1992) (see Figure 2).

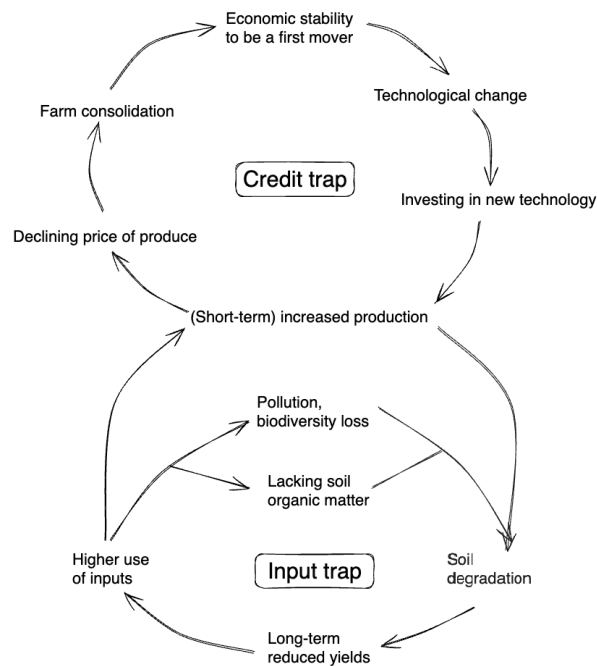


Figure 2. Visualization of the agricultural treadmill, according to Cochrane (1958), its connection to the agricultural input trap according to Clunies-Ross & Hildyard (1992), and how these two traps lead to soil degradation.

The input trap seeks to explain how farmers become entangled in a cycle of dependency on external inputs to maintain or boost agricultural productivity. Over the past half-century, there has been a massive increase in the use of inputs such as nitrogen, phosphorus, pesticides, irrigation, machinery, seeds, and energy in agriculture, driven by the goal of doubling global food production (Gomiero, 2016, p. 3). Clunies-Ross & Hildyard describe the input trap as follows: “Squeezed by prices, encouraged by advice and training, controlled by regulation, limited by research, and trapped by peer pressure, farmers have had little choice but to adopt more and more intensive systems” (1992, p. 59). Root causes can be diverse, from reduced yield or economic pressure to a lack of understanding of soil biology and ecosystem services. Higher inputs lead to reduced SOM, pollution, and biodiversity loss, accelerating soil degradation and reinforcing the trap. In short, input-intensive farming can be “characterized by a double loss of biodiversity and agricultural production” (Burian et al., 2024, p. 7).

Our analysis of the critique embedded in the visions and strategies of Danish soil health pioneers will be based on these two reinforcing traps.

2.4. Alternatives and transformation - envisioning real utopias

In response to the systemic critique and diagnosis, the last tasks of emancipatory social science are to build social alternatives and investigate their transformative potential. Real utopias are imaginaries of the future that can concern both specific institutions and macro-scale societal structures and are evaluated on desirability, viability, and achievability in this order (Wright, 2013) (see Figure 3).

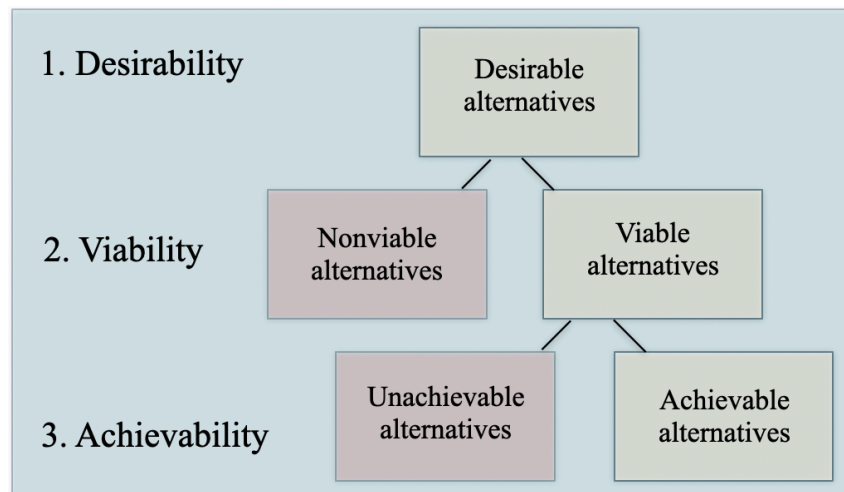


Figure 3. Visualization of the three criteria to evaluate real utopias based on Wright (2010, p.20).

Desirability constitutes the ‘utopia’ of real utopias. Without it, there is no reason to work for the alternative to become a reality. An action research methodology is introduced to ensure that the real utopian proposals discovered within this thesis are desirable. See the methods section for further elaboration. Desirable social alternatives are powerless if they are not viable and achievable (Wright, 2013, p. 8).

Viability examines robustness, unintended consequences, or negative feedback dynamics that could make the alternative unsustainable, asking, “If we could create this alternative, would we be able to stay there?” (Wright, 2013, p. 8). Viability can be evaluated based on criteria for emancipatory potential, as real utopias must be emancipatory to be viable (Wright, 2013). ‘Emancipatory’ refers to liberation from alienating productivist logic, growth, and overconsumption, not individualized lifestyles (Petridis, 2022, pp. 164–165).

Panos Petridis, a researcher from the Institute of Social Ecology in Vienna, outlines four conditions

for evaluating the emancipatory potential of strategies, based on which the viability of a real utopia proposal will be analyzed (2022, p. 165). Firstly, it must result from bottom-up demands, resonating with social and ecological movements (Petridis, 2022, p. 165). Secondly, it must contribute to emancipatory moral principles for society, here equality, democracy, and sustainability (Petridis, 2022, p. 165). Thirdly, it must contribute to building democratic institutions and modifying existing power relations toward more participatory decision-making (Petridis, 2022, p. 166). Fourthly, it must remain pertinent within both present and envisioned societies. This serves as a core *raison d'être* for real utopias, ensuring not only transitional but future validity, akin to André Gorz's concept of non-reformist reforms (Petridis, 2022, pp. 162, 166). Gorz coined the term to identify proposals that simultaneously ameliorate the existing system and fix existing problems while expanding the potential for further systemic changes (Wright, 2013, p. 20). Petridis emphasizes these conditions as heuristic tools for directing the focus toward emancipatory change rather than to the tempo of transitions (Petridis, 2022, p. 167). These criteria will guide the viability analysis.

Real utopian alternatives that are both trusted as desirable and viable become only truly relevant if they are achievable. "Achievability asks of a viable alternative: how do we move from here to there?" (Wright, 2013, p. 8). The 'achievability problem' is affected by our limited understanding of what comes after the near future and, in general, how credible the ideas of viability are for the envisioned alternatives. The limits of social possibility and future conditions are constantly being moved (Wright, 2013), making it impossible to precisely analyze the achievability of proposals with long-term strategies over decades. Furthermore, such an analysis is vulnerable to "wishful thinking" (Wright, 2010, p. 16).

When discussing achievability, an analysis of power is important. Wright defines the concept simply as "the capacity to do things in the world, to produce effects" (Wright, 2013, p. 12), distinguished within economic systems as economic power, state power, and social power, the last defined as "the capacity to mobilize people for cooperative, voluntary collective actions" (Wright, 2013, p. 12). The three types are always combined in complexity, and the importance lies in strengthening social power to be dominant. Real utopian alternatives aim to find ways to empower social agency (Wright, 2013, p. 12). Therefore, the achievability analysis in this thesis is based on current power and stakeholder dynamics and the likelihood of long-term achievability.

3. Methodology

3.1. Preliminary process

In January and the beginning of February 2024, we conducted open-ended online interviews, phone calls, and email correspondences with researchers, consultants, and farmers to narrow down and iteratively refine the research aim. See the list of preliminary interviews in Appendix A. In this initial process, we moved from our initial focus on perennial grains towards a broader investigation of visions for healthy soils, as this was viewed as more relevant for farming in the next few decades.

3.2. Critical Utopian Action Research

With Erik Olin Wright's emancipatory social science as the overall theoretical framework, the methodological foundation for this thesis is the distinct Scandinavian tradition of participatory action research named Critical Utopian Action Research (CUAR). One key aspect of sustainability science is the involvement of social actors outside academia (Lang et al., 2012). In the seminal work on sustainability science, Kates et al. state that "participatory procedures involving scientists, stakeholders, advocates, active citizens, and knowledge users are critically needed" (2001, p. 641). For this reason, we see CUAR as an interesting possibility for developing transdisciplinary sustainability science.

The CUAR methodology combines "critical analysis, imaginative thinking, and everyday life-based actions toward societal democratization" (Egmose et al., 2020, p. 1). It aims to create free spaces with a safe, trusted atmosphere for citizens to openly reflect on future living and gain confidence in handling challenges through collaborative visions for alternatives (Egmose et al., 2020, pp. 1–2). Critical Utopian Action Research relates to the broader family of action research but is rooted in emancipatory research traditions and oriented toward critical theory (Egmose et al., 2020, pp. 3–4), similar to Wright's emancipatory social science. The methodology's name echoes its process: it begins with critique, transitions to utopias, and culminates in action, mirroring Wright's argument that these elements can drive transformation toward a more sustainable, equal, and democratic society (Wright, 2010).

We share CUAR's normative aim to strengthen democracy in society through critical analysis and by facilitating free spaces for new visions and social learning to reach a more equal and sustainable society (Egmose et al., 2020, pp. 3–4). A prominent tool within CUAR methodology is 'future-creating workshops', initially developed by the German researcher Robert Jungk, where participants come

together to critique, envision, and strategize in a common workshop (Egmose et al., 2020, p. 3; Jungk & Müllert, 1987). This method inspired our visioning interviews, which are explained further in this section.

3.3. Selection of participants

To support the thesis's aim of participatory knowledge building and empowerment, we wanted to collaborate with pioneers in Danish agriculture who are working with soil in different agricultural systems. The preliminary process of inspiration, communication, and discussion with practitioners, consultants, and researchers built the foundation for our selection of participants.

These pioneers were found through snowballing, as is typical within action research (Nielsen & Lyhne, 2016). This method encompassed word-of-mouth recommendations, repeated mentions of names during preliminary interviews, suggestions from those pioneers we had already identified, and a literature review targeting individuals who demonstrate proactivity or hold influential positions within alternative agricultural networks, striving to effect change beyond their own farms. We conducted a preliminary, short phone interview with all participants to get an overview of their farming system, interest in the project, and general motivation to participate before the final selection. See Figure 4 for a visualization of how the selected pioneers were found.

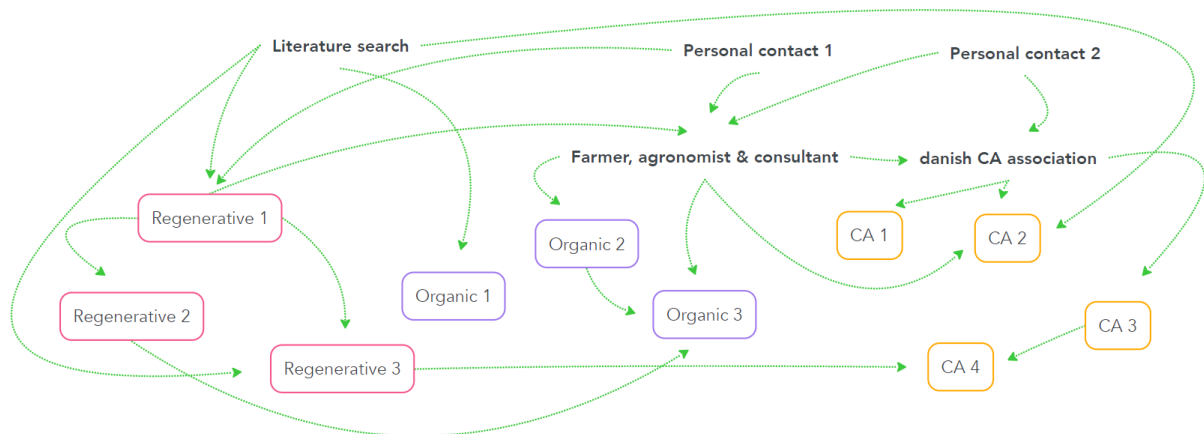


Figure 4. Snowballing method for finding pioneer farmers.

Eleven farmers from 10 different farms participated in a total of nine visioning interviews. Most sessions were individual, apart from one interview with two people owning a farm together and one interview with two neighboring farmers from the same production system. All the sessions were

completed in the last two weeks of February 2024, respecting the growing season starting in March. They took place physically on farms across Zealand, Fyn, Tåsinge, and Falster.

3.3.1. Three groups, three visions

The farmers were divided into three groups according to their agricultural practices. The first group represents conventional farmers practicing conservation agriculture (CA), including farmers further inspired by regenerative principles. The inclusion criteria for this group were that farmers practice CA principles on an industrial scale within conventional regulation. The second group consisted of medium and large-scale organic farmers. This group represents both the alternative and the mainstream within Danish agriculture, as these farmers operate within the dominant Danish food system while also being part of the organic movement, the biggest alternative production system to conventional. The inclusion criteria were that farmers practice organic farming and are interested in or practicing principles for healthy soil management. The third group represents market garden farmers practicing regenerative principles. These farmers are small-scale, experimental, and have bypassed the conventional system for selling produce and established an economic niche through mostly direct sales. The criteria for inclusion were that the farmers engage in organic, regenerative practices focused on soil health and microbiology, all while maintaining a financially sustainable business model.

Initially, we intended to keep participants anonymous from each other, but this proved arbitrary as most already knew and collaborated with each other. Through an iterative process and conversations with the pioneers, we found it valuable for them to know who they were indirectly visioning with, leading us to drop their anonymity. They are all kept anonymous here.

3.4. Visioning interviews

The future-creating workshop format aims to constitute a ‘free space’ through the three phases of critique, utopias, and actions. Participants engage as co-researchers and seek a common understanding with the action researchers who ask questions and facilitate each phase (Egmoose et al., 2020, pp. 5–6). This approach emphasizes accountability to all participants involved (Nielsen & Lyhne, 2016). To accommodate busy farmers across the country, we conducted individual visioning interviews based on Jungk’s future-creating workshops (Egmoose et al., 2020, p. 3). Drawing inspiration from Nielsen and Lyhne (2016), we adapted the workshop elements into a two-hour in-person interview format. This change in the original CUAR methodology will inevitably affect our

findings. As suggested by Egmoose (2020), conducting group visioning sessions over several days fosters stronger connections between participants and the researcher. Discussing proposed strategies in-depth with others allows for the development of more viable and achievable strategies. Egmoose et al. note that participants often form groups and plan to implement aspects of the strategy following visioning interviews (2020). These benefits of group workshops are not attainable through individual visioning interviews.

3.4.1. Design of interviews

The interviews consisted of six elements: introduction (10 min), background (10 min), critique (30 min), vision (30 min), transition (30 min), and wrapping up (10 min). The interview guide with all main and follow-up questions can be viewed in Appendix B. The methodological reasoning for the interview design is presented below.

All interviews began with introducing the project, mentioning our aim of creating a 'free space' and our method of asking open-ended questions, allowing participants to express their perspectives with time for complexity. Then, we asked the participants about themselves and their farm to understand how their social background might influence their responses. Based on this information, we sensitively structured interview questions on the spot for each interview.

In the critique phase, we asked the participants to criticize the state of agriculture and soil in Denmark today based on their experience as farmers. This phase facilitated the identification of reified structures in the status quo (Nielsen & Lyhne, 2016) but also built the foundation to envision alternative futures free from 'the power of reality,' otherwise often resulting in a lack of imagination (Egmoose et al., 2020). Wright's work emphasizes understanding and challenging structural barriers and existing power structures. Therefore, participants were encouraged to focus on power dynamics, the influence of larger institutions, farming practices, and systemic inequalities or injustices within the agricultural sector.

In the visioning phase, we asked the pioneers to envision a utopian future of Danish agriculture, both on their farms and in general. Social alternatives for organizing society and the economy are fundamental in Wright's concept of real utopian transformation, and this phase "facilitates energy to initiate action to change structures" (Nielsen & Lyhne, 2016, p. 58). The visioning phase was their space for exploring a future for living and working in which anything they desire is possible. The focus was on 'the good life,' core values, holistic perspectives, and how the life of a farmer would be

different from current realities. Everything in the vision sought to be described as specific as possible.

In the transition phase, we facilitated a brainstorming session where we asked the participants to describe all transformative pathways, experiments, niches, or well-known ways to reach the above visions within today's realities that they could think of. We asked follow-up questions about the overall steps, actor responsibility, specific farming practices, barriers to overcome, and economic consequences. We, as researchers, took a more active role in this phase by brainstorming with the farmers, asking detailed questions about their strategies (Nielsen & Lyhne, 2016), and seeking to arrive at achievable alternatives.

To conclude the visioning interviews, we explained the remaining process, describing how we would merge the visions and strategies with inputs from all participants and then send the collective vision and strategy document back to them for feedback and validation.

3.5. Writing, editing, and validating collective visions

Notes from sessions were condensed into three collective visions and strategies, each representing a production system. Combining input from the interviews was straightforward, as farmers within each system shared similar visions and strategies, often building upon each other's ideas. The interviews were recorded. Physical post-it notes were written during the visioning interviews and read aloud to the participants during the individual interviews for validation. These notes were combined into mindmaps and then written into coherent visions and strategy documents (see Appendix C). From now on, these merged vision and strategy documents will be referred to as 'collective visions'.

The collective visions were sent back to the participants to validate their continued alignment with the participants' thoughts and opinions. This process aimed to foster ownership, confirm usefulness, and include new perspectives. It was a fundamental motivation for us to give something inspirational back to the farmers who contributed to our project.

Participatory action research usually does not use traditional validation methods, such as precise transcription of interviews. Therefore, the process described above functioned as a way to extensively validate our interpretation of the visioning interviews, which is common in participatory action research (Nielsen & Lyhne, 2016). All participants read and commented on their respective collective vision, most with minor proposals for edits that we completed and validated with the other pioneers in their group. They have all verified that they feel represented by the final versions. This

way, we sought to mimic the collaborative process of the future creating workshop in an individual interview format.

3.5.1. The coding process

Once we received the validated final versions of the collective visions, we developed an inductive coding structure. This was done to identify common and opposing themes between the groups of soil pioneers and determine which elements of the vision and strategies were most frequently and strongly mentioned by the pioneers collectively.

We began by examining the CA vision and creating codes covering this data sample. Then, we reviewed the organic and regenerative collective vision documents, applying the codes from the CA vision and adding new codes when necessary. This process was repeated for the strategy texts. All three farmer groups mentioned 15 common themes at least once (see Appendix D). From these common themes, we identified three main thematic proposals with frequent recurrence and significant emphasis across all three farming groups.

3.5.2. Expert interviews

To further support the analysis of findings, we contacted four experts in the field. By the end of April 2024, we conducted three online expert interviews. These involved a policy advisor in Landbrug & Fødevarer, the largest agricultural interest organization in DK, an environmental advisor in Danmarks Naturfredningsforening, the largest ecological protection NGO in Denmark, and a researcher in sustainability and agriculture at Roskilde University. A second policy advisor from Landbrug & Fødevarer answered our questions through email correspondence (see Table 1 on page 27). The thematic proposals we identify are broad and may mean different things to different actors. The experts were asked to read the key thematic proposals before our interviews to be able to contribute a useful dimension to our analysis. An overview of the research design can be found in Figure 5 below.

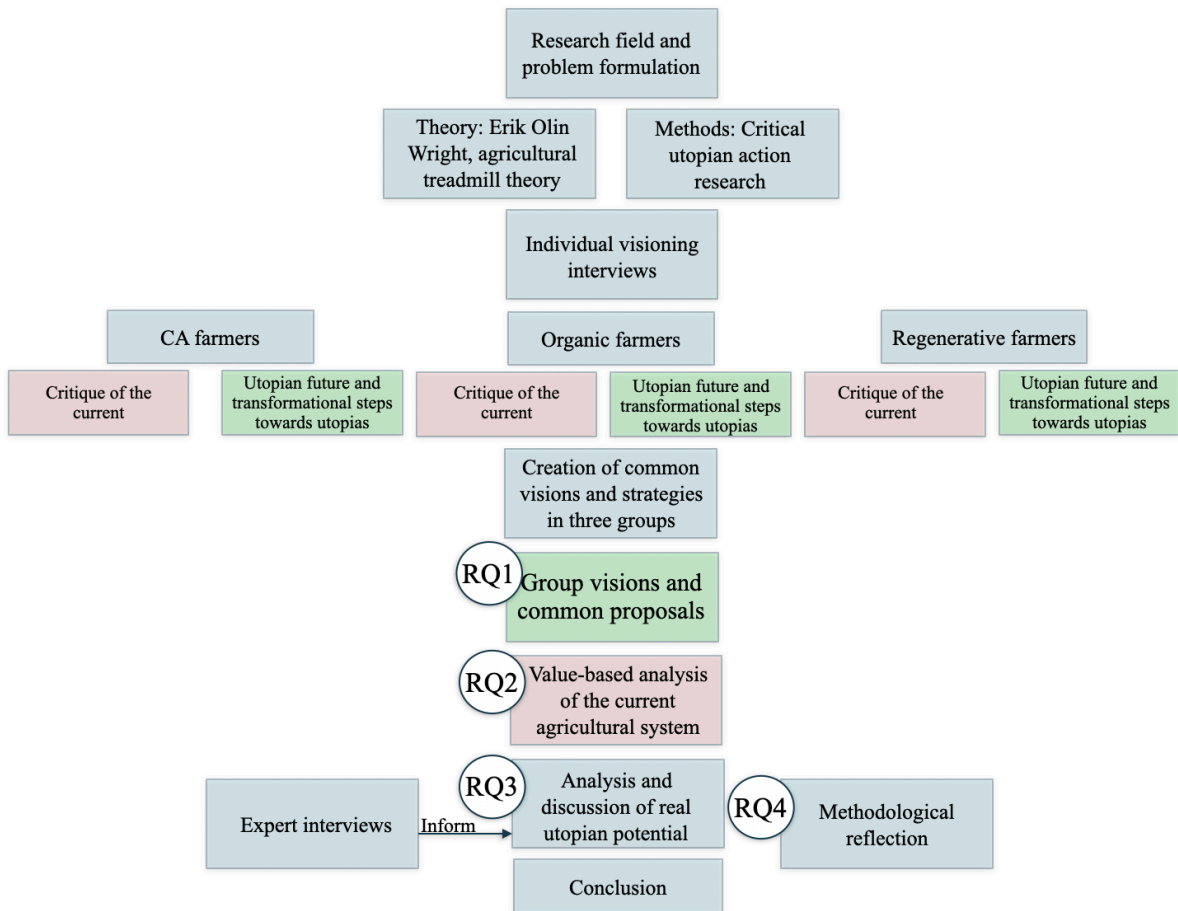


Figure 5. Visualization of the research design and process.

4. Visions for soil-health-centered agriculture

The visions and strategies will be presented here in a short, summarized form to answer RQ₁. We strongly recommend reading the extended versions in Appendix C for a more detailed understanding.

4.1. CA vision and strategy

The CA vision includes regulations and farming organizations, the position of farming in society, farming practices, education, and new ways of thinking. In this vision, regulations align with farmers' desire to focus on biodiversity, regenerative principles, and a minimized bureaucratic burden. Farmers have larger direct sales to consumers who are now actively engaged in agriculture and how produce is grown. This respect for food and farmers is also represented in the prices that consumers are willing to pay. Many improved farming practices are established, such as year-round green fields, using bio-solutions instead of pesticides, cows grazing and fertilizing the land naturally, reduced use of heavy machinery, and an overall reliance on self-sufficiency and circularity. Farmers now have an integrated place in society and strong trust in one another. The craft is deeply understood and appreciated, making young people interested. A mentality shift has occurred; now, farming is focused on producing food with maximum nutritional quality and a minimized environmental impact, and every farm and agricultural education institution centers on soil health and soil biology.

The CA strategy is centered on education and knowledge sharing, a mentality shift in society, encouraging a transition from conventional practices, network building, lobbying, and research. Sharing soil health and microbiology knowledge in agricultural education institutions, among farmer groups, and in knowledge centers are key ideas to bridge the gap between consumers and producers and to help a broad audience engage with a positive narrative of farming and regeneration. Another main element is encouraging an inclusive, nuanced, depoliticized discussion about agriculture and CA principles, with the notion that farmers can engage with CA principles from every point of departure. Central objectives include establishing lobby groups and fostering collaborations to exert political pressure at the national level for financial support during transitions and funding for research in CA and regenerative practices. Additionally, there is a focus on pressuring agricultural organizations to guarantee higher returns for nutrient-rich produce.

4.2. Organic vision and strategy

The organic vision focuses on regulations and representation, agricultural land use, farming practices, and sentiments and communities around farming. In the vision, farmers' organizations and businesses represent organic farmers in democratic decision-making. Subsidies are targeted to make

conventional farmers transition rapidly, and due to all-year greenery on fields and high taxes on the use of nitrogen, eutrophication is eradicated. All land is farmed organically in economically viable ways for farmers. Pesticides, chemical inputs, or tillage are not used anymore, and bacterial and microorganic life in the soil is treated with attention. A reduction in meat production gives space to more nature and green energy. The remaining farm animals are fed with local crops. Farmers and their employees have flexible working conditions. Everyone working in the food system believes in the idea of organic production. Farming is based on honesty, trust, and community ownership; consumers visit and spend time on the farms. Social care, inclusion, a 'slower' life, and a holistic way of thinking about the complex interplay of soil, plants, farmers, and the entire food system are also part of the vision.

The organic strategy focuses on sentiment changes in farming, the transition towards sustainable practices, and political pressure for new regulations. Similarly to the CA strategy, constructive communication and alleviating bureaucracy are central. The connection between producers and consumers is centered on promoting community ownership of farmland, supporting markets for 'small' organic produce, and working with public authorities to ensure equal access to high-quality food. Transitioning agricultural practices includes addressing climate change, prioritizing biodiversity, and promoting circular agrarian production. This involves on-farm fodder production, nitrogen-fixing plants, light machinery, reduced energy use, and support for nitrogen and CO₂ taxes combined with subsidies. Lastly, a key element is better systems for collective ownership and for the new generation to take over farming.

4.3. Regenerative vision and strategy

The elements of the regenerative vision are politics and regulation, the farming landscape in Denmark, farming practices, and mind-shift and education. Here, visions on regulations, taxes, subsidies, and the role of agricultural organizations and farmer consultants are similar to the other two visions. However, in this vision, a process-based certification system for regenerative agriculture, financial support for transitioning, and institutional investments further incentivize farmers to improve soil health continuously. Living soils are now the norm and can withstand extreme weather events. Regenerative principles are universally understood and integrated from elementary school to the decision-making level. New cooperatives distribute seeds and compost; perennial crops now constitute more than 80% of the farm landscape, characterized by smaller fields. A million hectares are left wild. The role of animals in farming aligns closely with the organic vision. All land is communally owned, and food is considered a public good. Respect and participation from the public

align with the two other visions, as does the role of the farmer in society. Finally, this vision emphasizes local self-sufficiency and fair global product exchange.

The regenerative strategy centers on education and the regenerative mindset, bottom-up strategies to support farmers, communication, and strategic lobbying. Similarly to the other two, this strategy includes transforming agricultural education towards prioritizing soil health management and community engagement. However, this strategy is supported by highlighting successful social and economic models within regenerative farming. Fostering a cultural shift of farming through finding common ground with the organic and CA farmers can challenge traditional views of farmers. Circularity and ecosystem integration within agriculture can be encouraged by establishing community recycling and compost facilities and by pressuring supermarkets and companies to support local regenerative food. Building a targeted media strategy to inform politicians, lobbying for a certification system for regenerative agriculture built on continuous regeneration processes, and demanding a long-term political vision for Denmark's agricultural landscape are also key ideas.

4.4. Three common, thematic proposals

After coding the common visions, three themes stood as most common among all three farmer groups (see Figure 6). The letters behind sentences refer to the specific production system that is being represented by a sentence (C = CA, O = Organic, R = Regenerative).

- 1) Governmental regulation, taxes, and subsidies should support more sustainable and less soil-disturbing land use*

Across all visions, future regulations and financial incentives directly promote soil regeneration, carbon sequestration, and enhanced biodiversity (C, O, R). Different levels of detail emerge from the farmer groups. There is a desire for rules to allow a variety of cover crops, legumes, and fodder mixes (C), rules mandating agricultural fields to be green all year around (O), and a desire for flexible regulation, taking local contexts and soils into consideration (R). Monetary incentives from the EU and the Danish government should directly fund the agricultural green transition to build healthy soils (C, O, R). Subsidies play different roles in the visions, from non-existent in the future (C) or less needed (O) to given for quality instead of quantity of produce (R). Overall, there is a strong wish for new taxation, specifically CO₂ and nitrogen taxes (O), to incentivize the transition towards healthy soil management (C, O, R).

2) *Sustainable farming practices must focus on soil health, minimal soil disturbance, avoid chemical inputs, and tailor to local environmental needs*

The second thematic proposal relates directly to soil management practices. There is agreement that year-round greenery, no-tillage, and minimal soil disturbance are key solutions to hinder soil degradation (C, O, R). The same goes for using cover crops, surface composting, and green manure to sequester carbon, fix natural fertilizers, and make them available in the soils (C, O, R). Across the groups, adapting to regional contexts and considering the specific needs of local soils is important (C, R), as is treating bacteria and microorganic life in the soils as a holistic entity (O), using biological solutions (C, O), and restoring biodiversity above and in soils (C, R). All farmer groups want to avoid using pesticides and artificial fertilizers in future soil management (C, O, R).

3) *Consumers must be encouraged to be interested and appreciative of food and take part in food production*

The last common thematic key proposal concerns consumers. All farmer groups wish consumers to be well-informed about cultivation and soil management practices so that they can make choices aligning with their values for sustainability and health (C, O, R). They also want consumers to participate actively and visit the farms to get involved, learn, and connect with the craft of farming (C, O, R). This relates to the desire across groups to have a more integrated place in society (C, R), with many more people understanding and finding it attractive to take part in food production (O, R), especially the young (C). Pioneers want the general public to build interest, respect, and connection towards farming and for this to reflect in the prices consumers are willing to pay for sustainable, quality production (C, O, R).

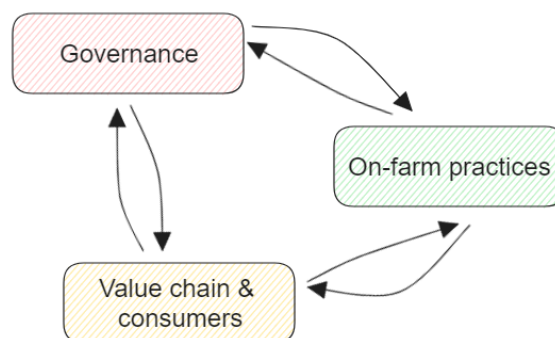


Figure 6. Visualization of the three main themes for a future alternative agriculture.

Originally, we set out to identify both common themes and conflicting themes between the three groups' visions and strategies. However, the coding revealed that no themes were, in fact, opposing each other. Aside from the 15 common themes, we also identified 15 themes that were not mentioned by all groups (see Appendix D). Many of these themes were related to and supportive of the common themes, indicating that instead of opposing opinions, varying degrees of importance were attributed to the different themes, leading to their varied mentioning. Of course, conflicting themes might arise with future elaboration and higher levels of detail in further research.

5. Forming a critique of current agriculture

Critiques of current structures and institutions must be based on moral principles (Wright, 2013, p. 3), and the values of equality, democracy, and sustainability are used to organize the critique thematically. All points of criticism mentioned in the following have either been directly mentioned in the critique phase of the visioning interviews or indirectly in the visioning and transformation phases. This section will answer RQ₂.

5.1. Equality

Farmers are often looked down upon (C, O, R) and have a negative social image, leading to social isolation (C) (Risgaard et al., 2007; Rutt, 2020). According to the pioneers, the broad society understands farming as very hard work or an overly romanticized occupation, reducing its complexity (R). Such narratives are far from reality and can create negative sentiments toward farming, making the craft less attractive. This issue feeds into what we have described as the knowledge trap (see Figure 7).

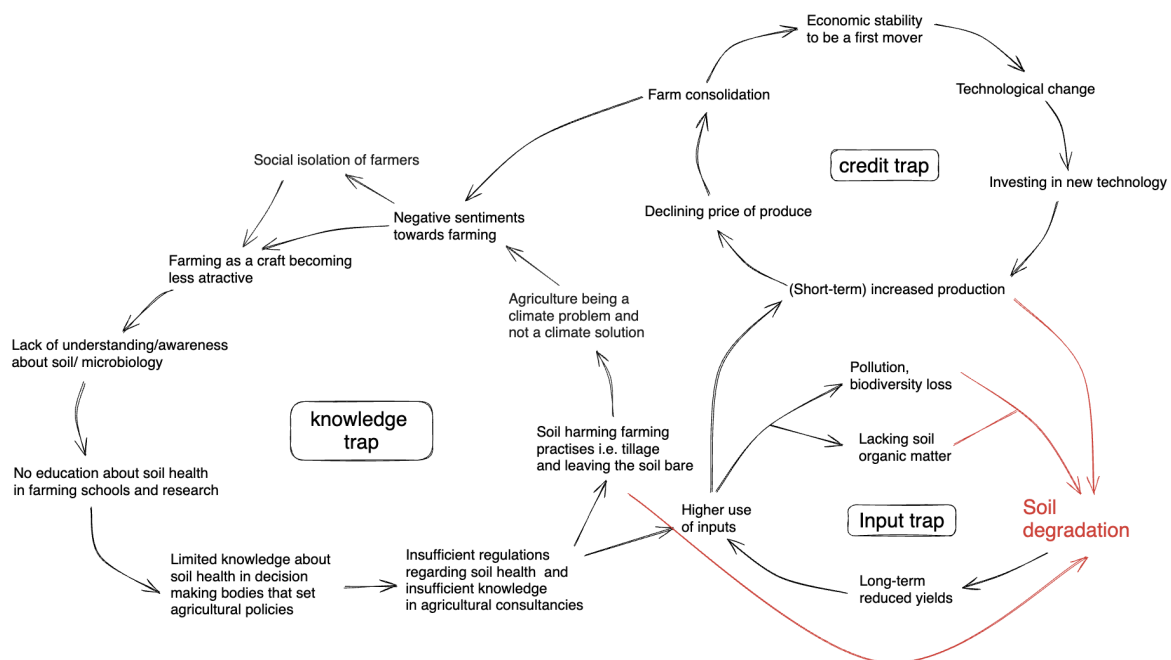


Figure 7. Conceptualization of how feedback loops create and reinforce soil degradation in Denmark, representing an overall sketch of the complexity and interconnectedness within agricultural practices. The credit and input trap are based on the ATT (Cochrane, 1958; Clunies-Ross & Hildyard, 1992) and have been confirmed by Danish pioneer farmers. The knowledge trap was developed by

analyzing how education, culture, and political regulation interrelate in Danish agriculture, resulting in a reinforcing circle of lacking knowledge, entailing several main critiques presented by pioneer farmers.

Farmers also critique how the whole farming system is set up for the economy and stuck in a cycle of chemicals and inputs, blocking the regeneration of soils and higher-quality produce (O, R). These sentiments refer directly to the input trap. Higher input use leads to soil degradation, driving higher inputs to reach yield expectations (Clunies-Ross & Hildyard, 1992; Gomiero, 2016).

A large barrier to transformation is financing; the pioneers note that it takes energy not to prioritize money and that it is very difficult for young farmers to get started as economic conditions are unfavorable (O, R). Wright echoes this critique by critiquing capitalism as inherently creating disparities in resource access. Capital acquisition and high startup costs are the main barriers for farming newcomers in Europe (Rico & Fuller, 2016). Farmers who, because of insufficient economic capacity, are unable to react as first movers to technological advancements are exposed to significant price decreases on their products further along in the credit trap. Therefore, as critiqued by the farmers, they are more vulnerable to having to shut down their production due to economic instability (O). Strong competition leads to farm consolidation and intensification, making it even harder for smaller-scale farmers to adopt new technologies in time to benefit from them as first movers (O). This reflects the phenomenon of the credit trap (see Figure 7).

When farmers transition to more soil health-centered production, yields are expected to decrease for a while until the transition is complete. Pioneers criticize that no subsidies are available to support transitions towards less soil disturbance or reduced pesticide use (C).

Wright (2013) argues that the underprovision of critical public goods is systematic within economically unequal systems. In this case, funding for transitioning, assistance for newcomers, and access to community or state-owned land are insufficiently provided, restricting individuals from entering into or transitioning within the agricultural profession (R, O). Another public good that is insufficiently provided is education. The lack of knowledge that prevails in decision-making bodies and society as a whole is a reflection of the agricultural educational system. Farmers criticized how teachings in conventional farm schools center on agricultural inputs without mentioning soil biology (R). Furthermore, much-needed knowledge sharing between farmers is lacking substantially (R).

A regenerative farming school was founded in Denmark in 2022, teaching soil biology and minimal disturbance of natural processes. However, it is not a part of the Danish state-funded education system and, therefore, costly to attend (Den Regenerative Jordbrugsskole, n.d.). The absence of education surrounding soil health contributes to a lack of understanding across society and within decision-making bodies responsible for agricultural policies, which perpetuates soil-harming farming practices (see knowledge trap in Figure 7). Pioneers mention that the widespread belief among many societal actors that future technological development will handle all sustainability-related challenges is dangerous (R), as this can be used as a discourse to delay the decision-making process (Moe, 2021, pp. 66–67).

5.2. Democracy

The pioneers identified a series of institutions and organizations that do not adequately represent smaller-scale, progressive farmers in decision-making processes. On an international scale, the EU only funds large-scale agriculture (O), and machinery and fertilizer companies do not represent farmers' interests (C). The prominent agricultural interest organization Landbrug & Fødevarer is perceived as regressive, ridiculing or ignoring regenerative principles (C). On a local scale, farmer consultancies have negative attitudes toward reducing pesticides and soil tillage (C). For example, Landbrug & Fødevarer present glyphosate as a “gentle agent”, emphasizing its benefits and not its detrimental effects on soils (Landbrug & Fødevarer, n.d.).

Following Wright, “Capitalism generates severe deficits in realizing democratic values (...) by excluding crucial decisions from public deliberation, [and] by allowing private wealth to affect access to political power (...)” (2013, p.7). The agribusinesses DLG and Danish Agro are collectively owned by farmers and set prices for produce, therefore highly influencing what is grown (O) (Danish Agro, n.d.; DLG, n.d.). Nonetheless, pioneers do not find that they adequately represent farmers' voices, their primary goal being to profit from farmers' produce (O). Pioneers demand to be included more democratically in DLG and Danish Agro's price-setting procedure (C). This exemplifies how power dynamics are out of balance, resulting in an undemocratic agricultural system.

Pioneers criticized the private ownership model (R) and demanded more possibilities for renting farmland (R). In a capitalist economy, the primary authority to distribute capital rests predominantly with private owners (Wright, 2013). As established previously, community and state-owned land are underprovisioned. Therefore, land owners can exclude others, such as farm workers and the local community, from decisions about land use, inhibiting democracy (R, O) (Wright, 2013). The pioneers,

in addition, find it unfair that there is no differentiation in bureaucracy levels with small-scale production, as it is currently impossible for small-scale farmers to not break the rules from time to time (O, R), building frustration towards the political sphere and limiting time for democratic participation.

Lastly, the democratic critique centers on research institutions. Aarhus University, being the national center for food and agriculture (Aarhus University, 2024), is found to be too dominant in farming research (C, R). The university is the main provider of research results for political deliberation. Due to this and the fact that only certain types of research get funded by the state and the industry, research steers too much towards existing instead of alternative production systems (C, R). An example is biochar, which Aarhus University extensively studied without a mention of its influence on microbiology (C) (Winding, 2024). Pioneers noted that there are too few avenues for communication between farmers and research institutions, yet another element restricting the effectiveness and democratic nature of today's agricultural research. (C).

5.3. Sustainability

Pioneers find existing regulations too rigid (R) and not sufficiently informed by new soil health and biodiversity research (C, O), reflecting a broader societal lack of knowledge (see Figure 7). Consultants, unaware of the importance of soil health and regenerative weed management (R, C), advise farmers to use traditional farming practices that involve tillage and other soil-harming methods (C, O, R), ultimately contributing to soil degradation and reinforcing the knowledge and input trap (see Figure 7). Pioneers argued that the Danish farming system focuses too much on short-term profits instead of on holistic practices and microbiology (C, O, R). The constant intensification creates an extractivist-oriented sector, reflecting the "imperative for consumerism and endless growth in material production," as discussed in Wright's analysis of how capitalism undermines sustainability (Wright, 2013, pp. 7–8).

The lack of knowledge is an overall and central critique. According to pioneers, agricultural knowledge needs to be diversified (R), pointing out how many farmers see soil as just a material for holding crops instead of the living entity it is (O, R). Also, practical knowledge and skills are inadequate. Pioneers know that tilling destroys micro life in the soil (C, O, R) and that no-till practices can lead to issues with grass weeds if not sprayed with herbicides (C). Both tillage and the use of pesticides contribute to soil degradation and kickstart the input trap (see Figure 7). Many farmers mentioned the immense difficulty of creating a no-till production system without herbicides (C, O).

However, some pioneers are successfully experimenting with such a production (O, R), confirming the insufficient knowledge sharing between farmers, which also contributes to the knowledge trap (see Figure 7).

Pioneer farmers also mentioned numerous on-farm challenges to sustainability, such as a lack of machinery for small-scale farming to deal with weeds (O, R) and a lack of high-quality compost, manure, and organic seeds (C, O, R). They critiqued how organic production still highly depends on conventional pig slurry (R), a problem that has been unresolved for decades (Jørgensen, 2007).

Pioneers argued that a substantial lack of knowledge also prevails in decision-making bodies (C, O), resulting in a lack of proper regulations that directly center on biodiversity and soil health, sustaining soil-harming practices (see Figure 7). The farmers pointed out that if they work the land in the way regulations dictate, the land will be harmed, or the soil won't be as healthy as it could be (C, O, R). The ongoing negotiations of a CO₂ tax on Danish agriculture do not mention the soil health effects of grazing cows, only the negative effects of cows in stables (O). Although both contribute to emissions, these nuances are not considered (Bregendahl, 2024; Soelberg & Røjle, 2024). Connecting to their vision for improved governance, pioneers critiqued how subsidies are currently given for how much land is used, not how it is used (O, R), with no incentives to build healthy soils (C, O, R). According to Wright (2013), this is how capitalism threatens environmental sustainability by not providing incentives for sustainable alternatives.

6. Real utopian transformation potential

In the following, we will analyze and discuss the three main proposals' overall desirability, viability, and achievability to investigate their real utopian potential to answer RQ₃. To gain further insights, we consulted four experts in the field of agricultural transition (see Table 1). The following sections will reference these interviews to support the analysis of the proposals' real utopian potential. The experts' identities are kept anonymous. In our expert interviews, they did not represent their organization but freely expressed their opinions from a professional perspective.

Table 1. Expert interviews and how they are referenced in the thesis.

Profession & organization	Type of interview	Referenced as
Policy advisor in Landbrug & Fødevarer (largest agricultural interest organization in DK).	online	Expert M
Policy advisor, also in Landbrug & Fødevarer	written	Expert J
Environmental advisor in Danmarks Naturfredningsforening (largest environmental protection NGO in Denmark)	online	Expert R
Researcher in sustainability and agriculture at Roskilde University	online	Expert H

6.1. Desirability

In the visioning interviews, all farmer groups elaborately envisioned the three common proposals, ensuring their desirability. However, it is relevant to consider whether they are also desirable for other farmers across production systems and the broader public.

When consulting the experts about the desirability of these proposals, we received a consensus from all that many other farmers resonate with the ideas (Expert R, Expert H). “Many share similar visions or slightly different visions” (Expert J), and “soil health is something [farmers] have always thought of” (Expert M). Two experts also highlighted the increased awareness of sustainable agricultural methods and soil health in the broader society (Expert M, Expert H). According to the experts, the proposals collectively encapsulate all main points that they see driving agricultural transformation (Expert H, Expert R), suggesting their cohesiveness and compelling nature (Wright, 2010, p. 17).

With experts confirming, we can assume that the three proposals are desirable for a broad array of farmers and likely desirable to the general public. However, as Wright mentions, “if you worry about desirability and ignore viability or achievability, then you are just a plain utopian” (Wright, 2013, p. 8).

6.2. Viability

The viability of the three proposals will be evaluated in a Danish context based on Petridis's (2022) criteria for assessing viability through questions of emancipatory potential. These criteria will guide the following analysis and discussion.

The proposals come from soil health pioneers. They also resonate with the current Danish climate and ecological movement and existing transdisciplinary collaborations, making them bottom-up demands, the first criterion of Petridis (2022, p. 165). A recently published farmer interview book centers on the management and regeneration of healthy soils, in line with the proposal of minimal soil disturbances and avoidance of chemical inputs (Ahl & Skovgaard, 2024). Involving consumers in regenerative farming and changing on-farm practices towards regenerative production are central pillars in the Danish Green Youth Movements' new agricultural manifesto (Den Grønne Ungdomsbevægelse, 2024). According to the NGO representative, regenerative farming practices cause “huge public awareness and interest in how to do things differently” (Expert R), noting how the topic has long entered the circle of professionals working within climate policies and nature protection in Denmark (Expert R).

The second criterion by Petridis states that the proposals must contribute to a set of emancipatory moral principles (Petridis, 2022, p. 165). The farmers' critiques are found to be based on equality, democracy, and sustainability. Principles of democracy and equality are expressed in their desire for more representative governance and more balanced consumer-farmer relations, and sustainability is shown in all three. The proposals based on the emancipatory moral principles might change or break the current treadmill in several ways. New governance and regulation representing pioneer farmers' needs will arguably lead to better on-farm practices, destabilizing the linkage between high-input farming and soil degradation. Combined with a closer consumer-farmer relationship, this could change sentiments towards farming, weakening the knowledge trap. New subsidies and environmental taxes might also increase the economic attractiveness of smaller-scale, high-quality production, changing the incentives within the credit trap. See Figure 8 for a visualization of how links of the treadmill could break as a result of the three proposals being implemented.

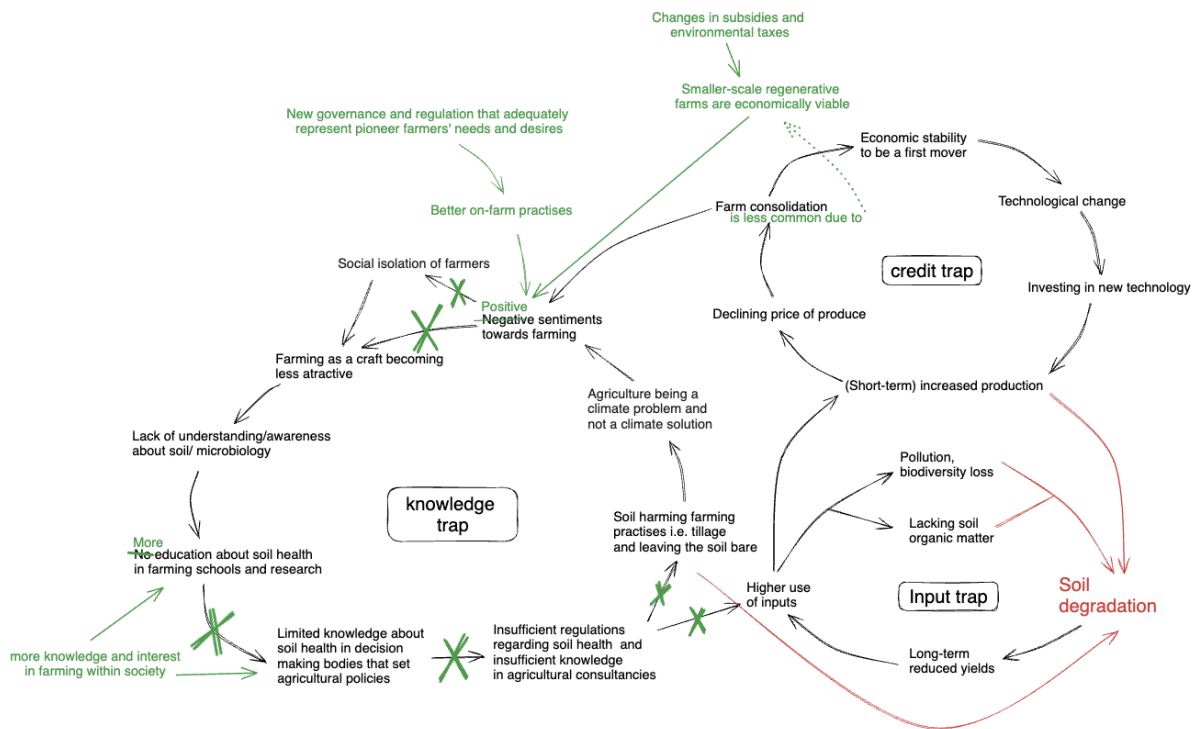


Figure 8. Breaking the treadmill? Visualization of how the agricultural treadmill based on Cochrane (1959), Clunies-Ross & Hildyard (1992) and expanded by us could be destabilized if the farmer’s proposals were to be implemented.

The proposals contribute to building democratic, participatory institutions, Petridis’s third criterion (Petridis, 2022, p. 166) indirectly by reinforcing the values of sustainability, democracy, and equality and directly by modifying power relations. Currently, the large majority of farmers are conventional (Odgaard et al., 2020), with interest organizations that, according to the NGO representative, are well-organized and have a “completely disproportionate influence on Danish society” (Expert R), a statement backed up by pioneer farmers and both historical and current literature (Aagaard et al., 2023; Nissen, 2014). At the same time, not enough representation is given to the growing number of farmers practicing alternatively. The proposals would change that by, for example, granting pioneers more say within agricultural organizations such as DLG and Danish Agro. Furthermore, with new practices and larger consumer involvement, a broader array of farmers can work more flexibly, leaving time and energy to participate actively in decision-making. Integrating soil health and regeneration more deeply within the general public through education can enforce the social power and agency which - according to Wright - is needed for transformation (2013, p.12). The interviewed researcher confirms that these proposals are necessary for better democratic decision-making (Expert H).

None of the proposals requires a fundamentally new societal structure, so they can be integrated into the existing sector, making them desirable in a future system. Therefore, the proposals are possible non-reformist reforms (Petridis, 2022, p. 162,166). New regulations can be integrated into today's Danish legal system, as current political negotiations of a CO₂ tax and public debates on nutrient leaking exemplify (DN, 2018; Svarer et al., 2024). Centering soil health practices might also be viable within current structures as regenerative farming grows across the country (Jameson et al., 2024). However, alternative agriculture is small compared to dominating conventional production. Community-supported productions and farmers' markets signal a rising interest (Grøn marked, 2023; Regenerative jordbrug i Danmark, n.d.), but large-scale engagement is still missing. Danish consumers spend one of the smallest percentages of disposable income on food in Europe (USDA Economic Research Service, 2023), seeking discounts more than ever before (Attrup, 2024). Such social and cultural aspects of food consumption will have to change for these current niches to become fully viable.

Together, the proposals include the conditions for emancipatory change. They are bottom-up, formed by moral principles, will modify power relations if implemented, and are well-placed between a current and desired society, expanding the potential for further system changes and suggesting strong conditions for viability (Petridis, 2022, p. 166; Wright, 2013, p. 20).

6.3. Achievability

On the premise that the proposals are desirable and viable, this section will discuss achievability, focusing on current stakeholder power and long-term trajectories. We recognize that our understanding of the practical feasibility of the proposals to be introduced and integrated is constricted, as we only have preliminary knowledge of future changes, pushes, levels of trust in viability, and changing desirability (Wright 2013).

6.3.1. Power and stakeholder dynamics

One of the most crucial parts of emancipatory transformation is "the creation of a collective agency to drive forward change" (Stuart et al., 2020, p. 6). The probability of achievability depends on the degree to which strategies are pursued consciously and the relative power of the social actors pursuing them (Wright 2010, p. 16), which will be analyzed in the following.

Several obstacles need to be overcome. Current stakeholder power across research institutions and interest organizations must direct focus away from technological solutions that stabilize rather than change existing production systems, such as pyrolysis for biochar and methane-reducing feed additives (Andersen et al., 2014; Christensen et al., 2023). This can pressure political parties towards systemic regulation, a fundamental need in current decision-making.

Today, sustainability crises are thought of in silos, lowering the attention toward soils, an issue underlined by both policy advisors (Expert M, Expert J). Other aspects, such as rewetting peatlands for emission reductions and restricting farming in areas with high nitrogen leaching, are viewed as more crucial than soil health (Expert M, Expert J, Expert R). It must be communicated very clearly how all these issues are interconnected, for example, that healthy soils play a key role in mitigating climate change and ensuring food security (Bünemann et al., 2018; EU Commission, n.d.; Karlen & Rice, 2017). Voices of researchers, social movements, and NGOs communicating this must gain more decision-making influence for crises in agriculture to be tackled in conjunction (Bünemann et al., 2018)

The achievability of new governmental regulation heavily influences the other two proposals' feasibility. Naturally, land use and agriculture regulation will directly affect on-farm practices, such as mandates for all-year-round green fields or cover crops. Certifications and labeling schemes for regenerative practices must be developed and implemented as prerequisites for governmental regulation, also mentioned by several farmers in the visioning interviews. Certifications exist for organic produce, animal welfare, and social fairness, which two out of three Danish consumers pay special attention to (Madsen, 2019). The NGO representative pointed out how certification for regenerative practices needs to be recognized internationally (Expert R). More than two-thirds of all agricultural produce in Denmark is exported, giving foreign consumers and businesses a huge influence on Danish agriculture (Expert H; Expert R; FoodExport, n.d.)

Still, farmers are already directed towards soil-health-centered agricultural practices. A large transition towards no-till is happening in conventional agriculture in Denmark, as it reduces work and expenses (Engmann, 2019); however, the road from no-till to CA farming, let alone to organic, regenerative agriculture, is long. Reduced soil disturbance and no-till farming entered the mainstream only in the last 5-10 years, and organic farming has taken 30 years to occupy the around 12% of Danish farmland it does today (Expert H; Landbrugsstyrelsen, 2024).

Many farmers might wait to change their systems until regulations support pioneers more economically, and consultancies have become better at aiding farmers in transition. If farmers are not idealists, the wait for regulation can be used as a discourse of delay to maintain the status quo (Lamb et al., 2020). Therefore, civil society and farmers need to push for better regulation, especially through smaller, alternative farmer networks that are already established (Frie Bønder - Levende Land, n.d.; Permakultur Danmark, n.d.; Regenerativt Jordbrug, n.d.).

Governance also affects consumer-farmer relations, as one policy advisor describes. Expert M sees it as essential to create “incentives and policies for consumers that will make it more interesting and more feasible to buy these [soil-health-focused] products”. It is broadly accepted that demand for products grown with attention to soil health must increase for the consumer-related proposal to be achieved (Expert M; Expert H; Expert R). However, as noted above, the majority of Danish produce is exported (FoodExport, n.d.), limiting the power of sustainable consumerism in Denmark (Expert R) and making it irrelevant for many farmers what Danish consumers think and do (Expert H). The export market must be more regulated nationally and internationally to close the gap between farmers and the broader society. This transition will move against the megatrend of agricultural globalization (Debonne et al., 2022) and is, therefore, highly unlikely.

In the visioning interviews, farmers stated that they want consumers to “value and appreciate” farming and to gain a “strong connection with and respect for food”, but are not clear on their desire for consumers to influence and give constructive feedback. Farmers must be willing to grant consumers actual influence in return for support and interest in their farming methods (Expert H). Because of many negative sentiments toward consumers, as discovered in RQ₁, farmers must emphasize their sincerity and openness to constructive criticism from consumers to build trust.

The proposals still need more social power to be achievable. However, these stakeholder dynamics may change in the future, as other factors will influence and shift power, making the proposals possibly more feasible in the long term.

6.3.2. Long-term trajectories

Future achievability depends on the long-term trajectories of various social structural conditions (Wright, 2010, p. 17), political and social discourses, and changing landscape factors that frame agricultural debates.

Soil compaction, erosion, and degradation, linked with more unpredictable weather, will also, in the long term, heighten the pressure on individual farms to seek new, soil-health-centered solutions if they are not to go bankrupt, consolidate and exhilarate the agricultural treadmill (see Figure 7). Which of these changes will come depends largely on societal and political changes.

As the ecological crises worsen, any government will be pressured to handle mitigation and adaptation. Agriculture will certainly be centered in Denmark, as the sector is expected to be responsible for half of Denmark's emissions in 2030 (Svarer et al., 2024). On the EU level, attention toward soil health rises through the EU soil health strategy for 2030, which aims to “specify the conditions for a healthy soil, determine options for monitoring soil and lay out rules conducive to sustainable soil use and restoration.” (EU, 2022). In addition, the EU ‘Farm to fork’ strategy aims to halve pesticide use in 2030 (Expert H, EU Commission, 2020). Such regulation will certainly nudge Denmark towards a more soil-health-focused agricultural management (Expert M, Expert H). However, the European Parliament election polls for June 2024 predict fewer representatives pushing for a green agricultural transition to be elected (Simon, 2024). If that happens, many regulations for a more sustainable agricultural sector might be delayed or dropped. A backlash is to be expected when campaigning for an alternative system. People who profit from and favor existing production forms often pressure against more sustainable production. The root cause is the maintenance of the capitalist system through the passive normalization of routines and institutions actively holding back individual and collective efforts to change (Wright, 2017; Stuart et al., 2020).

Denmark has undergone a dietary shift to consuming more plant-based foods and fewer animal-based foods (Keitzer et al., 2021). In October 2023, Denmark published the first national action plan for plant-based foods with a landmark investment of 1 billion Danish kroner (GFI Europe, 2023; Ministry of Food, Agriculture and Fisheries, 2023). Such a dietary change and the following shift in food production demands could make it easier for the individual farmer to change on-farm practices regarding what is produced. It is very difficult to forecast these long-term changes, as both the mainstream demand for discount foods and the niche demand for high-quality, local-grown produce bought directly from the farmers or on farmers' markets and farm shops are growing, as noted in the analysis of stakeholder dynamics. The evolution of value chains and consumer relations will depend on the success of pioneer farmers and their respective farming networks in amplifying their voices in the political discourse on the future of agriculture.

Overall, there is a potential for long-term trajectories supporting the real utopian vision. This notion is further supported by parts of the proposals that are likely to move closer to implementation in the coming years, such as reduced soil disturbance becoming more mainstream, the introduction of a CO₂ tax on agriculture, and potential new nitrogen use regulation on nitrogen use. However, how exactly the social structural conditions will change is impossible to predict, and unforeseen circumstances might change the expectations.

Based on Erik Olin Wright’s evaluation criteria of desirability, viability, and achievability (Wright, 2013), we overall consider the collective proposals of the soil health pioneer farmers to constitute a possible ‘real utopia’. See Figure 9 below for a graphic summary. However, work to develop the ideas, especially to build collective agency for achievability, will have to increase and be sustained in the coming years and decades.

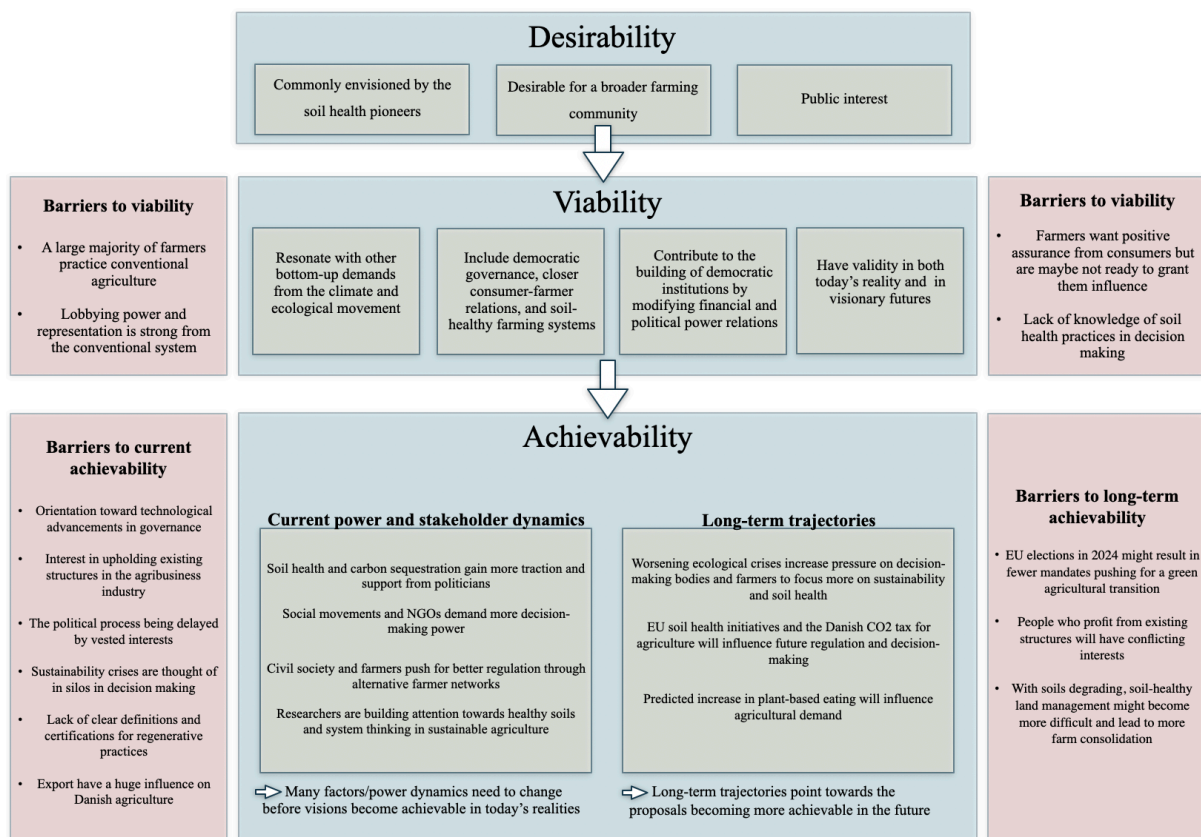


Figure 9. Graphic description and visualization of the proposals' desirability, viability, achievability, and barriers.

7. Methodological contributions

Our distinctive methodological contribution to the field of critical utopian action research is the approach of conducting individual visioning interviews and writing collective visions. This indirect recreation of the group visioning experience of CUAR adds an extra dimension to our study. The following reflection will answer RQ₄.

Many things went right. Feedback and draft editing were smoother than expected, deepening our understanding of the farmers' perspectives, as they could see that we had grasped and understood their messages and let us know when there were misunderstandings. Adopting an iterative, listening approach in the visioning interviews strengthened our connection to the pioneers. We received very positive feedback from the pioneers, who told us they felt respected and listened to during the process. The co-researching process enhanced the relevance and the value of the results. We credit this to the very open interview format, allocating time to sense, feel, and describe critiques, visions, and ideas for change.

If we were to repeat the method, we would change certain aspects. Our main methodological limitation was the lack of foundation for the pioneer groups to continue working together after this project and develop strategies further, as they never communicated directly with each other. We, therefore, lost some of the collective agency building which is part of the original CUAR methodology (Egmoose et al., 2020). This could have been done differently by figuring out if the pioneers knew each other earlier on in the process. Then, we would have been able to integrate the collective group dimension more into the process, lowering the barriers for the pioneers to continue working collectively after the end of this research project. We also could have clarified what farmers would be able to take away from participating with explicit ideas on how to use the common visions for internal mobilization and external communication, as we believe this was unclear for some pioneers, possibly hindering their engagement and ownership of the process.

For future use of the visioning interview method, we recommend prioritizing preliminary interviews more to ensure all participants understand the methodology and their active role in the process. We further recommend reflecting on how the research results can be made practically valuable to the participants so they can use them after the study is over. Lastly, we recommend asking participants early on in the research process about their availability after the visioning interviews, as communicating edits and iterative changes of the common visions did take quite some time and required the participants to have conversations, phone calls, and email correspondences with us.

The CUAR method to empower collective social and democratic change aligns with the idea of transdisciplinary sustainability science. This transdisciplinary design incorporates a diverse array of knowledge and finds solutions addressing various aspects of structural problems. In this way, it increases the legitimacy of critique, visions, and strategies for change (Lang et al., 2012). Our adaptation of the CUAR method shows avenues for further progress in the field. Our modified research design is applicable to groups that can't meet physically, making the CUAR methodology useful to a whole new spectrum of sustainability science research.

8. Conclusion

Soil health pioneers in Danish farming have overall very similar visions and a collective regenerative orientation, although they operate in different production systems.

Three themes stood out across all farmer groups as common transformative proposals. Firstly, regulations and subsidies from both the EU and the Danish government should support more sustainable and soil-healthy land use and directly promote soil regeneration, carbon sequestration, and enhanced biodiversity. Secondly, sustainable farming practices must focus on soil health, minimal soil disturbance, avoid chemical inputs, and tailor to local environmental needs. This includes year-round greenery, cover crops, surface composting, green manure, and avoiding pesticides and artificial fertilizers in future soil management. Thirdly, consumers must be encouraged to be interested, respectful, and appreciative of food and take part in food production so they can make well-informed choices aligning with their values and learn and connect with the craft of farming.

Together, these three common ideas outline a proposal for a real utopian soil-health-centered transformation. They show how connected soil health management is to the overall agricultural system, with governance, on-farm practices, and consumer value chains interrelated. Collectively, they unfold a value-based critique of the current agricultural sector centered on the lack of equality, democracy, and sustainability, aligning with the moral principles of Wright (2013).

Equality is threatened by negative mentalities towards farmers, the credit trap of the agricultural treadmill, and other conflicts arising within the complexity of a regenerative transformation. Democracy fails to represent smaller-scale, progressive farmers due to unequal access to capital and influence from large agribusinesses. This imbalance in decision-making power leads to a lack of democratic engagement in agricultural practices. Research funding prioritizes existing production over systemic changes. Lastly, sustainability is hindered by insufficient regulations, harmful soil management, and limited access to resources for a regenerative transformation, which are exacerbated by the knowledge and input traps.

Overall, the knowledge trap exacerbates the lack of understanding of living soils, resulting in limited knowledge of soil health in decision-making bodies and insufficient guidance for farmers. This leads to inadequate regulations regarding soil management and negative sentiments toward farmers. The input trap, which drives chemical input use, and the credit trap, which exacerbates unequal

economic conditions, together with the knowledge trap, drive the extended treadmill and exacerbate soil degradation within the current agricultural regime.

These traps reveal how deeply rooted practices that lead to soil degradation are in current Danish agriculture and how challenging it is to alter these structures. However, the collective proposals of pioneer farmers offer a potential real utopian transformation that can challenge these traps.

First of all, these proposals are highly desirable for Danish farmers pioneering soil-health practices, for farmers generally and likely also for the broader public. Secondly, these proposals are considered viable due to their emancipatory potential, as they follow the criteria of Petridis (2022). They are bottom-up and resonate with the current Danish climate and ecological movement. The proposals are based on moral principles of equality, democracy, and sustainability. They reinforce these values and modify power relations towards the building of more democratic, participatory institutions. They have a place in a desired future society and can also be integrated within the existing sector, as none require a fundamentally new societal structure. Thirdly, the proposals might be achievable in the future. Shifting stakeholder power is essential for this to happen. Upholding existing structures, silo thinking, and the orientation towards technological advancements instead of systematic change must be challenged. Granting more decision-making power to researchers, social movements, and pioneer farmers would significantly enhance achievability. EU initiatives on healthy soil management can raise the proposals on the agenda in the future, also in Denmark. Growing ecological awareness can alter consumer demand. However, challenges such as the rightward shift in EU politics and the exacerbating environmental crises will hinder achieving the proposals.

The collective proposals form the contours of a real utopia, which is desirable, viable, and possibly achievable, if not today, within long-term trajectories. For the proposals to be real utopias in the coming years and decades, social agency and work towards the proposals will have to be sustained and even increased.

Critical utopian action research through individual visioning interviews and the subsequent creation of collective visions has proven to be a promising methodology. It has the potential to be developed further, especially regarding ways to strengthen and maintain collective agency when a research project has ended. This could increase the legitimacy of eventual proposals, linking them even more tightly to current realities and future real utopias.

This thesis acted as a platform to explore and discuss pioneer farmers' visions for future agriculture focused on soil health. We, as researchers, are encouraged by the opportunity to present our findings at the Danish Organic Summit 2025, aiming to engage a wide audience in the sustainable transformation of agriculture. We hope to communicate about this project in many other ways and to many other actors within Danish agriculture as well.

Through this thesis, we identified how the visions of Danish pioneer farmers formulate a soil-health-centered, long-term real utopia, constituting a way that might, slowly but surely, destabilize and possibly finally break current knowledge, input, and credit traps in agriculture. However, a real utopia, regardless of its desirability, viability, and achieveability, will never alone be emancipatory. It will only guide as a collective visioning and organizing tool toward social transformation.

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10. Appendices

Appendix A: Table of initial meetings, interviews, and correspondences

DATE	OCCUPATION	ABOUT	CONTACT TYPE
8/1	Researcher at Roskilde University in agroecology	Discussion and inspiration on agricultural treadmill and perennials	mail correspondence
16/1	Director of a project at The Land Institute	Ideas for visioning questions, social perennial visions, and transdisciplinarity	mail correspondence, online interview
24/1	Agronomist, plant breeder, business owner	Clarifying questions on perennial domestication	mail correspondence, online interview
24/1	Farmer, part of the organization Andelsgaarde	Discovering the level of interest in perennials and soil regeneration	online interview (later part of a visioning interview)
8/1 + 26/1	Farmer, agronomist, farmer consultant	Broadening understanding of microbiology, soil health, perennials, and the level of this knowledge in farming communities	phone call, visit, and physical interview
29/1	Researcher, manager at perennial research station	Learning about Kernza and perennial grains, including future potential for domestication	field walk at SITES
30/1	Professor in ecosystem science at Lund University	Understanding carbon sequestration potentials and the natural science of soils	online interview
6/2	Farmer, on board in FRDK	Testing soil-health interest and interest in visioning	phone call (later part of visioning session)
7/2	Farmer, organized in FRDK	Testing soil-health interest and interest in visioning	phone call (later part of visioning session)
9/2	Farmer with expertise in perennials	Outlining interest and knowledge of regeneration and healthy soils among farmers	online interview

Appendix B: Interview guide for pioneer farmers

Inspired by methods from Critical Utopian Action Research & Emancipatory Social Science.

Timeframe: 2 hours.

1. Intro (10 min)
 - a. *We introduce ourselves* and our normative stance (eg. to support the sustainable transition of agriculture through research in visions for healthy, resilient soil).

Note: action research is by definition normative (Nielsen & Lyhne, 2016), and for transparency we (in short) explain our normative aim and purpose for our research to everyone we interview.

- b. *We introduce the project*, the overall research design and the aim, and how we will handle the data collection from the interview & ethical considerations.
 - i. Ask to record
 - ii. Ask for consent
 - c. *We mention the aim* of creating a ‘free space / reflexive sphere’ and go through the overall agenda for the interview (background, critique, visions, transformative pathways), that has been sent to them by mail in advance.
 - d. *We mention the method* of asking open-ended questions.
 2. Background (10 min)
 - a. We ask them to give us a short introduction about themselves and their farm.

If they haven't already answered, we ask them:

- i. How big is your production, how many hectares, and what is produced?
 - ii. What is your economic model? [What are the most important funds, markets, crops, or products for sustaining your farm overall?]
 - iii. What principles are the farming based on, and for how long have they been farming this way?

Note: these questions are inspired by the interview guide of Amy Teller, who has conducted interviews with Kernza growers in the Midwestern United States.

3. Critique (30 min)
 - a. We ask them to criticize the state of agriculture & soil in Denmark today based on their experience as a farmer for the sake of ‘emptying the room for critique’.

Follow up questions for inspiration:

- i. What [economic, regulative, political, cultural, social, knowledge-wise] barriers do you and others with a similar production [convent CA, organic, regenerative] meet in your farming practice?
 - ii. What are the main things [limiting, worrying] you?

- b. We simultaneously write down what they say as keywords on post-it notes and in collaboration with them, we start to group them to identify themes / reified structures until they have mentioned everything they can think of.

Note: In the Follow-up question i., we ask about economic barriers. Such barriers are likely to be the most prominent in the sector and will likely be brought up without having to ask the follow-up question. Farming is a business aimed at deriving profit. The economic system, i.e., capitalism, in which such a business operates, is very likely to have a significant impact on people's lives and opportunities.

4. Vision (30 min)

- a. We ask them to imagine/envision a utopian future of Danish agriculture. What would it look like to them? And how would it look on their farm?

Follow up questions for inspiration:

- i. What do you value most about farming today and want to see continue, and what values or principles do you believe should guide the construction of such an agricultural future?
- ii. Can you describe some concrete features or specific farming practices that would characterize your vision of sustainable agriculture, and what is needed from others [market, customers, regulation changes] for you to be able to integrate these? (*Remember, everything is possible now*).
- iii. How do you imagine that the life of farmers would be different?
- iv. Do you have plans for your land and your farming operation for after you're no longer farming?

- b. We write down what they say as keywords on post-it notes and again, in collaboration with them, group the post-its to identify themes and to see if they make one or more future visions. Does anything collide?

5. Transition (30 min)

- a. Based on the vision(s), we facilitate a brainstorm for all the possible transformative pathways, experiments, niches, or well-known ways towards reaching the visions within the realities of today.

Follow up questions for inspiration:

- i. What overall steps are necessary to move towards the vision, and who has the responsibility for these steps (state institutions, agricultural organizations, individual farmers, consumers, others)?
- ii. What general obstacles and challenges do you see to achieve this transition, who or what causes them, and how can they be overcome?
- iii. What economic benefits / consequences will arise when integrating these transitional pathways in your production?

6. Wrapping up (10 min)

- a. *We explain the process from here, that we cluster their thoughts with other farmers in the same group, and write it to a vision, that we send back to them for feedback and validation, and ask if they are up for a phone call when that is the case.*
- b. *We ask if there is anything left they want to mention or if they have questions about the process from here and thank them for their participation.*

Note: the vision draft (including the transformation pathways found relevant) is sent back to the farmers for them to comment on and for us to rewrite according to their feedback. This is for them to gain ownership over the results, to ensure their usefulness, and to confirm, disconfirm, or include new perspectives. It will function as a way to 'validate' our interpretation of the results, and is a common tool in participatory action research (Nielsen & Lyhne, 2016).

Appendix C: Common Visions

CA visions for the future of soil management in agriculture

Welcome to a future utopia imagined by Danish soil health pioneers within no-till Conservation Agriculture (CA). The vision is divided into 1) regulations and farmers organizations, 2) position of farming in society, 3) farming practices, and 4) education and new ways of thinking.

1) Regulations and farmers organizations

Rules and regulations are now supporting Conservation Agriculture. They allow a variety of cover crops, legumes, and fodder mixes, enhancing biodiversity and promoting regenerative farming practices.

Tax incentives are offered to farmers who actively engage in carbon sequestration, aligning economic and environmental goals. Slightly higher prices, such as 30 øre per liter of milk, ensure financial stability for farmers without dependence on governmental support. Agricultural subsidies do not exist anymore, and farmers thrive.

The bureaucratic burden that once overwhelmed farmers is now light, allowing them to focus more on farming than paperwork. Environmental externalities from farming are under control, making excessive bureaucracy unnecessary.

Farmer organizations like Landbrug & Fødevarer and SEGES now wholeheartedly support conservation and regenerative agriculture, cultivating societal trust in these methods. Landbrug og Fødevarer leads the agricultural transformation, with consultants promoting good soil management practices. Advisory services for farmers focus on enhancing production using available resources.

2) Position of farming in society

Conservation agriculture is the predominant farming approach. Numerous small farms are emerging across the agricultural landscape, and more people are involved in agriculture. The number of links between farms and tables has been reduced, which fosters a closer connection between farmers and consumers.

Many farm shops let consumers purchase their food straight from the source. Consumers are now well-informed about cultivation practices, and it is easy for them to make choices that align with their values regarding sustainable farming methods.

Products are priced to allow farm employees to enjoy their meaningful labor without being stressed, which enhances their well-being. This transformation ensures that the agriculture system as a whole is sustainable and resilient on many levels and closely connected to the community it serves.

3) Farming practices

The transformation towards CA is now happening everywhere, yet it manifests uniquely on each farm, considering the specific needs of the local soil. The use of heavy machinery has significantly decreased, leading to reduced diesel consumption and maintaining soil integrity throughout the year.

Farms now flourish with year-round greenery, thanks to practices like co-growing, cover crops, and intercropping, all adapted to local soil conditions. These methods also support biodiversity in flora and fauna. Instead of traditional insecticides and fungicides, bio-solutions are used. Practices such as surface composting with cover crops directly on the fields enrich the soil naturally, maximizing nutrient uptake without artificial inputs.

High-quality compost has become readily available and is supplied by local municipalities, further reducing the dependency on synthetic fertilizers. Many farmers manage groups of cows on their land, giving space for grazing and natural fertilization. Technology is also a part of the new agricultural system, with farm robots controlling fast-growing weeds, which again reduces the need for chemical inputs. Although some new technologies are used to make farming easier, the dominant way of solving problems is in tune with nature and not by inventing new technologies.

Now, farmers prioritize self-sufficiency and local, sustainable circularity of nutrients through manure and residues, cultivate their own animal fodder, and eliminate reliance on external suppliers. This shift not only enhances farm resilience but also ensures a closed-loop system where every aspect of farming is interlinked, promoting a self-sustaining, regenerative agricultural model that is both productive and environmentally conscious.

4) Education and new ways of thinking

Farming now has a more integrated place in society, and many young people are interested in it. A new way of thinking has been established among farmers, researchers, politicians, and consumers. All of whom value, appreciate, and deeply understand farming and food production. For example, consumers are willing to pay a bit more for food products so that subsidies can be elicited. There is strong confidence in 'godt landmandsskab'. Farmers trust that their colleagues are doing their jobs well and are using their senses and knowledge in good faith.

This mentality has shifted the focus from maximum yield per hectare to maximum quality of produce in terms of nutrition and health properties, with a minimization of environmental pressure. Farm animals thrive within their physiological limits. Farmers work within their capacity and can slow down during their workday whenever they need to. Agricultural schools are now focusing their teaching on biological principles. Soil biology and its importance to food production are taught at least on a basic level in every school. Many farms have transformed into knowledge centers, and more people visit the farms to connect with the craft and the farmer and see with their own eyes how food is produced.

Strategies toward the above CA vision

Many strategies are fundamental for a transition toward the vision described above. The strategies are divided into themes: 1) education and knowledge sharing, 2) mentality shift in society, 3) encouraging transition from traditional practices, 4) building new networks for lobbyism, and 5) universities and research.

1) Education and knowledge sharing

Integrate soil health and microbiology into farming school curricula to ensure that new generations of farmers are better equipped to adapt to emerging regenerative farming systems. Through farmer networks, lobby politicians and school administrators for such educational reform.

Highlight common ground concerning soil health, economic benefits, and reduced reliance on costly inputs, and share knowledge between conventional and no-till farmers. Address fear of change and take it seriously. Form small groups of 5-10 farmers to encourage the adoption of CA and to help overcome challenges when adopting new farming practices.

Establish on-farm knowledge centers to foster collaboration among students, farmers, and consultants on regenerative farming practices. Invite people to farms through events like the yearly 'healthy soil day' and organize activities and seminars that make farming education accessible to the public. Educate society on the importance of farming and its potential to be a climate solution rather than just a problem. Engage a broad audience with a positive narrative about farming: that it can build up organic matter, sequester carbon, and make biodiversity bloom in the fields.

2) Mentality shift in society

Advocate for a new agricultural enlightenment emphasizing the essential role of healthy soil and framing farming not as an enemy but as a friend of the green transition. Create 'fertile social environments', sharing good energy, joy, pleasure, and the feeling of leaving richer. Encourage inclusive, inviting, nuanced, depoliticized public discussions about agriculture, focusing on positive, transformative stories and the tangible benefits of regenerative / CA practices.

Build a narrative that reconnects consumers with the value and importance of food, countering misconceptions about food pricing and highlighting the already existing demand for sustainable, CO2-neutral produce. "Tell the good stories" to show the public that agriculture is transforming for the better to change society's perceptions of farmers today. Build up the seemingly lost interest and respect for food in consumers.

3) Encouraging transition from traditional practices

Address the deep-seated pride in traditional plowing practices, promoting no-till and CA methods as modern, forward-thinking choices to appeal to the younger generation of farmers. Challenge the sentiment that prevails in conventional farming of standing 'together against the enemy' (society) and bridge the division between no-till and tilling farmers.

Highlight the shift towards plant- and soil-focused farming that aligns with environmental and economic sustainability, encouraging a gradual transition in farming habits and practices.

4) Building new networks for lobbyism

Build up more momentum in the CA movement and focus on engaging non-farmers to push for CA interests. This can alleviate the burden of having to do much extra work on top of a busy schedule for farmers in the long run. Establish new collaborations that represent CA farmers (for example, working together with the Regenerative Farming Association).

Urge fertilizer and machinery companies to appear 'greener' than today by selling products (biological inputs, machinery) fitting for CA farming.

Enhance political pressure towards a focus on solutions *within* agriculture, such as CA farming and carbon storage in soils, not just solutions *without* agriculture, such as taking out land for forests or wetland areas.

Establish more economic support for CA farmers. For example, cheap loans when buying no-till technology, a premium for using regenerative principles in farming, or a specific co2-tax to support CA transitions (ex. for 5 years). Urge DLG and Danish Agro to set a higher return for farmers on pulses and legumes so that farmers have an incentive to grow them.

5) Universities and research

Assist research in universities that support the production system transformation by pushing knowledge and data. Researchers are trustworthy, independent, and have no vested interests, so support opportunities for them to experiment, test, and do pilot projects to inform and validate new political decisions. Demand a change in research finance so that studies of CA and regenerative production systems are prioritized when funding is distributed to create a 'pull effect' from researchers.

Cover broader and diversified research, especially the interconnections between principles in CA farming practices, carbon sequestration, and how plant mixes work together with soils. Hold researchers accountable (for example, when equalizing fossil and biogenic methane) to ensure farmers' trust in research and regulations.

Encourage research in 'biological' solutions (and not synthetic fertilizers or pesticides). Researchers are responsible for writing scientific reports with results on how microbiology can stand in place of traditional inputs. Pressure for changes in rules and regulations with this documentation.

Organic visions for the future of soil management in agriculture

Welcome to a future utopia imagined by Danish soil health pioneers within organic agriculture. The vision is divided into 1) regulations and representation, 2) agricultural land use, 3) farming practices, and 4) work, sentiments, and communities around farming.

1) Regulations and representation

Farmer organizations, like Landbrug & Fødevarer, and business cooperatives, like DLG, adequately represent farmers and their interests. Rules now mandate agricultural fields to be green all year round. Very high taxes on the use of nitrogen have made conventional farmers transition rapidly, and eutrophication issues in water environments have been eradicated. Now, there is less need for subsidies, and the remaining monetary support from both the EU and the Danish government is now targeted directly to support the agricultural green transition. Additionally, separate requirements exist for smaller-scale and larger-scale farms, so smaller farmers are no longer faced with a huge bureaucratic burden.

Through democratic regulation, more people are involved in decision-making in farming, both directly and indirectly. The state owns a lot of farmland, which is rented out to farmers to alleviate their economic burden and allow them to move more freely to and from the occupation of farming.

2) Agricultural land use

All of Denmark is being farmed organically in ways that are economically viable for farmers. Regenerative farming principles are integrated, so consumers need not be very aware. They can now trust that everything they buy is farmed organically and responsibly.

Across the country, there is now much more green produce, less production of meat, and less agricultural land. This gives space to more forests and nature. Økologisk Landsforening has succeeded in reducing the number of animals in Danish agriculture following their recently published report, 'fra foder til føde'.

Wind and solar power provide green electricity but are not very noticeable in the landscape, as only what is needed gets produced, and our energy consumption is reduced to a sustainable level.

3) Farming practices

Insecticides, fungicides, and herbicides are no longer used. Chemical inputs and tillage have no place in agriculture anymore. Such practices have been out phased as the new farming system no longer needs them. Now, solely organic fertilizers and green manure are used. The way of farming that was previously called 'organic, no-till farming' is now the new normal.

Farmers are interested in bacterial and microorganic life in the soil and treat it like a holistic entity, a living organism requiring focus and attention. The importance of keeping the land green all year round and the ways in which covering crops is beneficial are common knowledge. Farmers can adopt new technologies at their own speed or not at all if they don't find them useful.

Animal farmers grow feed for their animals themselves and are not reliant on agricultural institutions such as DLG. They are 'closing the loop' and can produce end-products on the farm, from planting to processing to selling them in farm shops.

4) Work, sentiments, and communities around farming

With new ways of working the fields, farmers can work less if they want to. As it takes time to get to know and build up the soil to be healthy, employees usually stay for a long time. On the other hand, it has become more flexible and affordable to have employees and trainees and easier to have visits from volunteers and woofers.

Everyone is aware of the healthfulness of organic products, and people working in the food system are involved because they believe in the organic ideology and not only because producing and selling organic products is profitable. Farming is based on honesty and community. There is a sense of trust and truthfulness among farmers. The 'andels' thought of communal ownership is finding more and more supporters, and it is common not to own your own farm and farm equipment but to share it with others.

In general, many more people are involved with food production, as it is liked and desirable to be part of it, and as farming is now very connected to nature. There are fewer steps between producers and consumers. This is achieved through consumers buying products directly from farmers' markets and visiting the farms.

Many farms have become community centers where people can meet, learn about farming and soil health, and, most importantly, spend time just being. Farming also includes an aspect of social care. Farmers are encouraged and motivated to hire marginalized and disabled workers, for example.

This also means that more people are working on the land and have more general knowledge about farming. There is life, activity, and energy in the countryside, as many people from cities have moved here, and there are many young people around. Life is slower, and small societies are blooming.

We have arrived at a more holistic way of thinking that focuses less on theoretical, quantitative goals and more on the complex interplay of soil, plants, farmers, and the entire food system.

Strategies toward the above organic vision

Many strategies are fundamental for a transition toward the vision described above. The strategies are divided into themes, being: 1) sentiment changes of farming, 2) transitioning towards sustainable practices, 3) regulation and political pressure, and 4) supporting a generation shift.

1) Sentiment changes in farming

Expand 'Andelstanken' to include the cooperative ownership and sharing of production facilities and companies. Give the example of 'Andelsgaarde,' community-owned farming land.

Make it socially unacceptable for agribusinesses to exploit farmers to grow their income year by year while farmers are struggling and farms are closing.

Build a supermarket chain (or something similar) inspired by farmers' markets for 'small' organic produce. Sell products locally to foster stronger connections with nearby consumers and organizations and to help bridge the gap between farmers and consumers. Enhancing community ties and mutual understanding can help counteract the misconception that 'farmers are stupid,' which still prevails in some parts of society.

Make consumers realize that plant-based eating is the way forward, but underline that not all responsibility is on consumers. Work to make consumers respect food more and, as a result, be willing to pay a bit more for it. Ensure that public authorities help people who cannot afford healthy, organic food.

Focus on the constructive parts of conversations to support a positive mind shift. Communicate attentively and listen actively. Communicate directly with each other in debates. Talk and share knowledge about the current situation, the shortcomings of Danish agriculture, and the vision for the future. Focus on person-to-person communication.

Practice mindfulness. Being a farmer should ultimately be about being happy every day. Prioritize rest and work only as much as your mental and physical well-being allows.

2) Transitioning towards sustainable practices

Emphasize the necessary changes in farming practices by highlighting the urgency of addressing climate change, which demands that certain agricultural methods must change. Prioritize biodiversity in agricultural management, as it closely aligns with maintaining healthy soils and offers economic benefits for farmers. By fostering biodiversity, farmers may become eligible for subsidies, enhancing their financial viability.

Create a strategy for more local, closed loops in agriculture. Smaller regions or islands could, for example, be closed loops regarding farming inputs and outputs.

Make fodder for animals on the farms to become more independent on DLG. Deliberately plant crops that fix nitrogen in the ground and support microorganisms. Additionally, work for weight limits on machines driving in the soils so they are not too heavy for healthy soil. Instead, develop machinery suitable for small-scale farmers.

Save energy, as it is not enough to just produce green electricity, and the same goes for other resources. Counter the sense that everything has to constantly grow. In relation to this, machinery should be repaired instead of bought new as often as possible.

Explore innovative agricultural practices from 'front-runner' countries that excel in this field beyond Denmark's current achievements.

3) Regulation and political pressure

Alleviate the burden of bureaucracy for farmers and make new and more simple regulations for small-scale farms. Make guides on how to easily get started with small, organic farms and push for more funding for small-scale agricultural projects on both the national and EU levels.

Pressure banks to make it possible (as it once was) to have an investment account so farmers do not have to borrow money if they don't want to. There should be economic alternatives to bank credit as the only way to invest.

Work for a nitrogen tax. Ensure that pressure for such regulation also comes from organizations not directly involved in farming, such as NGOs working with water environments and fishermen. Work for a CO2 tax in combination with regulation in subsidies to change production towards no-till organic.

Supporting cooperatively owned supermarkets already crowdfunding the agricultural transition toward more sustainable food production.

Discuss from a global standpoint, stressing the importance of international collaboration in local farming to prevent price dumping and ensure worldwide food security. Pressure from the public and more diversified politicians in power should push for system change, not just economic changes.

4) Supporting a generation shift

Change the 'locked in' syndrome for farmers so that young, interested people do not feel they have to commit their entire lives to farming and can opt out if they want to pursue another career. One way is to introduce better systems for taking over farms so young people can have an easier start and to support less strict rules for inheriting farms who are retiring if their children want to take over.

Another way could be to make it more common for one farm to be owned by more people. Support the transition from the bottom up, focus on the new generation in farming, and accept that change takes a long time.

Regenerative visions for the future of soil management in agriculture

Welcome to a future utopia imagined by Danish soil health pioneers within organic agriculture. The vision is divided into 1) politics and regulation, 2) the farming landscape in DK, 3) farming practices, and 4) mind shift and education.

1) Regulation and institutions

Governmental regulations ensure sustainable land use. Decisions on how the land is being used are guided by considerations of what makes sense in the local environment and soil. Broadly, subsidies are now given for how and what is grown in terms of principles and quality. Farmers now share a common objective to restore soils. Regulations are made to support this goal, with flexibility for farmers to make individual decisions and space for occasional failures and fuckups in farming. Laws and regulations simplify the processes based on farming size.

A process-based and dynamic certification system for regenerative agriculture gives farmers more incentives to build healthy soils and continuously improve the quality of soil and products. There is also a support system for transitioning, so it is financially viable and desirable to go regenerative.

It has become the role of big institutions and companies to invest financial and human resources in the regenerative transition with vegetable and grain production. Farmers' hard physical labor is now shared, and helping out on the farm is part of many people's everyday lives. Local, democratic agricultural organizations represent and lobby for farmers' interests and support the regenerative transition. Conflicts of interest within the board of such organizations are not allowed. The craft of farming is alive, and there is rich knowledge exchange and discourse between practitioners.

Regenerative farming transcends political barriers and is universally understood and integrated into everyday life, enabling informed and collective decision-making. Using agriculture as a carbon sink is now acknowledged as a key solution to the climate crisis. Already in ground school, children learn about living soil. The media presents the complex nature of farming, supporting good discussions.

2) Farming practices

A diverse array of farms exist and flourish. Good practices and quality production are economically viable. The economy does not dictate farm practices but aligns with ecological and social aspects. Living soils with a carbon content close to 10% are now the norm across the country. They can withstand extreme weather events. Farmers consultants have built up extensive knowledge and experience with soil biology and use it to guide farmers on how to better maintain healthy, fertile soils.

Cooperatively owned hubs for distributing seeds and fertile compost have been established, and collaborations have been made with practitioners in other sectors, such as the marine environment. A huge diversification of organic seeds tailored to local contexts and soils has entered production, as have perennial crops, the latter now constituting more than 80% of the farmland.

The landscape is characterized by smaller fields divided by natural fences, trees, and bushes where wild animals can move and shelter. Out of all 2.6 million hectares of Danish agricultural land, one million is left wild. Nature has reclaimed the spaces, and forests are abundant. The landscape is a testament to the commitment to ecological restoration, featuring restored waterways and expanded biodiversity corridors.

Very few animals are indoors. Instead, they graze the fields and the now common ‘fællede’ between nut and fruit trees, which hold rain and provide shade. Animal husbandry and plant cultivation are tightly linked, increasing both sustainability and productivity. Overall, there are much fewer animals, as food is produced directly for human consumption. Animals mainly support regenerative purposes.

Specialized machinery for small-scale farms ensures efficient human energy use. Plastic used in farm equipment has been replaced with sustainable alternatives.

4) Farming communities

‘Andels’-thinking and collective ownership are foundational. Throughout the day, people work, enjoy the land, and use numerous pathways through the agricultural fields for recreation. All land is now communally owned, and it possesses its own intrinsic rights. A farm is expanded only when it makes sense for the production and not solely for economic reasons. Farmers are now viewed and treated as providers of public goods. They either rent the land or are paid a salary for managing it. Farming every day is a collaborative effort. Many different people participate and can choose tasks that best suit them.

The general public has a strong connection with and respect for food and is now eating a predominantly plant-based diet with a focus on perennial foods. With reduced working hours, people are dedicating more time to cooking and participation in food production, embracing a slower rhythm of life. With many more people working in agriculture comes more flexibility and greater attention to personal well-being.

Community kitchens collectively process and preserve food. Supermarkets are now platforms that promote and sell local produce. Smaller regions within Denmark and larger geographical areas such as the Nordic countries are moving towards self-sufficiency, reducing their reliance on exports and embracing an economy driven by exchange.

This way of farming provides everything Danish society needs without exploiting livelihoods in other parts of the world. A democratically structured world government ensures a fair exchange of products that are still procured for the international market.

In this regenerative production, farmers transition to a role that requires more observation, analysis, and strategic oversight. This opens space for a holistic mindset and open senses when practicing agriculture.

Strategies towards the above regenerative vision

Many strategies are fundamental for a transition toward the vision described above. The strategies are divided into themes, being: 1) education and the regenerative mindset, 2) bottom-up strategies to support farmers, 3) communication, and 4) strategic lobbyism

1) Education and the regenerative mindset

Try to change the way we think about farming. Introduce more complex thinking in agricultural schools, with a focus on regenerative value-based farm management. Teach in schools how decisions can have consequences and affect our surroundings for decades to come. Teach about soil regeneration and how it takes time and can’t be rushed. All children should have access to soil and gardens.

Integrate mindfulness and awareness of mental and physical health as aspects of daily life without being religious, forceful, or dogmatic. Work to evolve a better collective understanding of microbiology, as this will aid in providing a more holistic general understanding of life.

Teach about organic seeds, living, fertile soils and compost and how to support living soil. And teach about farming as part of the whole ecosystem and soils as a living entity, not just a medium for growing crops. This is relevant to agronomy studies, farming and gardening schools, evening schools, and public discourses.

Ensure voluntary working days on farms to connect more people back to the land. Build pathways through agricultural land to make it easier for people to go outside. Ensure more community thinking in agriculture.

In supermarkets and workplaces, demand organic, regeneratively produced produce. Higher demand for quality farming products creates positive pressure on the system and on farmers on the edge of transitioning to a more sustainable farming system.

2) Bottom-up strategies to support farmers

Evolve and showcase social and economic success models for making a living as a regenerative farmer. Lead by example and focus on the new generation of farmers by establishing farm communities and educational centers. Continue building and supporting farmer groups. When being connected to other farmers with similar visions, criticism and ridicule from colleagues when making a mistake are easier to handle.

Work to diminish social barriers between farmers who practice different styles of farming to facilitate a smooth transition towards regenerative agriculture from all points of departure.

When selling a farm, ensure that it continues to be farmed using regenerative principles by trustworthy people who share similar values.

Find a way to produce more green manure so that organic farmers are not dependent on animal manure from conventional farms. Focus on circularity within your own farm and your region and integrate different ecosystems within your production. This could be achieved by establishing common composting systems, a sort of 'andelskompost,' or recycling stations with a focus on creating a living compost.

3) Communication

Motivate farmers to build up social capital and the ability to ask for help to ensure better resilience.

Challenge ideas about material growth. Instead, focus on growth in quality and sustainability and make it clear that increasing quality and environmental benefits can actually be a business case. Work to communicate farming not only as a business but also as a provider of public good.

Communicate in the language of conventional farmers to help them realize the benefits of regenerative principles. Recognize that conventional farmers are already innovators; can they innovate on their existing infrastructure to produce more sustainably? Support the cultural shift towards perceiving farming as 'cool'.

4) Strategic lobbying

Inform the political system of farmers' wants through media communication. Due to farmers' limited resources and energy, be very strategic about where to apply pressure.

Lobby for a certification/ accreditation for regenerative farming. Work for that will come in levels and will be process-based (for example, a 0,5% increase in carbon in soils every year). Being regenerative is a never-ending process, not a result.

Demand a vision/strategy for Denmark's land and landscape 100 years from now. Reflect on and relate it to this vision. Formulate core values and integrate them into your work to ensure value-based action. Hold no one accountable right away (including politicians) so everyone can be free to talk and dream, even though they, at the moment, contradict themselves through their current policies and standpoints.

Build a common 'big voice' with more full-time lobbyists. Collaborate with the organic to challenge Landbrug & Fødevarer and work for a more progressive and realistic representation of farmers in the political sphere.

Do lobbying for community ownership, as inspired by Andelsgaarde. Support the work of an agricultural public fund that can buy up land and lend it to farmers that farm it regeneratively.

Pressure supermarkets to commit to buying more Danish, local, and regenerative food. Make them act more like farmers' markets. Connect and form alliances with international companies that also work for a regenerative transition because they need low carbon footprints to report high ESG scores.

Appendix D: Coding of visions and strategies

Text indicated as such = from CA visions

Text indicated as such = from CA strategies

Text indicated as such = from Organic visions

Text indicated as such = from Organic strategies

Text indicated as such = from Regenerative visions

Text indicated as such = from Regenerative strategies

CONNECTING THEMES - Mentioned by all three farming groups

Regulation Representation and Support

- 1) Governmental regulation, taxes, and subsidies should support more sustainable and less soil-disturbing land use
 - Rules and regulations are now supporting Conservation Agriculture. They allow a variety of cover crops, legumes, and fodder mixes, enhancing biodiversity and promoting regenerative farming practices. Tax incentives are offered to farmers who actively engage in carbon sequestration, aligning economic and environmental goals.
 - Agricultural subsidies do not exist anymore, and farmers thrive.
 - Rules now mandate agricultural fields to be green all year round. Very high taxes on the use of nitrogen have made conventional farmers transition rapidly, and eutrophication issues in water environments have been eradicated. Now, there is less need for subsidies, and the remaining monetary support from both the EU and the Danish government is now targeted directly to support the agricultural green transition.
 - Work for a nitrogen tax. Ensure that pressure for such regulation also comes from organizations not directly involved in farming, such as NGOs working with water environments and fishermen. Work for a CO2 tax in combination with regulation in subsidies to change production towards no-till organic.
 - Ensure that public authorities help people who cannot afford healthy, organic food.
 - Regulations are made to support this goal (to restore soils), with flexibility for farmers to make individual decisions and space for occasional failures and fuckups in farming.
 - Governmental regulations ensure sustainable land use. Decisions on how the land is being used are guided by considerations of what makes sense in the local environment and soil. Broadly, subsidies are now given for how and what is grown in terms of principles and quality.
- 2) Reduced bureaucratic burden for farmers
 - The bureaucratic burden that once overwhelmed farmers is now light, allowing them to focus more on farming than paperwork.
 - Separate requirements exist for smaller-scale and larger-scale farms, so smaller farmers are no longer faced with a huge bureaucratic burden.
 - Alleviate the burden of bureaucracy for farmers and make new and more simple regulations for small-scale farms.
 - Laws and regulations simplify the processes based on farming size.
- 3) Representation of farmers' interests by various agricultural organizations
 - Farmer organizations like Landbrug & Fødevarer and SEGES now wholeheartedly support conservation and regenerative agriculture, cultivating societal trust in these methods. Landbrug og Fødevarer leads the agricultural transformation, with consultants promoting good soil management practices. Advisory services for farmers focus on enhancing production using available resources.

- Farmer organizations, like Landbrug & Fødevarer, and business cooperatives, like DLG, adequately represent farmers and their interests
- Local, democratic agricultural organizations represent and lobby for farmers' interests and support the regenerative transition. Conflicts of interest within the board of such organizations are not allowed.
- Farmers consultants have built up extensive knowledge and experience with soil biology and use it to guide farmers on how to better maintain healthy, fertile soils.

4) Support for transition and young farmers

- Establish more economic support for CA farmers. For example, cheap loans when buying no-till technology, a premium for using regenerative principles in farming, or a specific co2-tax to support CA transitions (ex. for 5 years).
- The state owns a lot of farmland, which is rented out to farmers to alleviate their economic burden and allow them to move more freely to and from the occupation of farming.
- Make guides on how to easily get started with small, organic farms and push for more funding for small-scale agricultural projects on both the national and EU levels.
- Change the 'locked in' syndrome for farmers so that young, interested people do not feel they have to commit their entire lives to farming and can opt out if they want to pursue another career. One way is to introduce better systems for taking over farms so young people can have an easier start and to support less strict rules for inheriting farmers who are retiring if their children want to take over.
- Pressure banks to make it possible (as it once was) to have an investment account so farmers do not have to borrow money if they don't want to. There should be economic alternatives to bank credit as the only way to invest.
- There is also a support system for transitioning, so it is financially viable and desirable to go regenerative.
- When selling a farm, ensure that it continues to be farmed using regenerative principles by trustworthy people who share similar values.

Farming practices

5) Sustainable farming practices must focus on soil health, minimal soil disturbance, avoid chemical inputs and tailor to local environmental needs

- Conservation agriculture is the predominant farming approach.
- The transformation towards CA is now happening everywhere, yet it manifests uniquely on each farm, considering the specific needs of the local soil.
- Farms now flourish with year-round greenery, thanks to practices like co-growing, cover crops, and intercropping, all adapted to local soil conditions
- These methods also support biodiversity in flora and fauna. Instead of traditional insecticides and fungicides, bio-solutions are used.
- Practices such as surface composting with cover crops directly on the fields enrich the soil naturally, maximizing nutrient uptake without artificial inputs.
- High-quality compost has become readily available and is supplied by local municipalities, further reducing the dependency on synthetic fertilizers. Many farmers manage groups of cows on their land, giving space for grazing and natural fertilization.
- Insecticides, fungicides, and herbicides are no longer used. Chemical inputs and tillage have no place in agriculture anymore. Such practices have been outphased as the new farming system no longer needs them. Now, solely organic fertilizers and green manure are used.
- The way of farming that was previously called 'organic, no-till farming' is now the new normal.

- The importance of keeping the land green all year round and the ways in which covering crops is beneficial are common knowledge. Farmers can adopt new technologies at their own speed or not at all if they don't find them useful.
- Farmers are interested in bacterial and microorganic life in the soil and treat it like a holistic entity, a living organism requiring focus and attention.
- Deliberately plant crops that fix nitrogen in the ground and support microorganisms.
- Prioritize biodiversity in agricultural management, as it closely aligns with maintaining healthy soils
- A diverse array of farms exist and flourish
- Living soils with a carbon content close to 10% are now the norm across the country.
- The landscape is characterized by smaller fields divided by natural fences, trees, and bushes where wild animals can move and shelter. Out of all 2.6 million hectares of Danish agricultural land, one million is left wild. Nature has reclaimed the spaces, and forests are abundant. The landscape is a testament to the commitment to ecological restoration, featuring restored waterways and expanded biodiversity corridors

6) Circularity on different scales

- Now, farmers prioritize self-sufficiency and local, sustainable circularity of nutrients through manure and residues, cultivate their own animal fodder, and eliminate reliance on external suppliers. This shift not only enhances farm resilience but also ensures a closed-loop system where every aspect of farming is interlinked, promoting a self-sustaining, regenerative agricultural model that is both productive and environmentally conscious.
- Animal farmers grow feed for their animals themselves and are not reliant on agricultural institutions such as DLG. They are 'closing the loop' and can produce end-products on the farm, from planting to processing to selling them in farm shops.
- Create a strategy for more local, closed loops in agriculture. Smaller regions or islands could, for example, be closed loops regarding farming inputs and outputs.
- Make fodder for animals on the farms to become more independent on DLG.
- Smaller regions within Denmark and larger geographical areas such as the Nordic countries are moving towards self-sufficiency, reducing their reliance on exports and embracing an economy driven by exchange.
- This way of farming provides everything Danish society needs without exploiting livelihoods in other parts of the world.
- Find a way to produce more green manure so that organic farmers are not dependent on animal manure from conventional farms. Focus on circularity within your own farm and your region and integrate different ecosystems within your production. This could be achieved by establishing common composting systems, a sort of 'andelskompost,' or recycling stations with a focus on creating a living compost.

7) Decreased use of heavy machinery and make smaller machines more accessible

- The use of heavy machinery has significantly decreased, leading to reduced diesel consumption and maintaining soil integrity throughout the year.
- Additionally, work for weight limits on machines driving in the soils so they are not too heavy for healthy soil. Instead, develop machinery suitable for small-scale farmers.
- (...) machinery should be repaired instead of bought new as often as possible.
- Specialized machinery for small-scale farms ensures efficient human energy use

Farmers and the broader community

8) More direct connections between producers and consumers

- The number of links between farms and tables has been reduced, which fosters a closer connection between farmers and consumers
- Many farm shops let consumers purchase their food straight from the source.
- There are fewer steps between producers and consumers. This is achieved through consumers buying products directly from farmers' markets and visiting the farms.
- Sell products locally to foster stronger connections with nearby consumers and organizations and to help bridge the gap between farmers and consumers
- Farmers' hard physical labor is now shared, and helping out on the farm is part of many people's everyday lives.

9) Consumers must be encouraged to be interested and appreciative of food and take part in food production

- Consumers are now well-informed about cultivation practices, and it is easy for them to make choices that align with their values regarding sustainable farming methods.
- Farming now has a more integrated place in society, and many young people are interested in it. A new way of thinking has been established among farmers, researchers, politicians, and consumers. All of whom value, appreciate, and deeply understand farming and food production.
- [...] more people visit the farms to connect with the craft and the farmer and see with their own eyes how food is produced.
- Numerous small farms are emerging across the agricultural landscape, and more people are involved in agriculture.
- Build a narrative that reconnects consumers with the value and importance of food, countering misconceptions about food pricing and highlighting the already existing demand for sustainable, CO2-neutral produce. "Tell the good stories" to show the public that agriculture is transforming for the better to change society's perceptions of farmers today. Build up the seemingly lost interest and respect for food in consumers.
- More people have more general knowledge about farming.
- In general, many more people are involved with food production, as it is liked and desirable to be part of it, and as farming is now very connected to nature.
- This also means that more people are working on the land
- Everyone is aware of the healthfulness of organic products [...]
- Work to make consumers respect food more
- The general public has a strong connection with and respect for food and is now eating a predominantly plant-based diet with a focus on perennial foods
- Regenerative farming [...] is universally understood and integrated into everyday life
- [...]people are dedicating more time to cooking and participation in food production [...]
- [...] many more people [are] working in agriculture [...]
- Throughout the day, people work, enjoy the land, and use numerous pathways through the agricultural fields for recreation.
- Ensure voluntary working days on farms to connect more people back to the land. Build pathways through agricultural land to make it easier for people to go outside.

Social aspects

10) Strong connections and exchange between farmers

- There is strong confidence in 'godt landmandsskab'. Farmers trust that their colleagues are doing their jobs well and are using their senses and knowledge in good faith.

- Highlight common ground concerning soil health, economic benefits, and reduced reliance on costly inputs, and share knowledge between conventional and no-till farmers. Address fear of change and take it seriously. Form small groups of 5-10 farmers to encourage the adoption of CA and to help overcome challenges when adopting new farming practices.
- Address the deep-seated pride in traditional plowing practices, promoting no-till and CA methods as modern, forward-thinking choices to appeal to the younger generation of farmers. Challenge the sentiment that prevails in conventional farming of standing 'together against the enemy' (society) and bridge the division between no-till and tilling farmers.
- Farming is based on honesty and community. There is a sense of trust and truthfulness among farmers.
- Farming also includes an aspect of social care.
- Talk and share knowledge about the current situation, the shortcomings of Danish agriculture, and the vision for the future. Focus on person-to-person communication.
- Farmers now share a common objective to restore soils
- The craft of farming is alive, and there is rich knowledge exchange and discourse between practitioners.
- Evolve and showcase social and economic success models for making a living as a regenerative farmer. Lead by example and focus on the new generation of farmers by establishing farm communities and educational centers. Continue building and supporting farmer groups. When being connected to other farmers with similar visions, criticism and ridicule from colleagues when making a mistake are easier to handle.
- Work to diminish social barriers between farmers who practice different styles of farming to facilitate a smooth transition towards regenerative agriculture from all points of departure.
- Motivate farmers to build up social capital and the ability to ask for help to ensure better resilience.
- Communicate in the language of conventional farmers to help them realize the benefits of regenerative principles. Recognize that conventional farmers are already innovators; can they innovate on their existing infrastructure to produce more sustainably?

11) Collaborate, build alliances and communities around farming

- Build up more momentum in the CA movement and focus on engaging non-farmers to push for CA interests. This can alleviate the burden of having to do much extra work on top of a busy schedule for farmers in the long run. Establish new collaborations that represent CA farmers (for example, working together with the Regenerative Farming Association).
- Create 'fertile social environments', sharing good energy, joy, pleasure, and the feeling of leaving richer
- Invite people to farms through events like the yearly 'healthy soil day' (...)
- (...) small societies are blooming.
- Discuss from a global standpoint, stressing the importance of international collaboration in local farming to prevent price dumping and ensure worldwide food security
- Explore innovative agricultural practices from 'front-runner' countries that excel in this field beyond Denmark's current achievements.
- Enhancing community ties and mutual understanding can help counteract the misconception that 'farmers are stupid,' which still prevails in some parts of society.
- There is life, activity, and energy in the countryside, as many people from cities have moved here, and there are many young people around.
- Collaborations have been made with practitioners in other sectors (...)

- Connect and form alliances with international companies that also work for a regenerative transition because they need low carbon footprints to report high ESG scores.
- Ensure more community thinking in agriculture.

12) Slower and more flexible work life

- Farmers work within their capacity and can slow down during their workday whenever they need to.
- Life is slower, and small societies are blooming.
- With new ways of working the fields, farmers can work less if they want to.
- [...] it has become more flexible and affordable to have employees and trainees and easier to have visits from volunteers and woofers.
- Practice mindfulness. Being a farmer should ultimately be about being happy every day. Prioritize rest and work only as much as your mental and physical well-being allows.
- [...] reduced working hours [...]
- [...] embracing a slower rhythm of life
- [...] more flexibility and greater attention to personal well-being.

Education

13) Soil health as an educational focus

- Agricultural schools are now focusing their teaching on biological principles. Soil biology and its importance to food production are taught at least on a basic level in every school. Many farms have transformed into knowledge centers [...]
- Integrate soil health and microbiology into farming school curricula to ensure that new generations of farmers are better equipped to adapt to emerging regenerative farming systems. Through farmer networks, lobby politicians and school administrators for such educational reform.
- Establish on-farm knowledge centers to foster collaboration among students, farmers, and consultants on regenerative farming practices.
- (...) organize activities and seminars that make farming education accessible to the public.
- Many farms have become community centers where people can meet, learn about farming and soil health, and, most importantly, spend time just being.
- Already in ground school, children learn about living soil.
- Try to change the way we think about farming. Introduce more complex thinking in agricultural schools, with a focus on regenerative value-based farm management. Teach in schools how decisions can have consequences and affect our surroundings for decades to come. Teach about soil regeneration and how it takes time and can't be rushed. All children should have access to soil and gardens.
- Teach about organic seeds, living, fertile soils and compost and how to support living soil. And teach about farming as part of the whole ecosystem and soils as a living entity, not just a medium for growing crops. This is relevant to agronomy studies, farming and gardening schools, evening schools, and public discourses.

Economy

14) A production centering on environmental sustainability is also economically viable

- Highlight the shift towards plant- and soil-focused farming that aligns with environmental and economic sustainability, encouraging a gradual transition in farming habits and practices.

- By fostering biodiversity, farmers may become eligible for subsidies, enhancing their financial viability
- Good practices and quality production are economically viable. The economy does not dictate farm practices but aligns with ecological and social aspects.
- (...) make it clear that increasing quality and environmental benefits can actually be a business case

Mentality shift

15) Focus on quality rather than quantity

- This mentality has shifted the focus from maximum yield per hectare to maximum quality of produce in terms of nutrition and health properties, with a minimization of environmental pressure.
- We have arrived at a more holistic way of thinking that focuses less on theoretical, quantitative goals and more on the complex interplay of soil, plants, farmers, and the entire food system.
- (...) focus on growth in quality and sustainability (...)
- (...) ensure value-based action.
- Work to communicate farming not only as a business but also as a provider of public good.

Themes mentioned by two groups

1) Diet

- Make consumers realize that plant-based eating is the way forward (...)
- The general public has a strong connection with and respect for food and is now eating a predominantly plant-based diet with a focus on perennial foods.

2) Agriculture is a solution within the green transition and not an enemy of it

- Enhance political pressure towards a focus on solutions *within* agriculture, such as CA farming and carbon storage in soils, not just solutions *without* agriculture, such as taking out land for forests or wetland areas.
- Advocate for a new agricultural enlightenment emphasizing the essential role of healthy soil and framing farming not as an enemy but as a friend of the green transition.
- Educate society on the importance of farming and its potential to be a climate solution rather than just a problem.
- Using agriculture as a carbon sink is now acknowledged as a key solution to the climate crisis.

3) System change, decision making and growth critique

- Pressure from the public and more diversified politicians in power should push for system change, not just economic changes.
- Counter the sense that everything has to constantly grow.
- Emphasize the necessary changes in farming practices by highlighting the urgency of addressing climate change, which demands that certain agricultural methods must change.
- (...) underline that not all responsibility is on consumers
- Make it socially unacceptable for agribusinesses to exploit farmers to grow their income year by year while farmers are struggling and farms are closing.
- Through democratic regulation, more people are involved in decision-making in farming, both directly and indirectly.

- Regenerative farming transcends political barriers and is universally understood and integrated into everyday life, enabling informed and collective decision-making.
- A farm is expanded only when it makes sense for the production and not solely for economic reasons
- Challenge ideas about material growth.

4) Community/ state ownership

- The 'andels' thought of communal ownership is finding more and more supporters, and it is common not to own your own farm and farm equipment but to share it with others.
- The state owns a lot of farmland, which is rented out to farmers to alleviate their economic burden
- Expand 'Andelstanken' to include the cooperative ownership and sharing of production facilities and companies. Give the example of 'Andelsgaarde,' community-owned farming land.
- (...) make it more common for one farm to be owned by more people. Support the transition from the bottom up, focus on the new generation in farming, and accept that change takes a long time.
- 'Andels'-thinking and collective ownership are foundational.
- All land is now communally owned [...]
- [Farmers] either rent the land or are paid a salary for managing it. Farming every day is a collaborative effort. Many different people participate and can choose tasks that best suit them.
- Cooperatively owned hubs for distributing seeds and fertile compost have been established,
- Do lobbying for community ownership, as inspired by Andelsgaarde. Support the work of an agricultural public fund that can buy up land and lend it to farmers that farm it regeneratively.

5) Higher prices of products

- Slightly higher prices, such as 30 øre per liter of milk, ensure financial stability for farmers without dependence on governmental support.
- Products are priced to allow farm employees to enjoy their meaningful labor without being stressed, which enhances their well-being. This transformation ensures that the agriculture system as a whole is sustainable and resilient on many levels and closely connected to the community it serves.
- [...] consumers are willing to pay a bit more for food products so that subsidies can be elicited.
- Work to make consumers respect food more and, as a result, be willing to pay a bit more for it. Ensure that public authorities help people who cannot afford healthy, organic food.

6) The role of supermarkets

- Supporting cooperatively owned supermarkets already crowdfunding the agricultural transition toward more sustainable food production.
- Build a supermarket chain (or something similar) inspired by farmers' markets for 'small' organic produce.
- Supermarkets are now platforms that promote and sell local produce.
- Pressure supermarkets to commit to buying more Danish, local, and regenerative food. Make them act more like farmers' markets.
- In supermarkets and workplaces, demand organic, regeneratively produced produce.

7) Natural areas and agricultural land use

- Across the country, there is now much more green produce, less production of meat, and less agricultural land. This gives space to more forests and nature. Økologisk Landsforening has succeeded in reducing the number of animals in Danish agriculture
- Very few animals are indoors. Instead, they graze the fields and the now common 'fællede' between nut and fruit trees, which hold rain and provide shade. Animal husbandry and plant cultivation are tightly linked, increasing both sustainability and productivity. Overall, there are much fewer animals, as food is produced directly for human consumption. Animals mainly support regenerative purposes.
- perennial crops (...) now constitute more than 80% of the farmland.

8) Tell the "good" stories

- Encourage inclusive, inviting, nuanced, depoliticized public discussions about agriculture, focusing on positive, transformative stories and the tangible benefits of regenerative / CA practices.
- Engage a broad audience with a positive narrative about farming: that it can build up organic matter, sequester carbon, and make biodiversity bloom in the fields.
- "Tell the good stories" to show the public that agriculture is transforming for the better to change society's perceptions of farmers today.
- Focus on the constructive parts of conversations to support a positive mind shift. Communicate attentively and listen actively. Communicate directly with each other in debates

Single themes - Mentioned by one group only

1) Holistic understanding of life and it's connection to soil

- (the land) possesses its own intrinsic rights.
- Work to evolve a better collective understanding of microbiology, as this will aid in providing a more holistic general understanding of life.

2) Organic farming is the new normal

- The way of farming that was previously called 'organic, no-till farming' is now the new normal.
- All of Denmark is being farmed organically in ways that are economically viable for farmers.
- Regenerative farming principles are integrated, so consumers need not be very aware. They can now trust that everything they buy is farmed organically and responsibly.

3) Strategic lobbying

- Build a common 'big voice' with more full-time lobbyists. Collaborate with the organic to challenge Landbrug & Fødevarer and work for a more progressive and realistic representation of farmers in the political sphere.
- Inform the political system of farmers' wants through media communication. Due to farmers' limited resources and energy, be very strategic about where to apply pressure.

4) Accreditation of regenerative farming

- A process-based and dynamic certification system for regenerative agriculture gives farmers more incentives to build healthy soils and continuously improve the quality of soil and products.

- Lobby for a certification/ accreditation for regenerative farming. Work for that will come in levels and will be process-based (for example, a 0,5% increase in carbon in soils every year). Being regenerative is a never-ending process, not a result.

5) New technologies

- Technology is also a part of the new agricultural system, with farm robots controlling fast-growing weeds, which again reduces the need for chemical inputs. Although some new technologies are used to make farming easier, the dominant way of solving problems is in tune with nature and not by inventing new technologies.

6) Research

- Assist research in universities that support the production system transformation by pushing knowledge and data. Researchers are trustworthy, independent, and have no vested interests, so support opportunities for them to experiment, test, and do pilot projects to inform and validate new political decisions. Demand a change in research finance so that studies of CA and regenerative production systems are prioritized when funding is distributed to create a 'pull effect' from researchers.
- Cover broader and diversified research, especially the interconnections between principles in CA farming practices, carbon sequestration, and how plant mixes work together with soils. Hold researchers accountable (for example, when equalizing fossil and biogenic methane) to ensure farmers' trust in research and regulations.
- Encourage research in 'biological' solutions (and not synthetic fertilizers or pesticides). Researchers are responsible for writing scientific reports with results on how microbiology can stand in place of traditional inputs. Pressure for changes in rules and regulations with this documentation.

7) Energy

- Wind and solar power provide green electricity but are not very noticeable in the landscape, as only what is needed gets produced, and our energy consumption is reduced to a sustainable level.
- Save energy, as it is not enough to just produce green electricity, and the same goes for other resources.