REPORT

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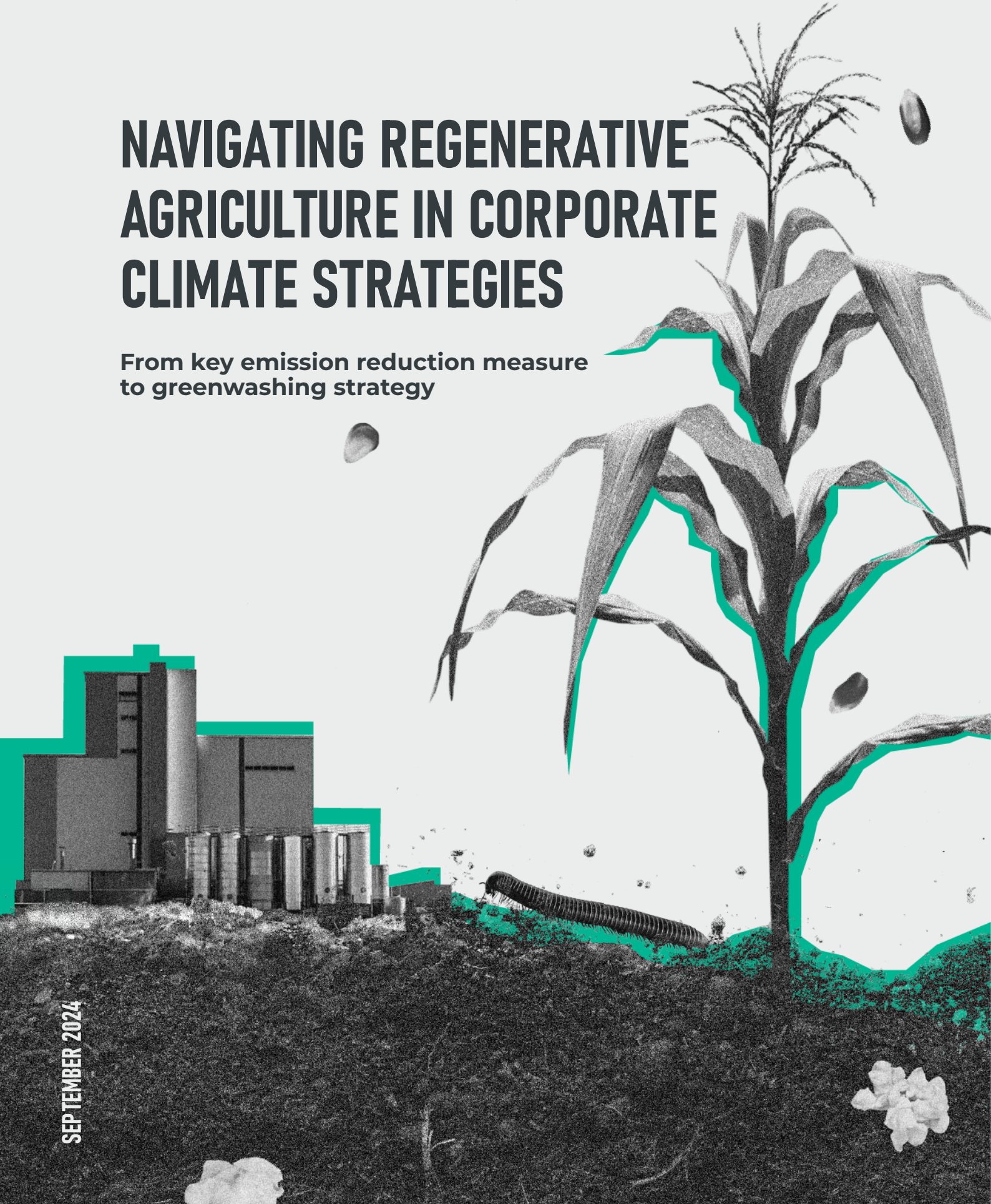
NAVIGATING REGENERATIVE AGRICULTURE IN CORPORATE CLIMATE STRATEGIES

From key emission reduction measure to greenwashing strategy



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From key emission reduction measure to greenwashing strategy

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SUMMARY

The food and agriculture sector is responsible for approximately a third of global greenhouse gas emissions. Among key emissions reduction strategies for the sector, regenerative agriculture has gained increasing interest among agri-food industry leaders, civil society organisations, farming communities and research organisations. Although regenerative agriculture is becoming progressively more popular, there is no universally agreed-upon definition of regenerative agriculture. At its core, regenerative agriculture goes beyond sustainable agriculture by aiming to restore and redesign the entire farming ecosystem. Regenerative agriculture is framed as a series of principles, practices or outcomes, or a combination of these, which seek to restore soil health, biodiversity, climate, ecosystem function while also improving socioeconomic outcomes.

Regenerative agriculture plays an increasingly large role in corporate sustainability strategies, but the extent to which regenerative agriculture can systematically lead to fewer emissions is still in the process of being researched. Especially which practices are effective in increasing permanent carbon sequestration in agricultural soils remains a subject of debate. Despite these uncertainties, there are early signs that regenerative agriculture is being misused by large companies and that its meaning is being diluted, leaving out key principles and practices such as climate justice and reducing chemical inputs. Some proponents of regenerative agriculture also emphasise its potential to increase soil carbon sequestration, often to claim lower emissions, which can divert attention from the need for overall emission reductions.

Since there are signs that regenerative agriculture is one of the key measures presented in corporate climate strategies, it is crucial to understand what the concept means from a scientific perspective as well as in practice. This report evaluates the current regenerative agriculture landscape, exploring how companies are using the concept and how it fits into the broader discussion surrounding food and agriculture companies' transition to lower-emission and more sustainable agriculture systems. With concerns about its potential misuse in mind, we examined 30 multinational food and agriculture companies' climate and sustainability plans. Ultimately, the study aims to steer the food and agriculture sector towards more effective climate action; that is, highlighting options for good practice replication, as well as moving away from less effective solutions. To do this, we assess whether a common definition of regenerative agriculture has emerged, whether companies are setting quantitative targets, and how they plan to use regenerative agriculture

for emission reductions, removals, or both. After taking stock of regenerative agriculture use in corporate sustainability and climate strategies, it underscores what the implications are for various actors: policymakers, standard setters and initiatives who develop sector guidance, as well as corporate actors themselves.

To gather data, we reviewed publicly available information from company websites and other sustainability communication materials, including sustainability reports, climate transition plans and press briefings. This allowed us to assess whether companies were implementing or planning to implement regenerative agriculture. Based on this analysis, we created a scale of company 'engagement' with regenerative agriculture, reflecting the extent to which companies are adopting this term, implementing the practices associated with regenerative agriculture, and providing detailed information about both.

This analysis finds that regenerative agriculture is no longer a niche term among multinational food and agriculture companies. We find that 24 out of the 30 companies analysed refer to regenerative agriculture in their sustainability communication. Of these 24 companies, 18 define regenerative agriculture, eight companies, which we call 'extensive users', already have quantitative regenerative agriculture targets in place, and eight companies, which we call 'early experimenters,' are currently piloting regenerative agriculture projects. A small subset of 'extensive users' links these targets to their emission reduction targets, but few companies expect significant emission reductions to come from regenerative agriculture. We find that there is a lack of a common definition or regenerative agriculture, even among those who use regenerative agriculture most in their sustainability strategies and communication.

Although it is crucial and commendable that companies are pursuing practices aimed at sustaining and enhancing soil health, biodiversity and water usage, it is unclear how regenerative agriculture will lead to significant emission reductions and permanent removals. Companies' regenerative agriculture strategies allow for significant flexibility and do not always mention practices key to regenerative agriculture's comprehensive definitions such as reducing fertiliser use or chemical inputs. Moreover, companies present soil carbon sequestration as a key component of regenerative agriculture, although its potential in agricultural soils is heavily debated, and permanence of such removals is limited. Furthermore, in the absence of a reliable measurement and verification system, it is difficult to assess the changes in soil carbon content and make robust claims. We also find that meat and dairy companies use regenerative grazing, a subcategory of regenerative agriculture, to continue unsustainably high production numbers. The claim that carbon sequestration in pasture soils neutralises methane emissions from livestock is misleading given that regenerative grazing practices will only lead to a small amount of carbon being sequestered in soils, and so are not a silver bullet for the meat and dairy industry.

These findings suggest that regenerative agriculture, as it is currently defined and practiced by multinational food and agriculture companies, lacks the ambition necessary to significantly reduce pollution, environmental degradation, emissions or even increase soil carbon sequestration. Food and agriculture companies are not using regenerative agriculture to redesign the food production system – instead, they are superposing some regenerative agriculture practices on top of business-as-usual agricultural practices. A common, ambitious and science-based regenerative agriculture framework is required to assess company definitions and approaches to regenerative agriculture and propose a path forward for regenerative agriculture. This framework also needs to be rooted in local and Indigenous understandings of regenerative agriculture.

In the absence of a commonly agreed framework, companies claiming to reduce emissions through regenerative agriculture should clearly articulate how these reductions will be achieved and ensure that their claims are backed by stringent verification schemes. Other actors advocating for regenerative agriculture including civil society and researchers should use caution when emphasising its impacts on soil carbon sequestration and focus on how regenerative agriculture can be used to reduce agricultural emissions. This is especially true for the meat and dairy industry, where claims that carbon sequestration in pasture soils neutralises methane emissions from livestock distract from the need to reduce livestock numbers. Finally, we recommend that standard-setters and developers of sector guidance, including the SBTi's FLAG guidance, set clear limits to the extent to which land-based CDR in the supply chain can count towards the achievement of emission reduction targets and net-zero targets, or demand separate reduction and removal targets for enhanced clarity and accountability.

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/\ 01 INTRODUCTION

1.1 BACKGROUND AND KNOWLEDGE GAPS

The food and agriculture sector is responsible for approximately a third of global greenhouse gas (GHG) emissions (Costa et al., 2022). Even if fossil fuel emissions were eliminated immediately, global food systems alone would make it impossible to limit global warming to 1.5°C (Clark et al., 2020). The food and agriculture sector faces a unique challenge as it has interlinked implications for climate mitigation, climate adaptation, food security and biodiversity (Roe et al., 2019). Despite these challenges, a growing body of research shows that implementing ambitious and transformative changes to food production and consumption could help feed a growing population while also keeping global warming to 1.5°C, and large food and agriculture companies are crucial to this process (Searchinger et al., 2019).

Key emissions reduction strategies for the food and agriculture sector include reducing food loss and waste, lowering methane emissions from livestock activities and rice cultivation, and shifting to regional, plant-based diets (Roe et al., 2019; Clark et al., 2020). Among these strategies, regenerative agriculture has gained increasing interest among agri-food industry leaders, civil society organisations, farming communities and research organisations (Ewer et al., 2023). At its core, regenerative agriculture goes beyond sustainable agriculture by aiming to restore and redesign the entire farming ecosystem, or, 'regenerate' it (IPES-Food, 2022; Rainforest Alliance, 2022). Regenerative agriculture is framed as a series of principles, practices or outcomes, or a combination of these, which seek to restore soil health, biodiversity, climate, ecosystem function while also improving socioeconomic outcomes (Sands et al., 2023). Practices which often fall under the regenerative agriculture umbrella include cover cropping, crop diversification, no-till or minimal tillage, agroforestry, silvopasture and rotational grazing (Boehm et al., 2023). These practices can lead to a range of positive environmental outcomes, in particular potentially increasing carbon sequestration in agricultural soils (Newton et al., 2020). Proponents of increasing soil carbon sequestration also link it to broader societal benefits, such as increases in yield, soil resilience, and improved water quality (Vermeulen et al., 2019).

Regenerative agriculture itself is not new – what is now being called 'regenerative agriculture' has been practiced for centuries, even millennia, by Indigenous and local communities around the world (Sands et al., 2023). What is new, however, is its recent inclusion in discussions around transitions towards a carbon negative food system. Major benchmarks and food transition research mention regenerative agriculture (Boehm et al., 2023), and several international organisations are now positioning regenerative agriculture practices as critical to shifting global food systems. The UNFCCC set a target for 20% of major food suppliers to fully adopt regenerative agriculture and land restoration practices by 2030 (UNFCCC, 2021), and the Food and Agriculture Organisation (FAO) includes regenerative farm

practices in its global roadmap for improving soil and water quality and agricultural production (FAO, 2023). Regenerative agriculture took centre stage during COP28 in the United Arab Emirates (UAE), where the Action Agenda on Regenerative Landscapes flagship initiative was launched (WBCSD, 2023). The initiative reinforces the commitment to transitioning large agriculture landscapes to regenerative landscapes by 2030.

Although regenerative agriculture is becoming increasingly popular, there is no universally agreed-upon definition of regenerative agriculture. Despite the lack of such a definition, studies have identified that regenerative agriculture plays a prominent role in the transition plans of some of the largest food companies (Ewer et al., 2023; NewClimate Institute, 2024). The lack of such a definition may have enabled agribusiness companies to layer regenerative practices on top of resource-intensive farming and define this approach as 'regenerative agriculture', potentially leaving out key components of the concept (Sands et al., 2023; Changing Markets Foundation, 2024). One of regenerative agriculture's early advocates has cautioned that the word 'regenerative' has become a new buzzword, and that "there is a danger of it getting greenwashed" (Giles, 2019).

Large corporate uptake of topics like regenerative agriculture and soil carbon sequestration could increase financial support for scaling soil management practices globally (Vermeulen et al., 2019). Soil has historically been missing from sustainability and climate policy, so any attention companies are bringing to increasing soil health is seen as a positive shift (Davies, 2017). However, the extent to which regenerative agriculture can systematically lead to fewer emissions and which practices are effective in increasing carbon sequestration in agricultural soils is still heavily debated (Garnett et al., 2017; McGuire, 2018; Ranganathan et al., 2020). The political, technological and social feasibility of deploying regenerative agriculture at scale also remains uncertain. Studies have also noted that some companies are misusing the term to avoid reducing their own emissions and that the meaning is being diluted, leaving out key principles and practices such as climate justice and reducing chemical inputs (IPES-Food, 2022, p. 25; Changing Markets Foundation, 2024). If regenerative agriculture is not used in alignment with its original meaning, its value for producers genuinely involved in making food production more sustainable could be diminished (Newton et al., 2020; Ewer et al., 2023).

1.2 OBJECTIVES

Because the agrifood sector is responsible for a large share of emissions, agrifood companies have crucial role to play in climate change mitigation. Since there are signs that regenerative agriculture is one of the key measures presented in corporate climate strategies, it is crucial to understand what the concept means from a scientific perspective as well as in practice. This report seeks to take a deeper look at regenerative agriculture use by corporate actors, especially with regards to regenerative agriculture's role in reaching corporate GHG emission reduction targets. Ultimately, the objective of the study is to steer the food and agriculture sector towards more effective climate action; that is, highlighting options for good practice replication, as well as moving away from less effective solutions. This is important for various actors: policymakers, standard setters and initiatives who develop sector guidance, as well as corporate actors themselves.

Although a small number of studies have taken stock of regenerative agriculture use among food and agricultural companies (FAIRR, 2023), this report breaks down the science underpinning regenerative agriculture's impact on GHG emissions, putting it into conversation with company regenerative agriculture definitions and frameworks. It goes beyond taking stock of regenerative agriculture use, also investigating the significance of regenerative agriculture in major food and agriculture companies' climate strategies and seeing if a common definition of regenerative agriculture has solidified. Finally, this research seeks to understand the extent to which companies are relying on regenerative agriculture and soil carbon sequestration specifically for their climate transition plans, and what this could mean for climate mitigation in the food and agriculture sector more broadly.

This report is structured as follows. In the first section, we give a more detailed overview of regenerative agriculture – describing the history of the term, its definitions, and the scientific foundations and debates surrounding regenerative agriculture practices. The second section explores the relevance of regenerative agriculture in the context of corporate climate strategies. In the third section, we present our research methods. The fourth section illustrates to what extent regenerative agriculture plays a role in the climate strategies of 30 major food and agriculture companies and how they define the practice. We divide the 30 companies into four categories based on the extent to which they refer to regenerative agriculture. We also present deep dives of eight companies which refer to regenerative agriculture the most in their climate plans. In the fifth section, we shed light on the potential implications of the substantial role of regenerative agriculture in corporate climate strategies, leading to conclusions and recommendations presented in the final section.

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REGENERATIVE AGRICULTURE IN THE CONTEXT OF CORPORATE CLIMATE ACTION

2.1 CURRENT UNDERSTANDING OF REGENERATIVE AGRICULTURE

At its core, regenerative agriculture is a holistic approach to farming that aims to restore soil and ecosystem health while enhancing social and economic dimensions of sustainable food production (Schreefel et al., 2020). Regenerative agriculture can be both a general approach to agriculture and an umbrella term for certain practices. In their comprehensive reviews of regenerative agriculture, Schreefel et al. (2020) and Newton et al. (2020) both find that there is no single definition of regenerative agriculture. This is by design - there is no 'one-size-fits-all' practice that will systematically have a positive impact in diverse soils and regions (Lal, 2020; Newton et al., 2020), hence the reluctance to choose one definition. In this way, regenerative agriculture is closer to an umbrella term than a scientific concept (Giller et al., 2021). Regenerative agriculture shares some similarities with agroecology and nature-based solutions, but agroecology remains the more established term for addressing sustainability issues in food systems (IPES-Food, 2022). Agroecology proposes to restructure food systems with distributive justice and environmental soundness at its centre (IPES-Food, 2022).

The lack of a single definition is not necessarily an issue – regenerative agriculture's broad framing even facilitates it being repurposed for and adapted to specific soils and ecosystems. However, the lack of a single definition becomes an issue when entities refer to regenerative agriculture as a measure to reduce GHG emissions, which need to be measured and verified. If regenerative agriculture is not well defined it could be repurposed by diverse stakeholders and diluted from its original intended impact (Ewer et al., 2023).

Depending on the definition, regenerative agriculture focuses on the practices (principles and/or particular actions), or expected outcomes of regenerative agriculture, or a combination of both practices and outcomes (Newton et al., 2020). Ewer et al. (2023) identified a set of practice and outcome pillars that are commonly associated with regenerative agriculture (see → **Tab. 1**). They were based on the review studies from Burgess et al. (2019), Newton et al. (2020), Schreefel et al. (2020) and Giller et al. (2021). These studies also point to fact that regenerative agriculture definitions tend to define socio-economic issues less, or leave them out altogether (Newton et al., 2020). Not all regenerative practices yield the same outcomes, depending on climate, topography and soil type (Ewer et al., 2023). Some practices may have a positive effect on one outcome, such as soil carbon sequestration, but have a neutral or negative impact on another, such as yields (Moinet et al., 2023).

One of, if not the, key components of regenerative agriculture is soil health. Soil health can be summarised as the "continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans" (USDA, no date). A healthy soil performs its core functions: regulating water, sustaining plant and animal life, filtering and buffering potential pollutants, cycling nutrients, and providing physical stability and support. Co-benefits of a healthier soil include increased productivity, biodiversity, and soil water retention and are often cited as potential outcomes of regenerative agriculture (see → **Tab. 1**).

Tab. 1
Practices and outcomes often associated with regenerative agriculture

Practices	Outcomes
Reducing or eliminating soil tillage	Enhanced ecosystem services
Permanent soil cover with cover crops/ minimising bare ground	GHG emission reductions
Crop rotation and diversification	Improved biodiversity
Increasing water percolation/water resource management principles	Improved livelihoods
Integrating animals	Improved freshwater use and oceans
Green manures	Improved productivity
Adding compost	Improved agriculture system resilience
Avoiding or eliminating synthetic inputs	Improved soil health
	Improved animal welfare*

* not included in Ewer et al. (2023)
Source: Ewer et al. (2023).

2.2 REGENERATIVE AGRICULTURE FOR AGRIFOOD COMPANIES' EMISSIONS REDUCTIONS AND REMOVALS

In the context of the food and agricultural sector's impact on GHG emissions and the challenges met in reducing these emissions, this report focuses mainly on the carbon sequestration and GHG emissions reduction component of regenerative agriculture, as mentioned in → **Section 1.2**.

Regenerative farming approaches have the potential to both reduce agricultural emissions and increase the carbon stored in soils. On the emission reduction side, for instance, using organic fertilisers or cultivating legumes can reduce the need for mineral fertilisers. This can lead to fewer emissions as mineral fertilisers are

energy-intensive (Paul et al., 2023). Conservation agriculture practices such as no-till or low-till agriculture can reduce emissions from machinery use, although their impact on carbon sequestration rates can be limited (Schlesinger and Amundson, 2019). Overall, actual impact of regenerative agriculture on emission reduction is unclear – instead, the focus tends to be on emission removals through soil carbon sequestration (Searchinger et al., 2019).

REGENERATIVE AGRICULTURE AND SOIL CARBON SEQUESTRATION

In part due to the lack of a single definition, the focus of regenerative agriculture has shifted from soil health to soil carbon sequestration in recent years, especially among those seeking to operationalise regenerative agriculture at the company level and use the practice for reaching climate targets (see → **Box 1** for an overview of soil carbon sequestration). Indeed, some organisations have narrowed the scope of regenerative agriculture to carbon farming, an approach to agriculture exclusively focused on increasing soil carbon sequestration (Carbon Cycle Institute, no date; CSU Chico and The Carbon Underground, 2017). Certain regenerative agriculture management practices – such as cover cropping, converting to perennial crops or adding manure and compost – are known to have positive effects on soil organic carbon levels, especially in early years of implementation (Paustian et al., 2019; Schlesinger, 2022). Increasing soil organic carbon levels is likely to contribute to agricultural resilience mainly through maintaining soil physical conditions that are suitable for root growth and water infiltration and retention (Powlson and Galdos, 2023). Soil carbon sequestration is a crucial measure to reduce the food system's emissions (Costa et al., 2022); in particular, it is important as it is one of the sectors with significant residual emissions in 1.5°C-aligned pathways (IPCC, 2023). Soil carbon sequestration is linked to soil health and GHG emissions, hence it not being included as a key outcome in → **Tab. 1**.

A significant challenge related to soil carbon sequestration is its lack of permanence, as carbon stored in soils can be lost if land is reverted to non-regenerative practices or faces disturbances like fires, flooding, or extreme weather, requiring perpetual maintenance (Fuss et al., 2018; Paul et al., 2023). Climate change may compound this issue and has already led to substantial soil organic carbon losses across all geographies (Paul et al., 2023). To protect biomass and soil carbon from future disturbances and land-use changes, strict guidelines and systematic reviews are needed. However, predicting and preventing these losses will be especially challenging in the face of changing climate conditions and increased occurrence of extreme weather events.

In addition to the challenge regarding permanence, there are trade-offs between increasing soil carbon sequestration and other agricultural functions, such as chemical use, water use or ancillary emissions (Moinet et al., 2023). For example, no-till agriculture leads to increased pesticide use and regenerative agriculture practices can increase nitrous oxide emissions over time due to the additional

organic fertiliser application (Lugato et al., 2018; Xiao et al., 2021). These trade-offs complicate the assessment of regenerative agriculture's overall impact on GHG emissions beyond the farm level, at the landscape or global level. More research is still needed to better understand the net effects of these practices on emissions (Schlesinger and Amundson, 2019; Ewer et al., 2023).

Box 1

What is soil carbon sequestration?

Carbon sequestration in soils is a form of land-based carbon dioxide removal (CDR) like carbon storage above ground in trees. Soils are significant carbon stores, and all soils contain both soil organic carbon and soil inorganic carbon. Different soil types differ in how much carbon they contain, sometimes even from one field to another (Minasny et al., 2017). Soil carbon sequestration occurs when land management changes increase the amount of organic carbon stored in soils, resulting in a removal of CO_2 from the atmosphere (Fuss et al., 2018). The level of carbon in soils is a balance between carbon inputs and carbon losses. Microorganisms convert decaying organic matter to soil organic carbon, so soil organic carbon stocks can be increased by adding dead plant material from above ground plant litter, root exudates from living plants, and through the addition of animal manure containing partly digested plant material (Jordon et al., 2024). Practices that either increase inputs or reduce losses can increase soil organic carbon levels (Fuss et al., 2018). Increasing soil organic carbon is also crucial for soil fertility and is central to numerous functions delivered by soils such as soil structure and stability, water retention and soil biodiversity (Kopittke et al., 2022). Depletion of soil organic carbon can also be used as an indicator of soil degradation (Jordon et al., 2024).

While soils can sequester carbon quite rapidly in the early years after regenerative farming practices are implemented, the rate of carbon sequestration typically dwindles over time as carbon sinks become saturated. Saturation can happen after different lengths of time depending on practices, soil type and climate zones, with estimates ranging from 10-100 years after management changes (Fuss et al., 2018). The IPCC assumes a 20-year saturation period, after which practices would need to be maintained indefinitely, with no additional soil carbon sequestration. This implies that more degraded soils have a greater capacity for sequestration before reaching saturation point, while soils in good condition may not have any more storage capacity (Garnett et al., 2017).

Although regenerative agriculture practices can lead to soil carbon sequestration, estimates of their worldwide sequestration potential vary. These estimates range from 2.3-5.3 $GtCO_2e$ per year, with a median of 3.5 $GtCO_2e$ (Fuss et al., 2018). For context, global net anthropogenic GHG emissions were 59 $GtCO_2e$ in 2019 (IPCC, 2023). Larger numbers, such as those cited by Rodale Institute (2020), have been widely discredited (Jordon et al., 2024). Estimates vary because the conditions that

influence soil carbon retention levels are complex and depend on factors such as climate, rainfall, the soil microbial community and management practices (Garnett et al., 2017; Searchinger et al., 2019). Many researchers therefore view the climate mitigation potential of soil carbon sequestration in agricultural lands as modest and highly context-specific (Moinet et al., 2023).

Furthermore, the potential of soil to store carbon does not necessarily mean that large-scale soil carbon sequestration is feasible. The feasibility of such an approach involves technical, biological, economic, social, and political considerations (Poulton et al., 2018; Bai and Cotrufo, 2022). The uncertainty surrounding field productivity under regenerative management raises questions about profitability and the risk of carbon leakage. Disseminating regenerative agriculture solutions across many farmers in companies' supply chains adds complexity to reporting.

In addition to dissemination challenges, the lack of reliable measurement and verification systems for carbon sequestration is also limiting. Measuring soil carbon sequestration is both difficult and costly for farmers and those monitoring the process, as the most reliable method for measuring soil carbon sequestration remains through soil sampling (McDonald et al., 2023). Modelling capabilities are evolving, but their accuracy still depends on model complexity, calibration and the quality of inputted data (Paul et al., 2023). These difficulties in tracking and reporting highlight the gap between the potential for soil carbon sequestration and the feasibility of accurately and verifiably accounting for it. This is even more true for the introduction of soil carbon sequestration into carbon markets. Payments for soil carbon sequestration could encourage more farmers to implement regenerative agriculture practices. However, questions surrounding additionality, permanence, measurement costs, and the overall feasibility of soil carbon sequestration credits remain unanswered (Scherger, 2022; Paul et al., 2023).

In summary, while soil carbon sequestration is one of several solutions to reduce agriculture's environmental and climatic impacts, its role in lowering net agricultural emissions will be limited. Implementing, predicting, and measuring soil carbon sequestration in working agricultural soils is more challenging compared to direct emissions reduction measures (Schlesinger, 2022; Moinet et al., 2023). Avoiding converting additional land for farming to prevent further harm from current food systems should be prioritised (Garnett et al., 2017; Moinet et al., 2023), and focusing only on soil carbon sequestration could also lead to political inertia (Schlesinger and Amundson, 2019). Instead, regenerative agriculture should be pursued for its potential to support climate change adaptation and enhance the resilience of agricultural systems and farming communities to adverse weather conditions, rather than focusing solely on soil carbon sequestration (Droste et al., 2020).

REGENERATIVE GRAZING

Although this report covers a range of food and agriculture producers, the subset of regenerative agriculture which focuses specifically on livestock systems merits more explanation, especially as it has gained significant traction among beef and dairy companies (Changing Markets Foundation, 2024). Livestock has a significant impact on climate. Due to enteric fermentation, livestock systems are responsible for around 80% of global methane emissions, and meat and dairy production accounts for 57% of emissions within the global food system (Jordon et al., 2024). Furthermore, many grasslands around the world are degraded and overgrazed, leading to the loss of significant carbon stores in pastures.

Some industry actors have claimed that cattle methane emissions are part of a natural biogenic carbon cycle in which methane emissions could be compensated by soil carbon sequestration (Changing Markets Foundation, 2024). This approach does not take into account the difference in timespan of warming effects of methane versus carbon dioxide. Carbon sequestration addresses long-term carbon dioxide buildup, but it does not offset the immediate, intense warming caused by methane emissions. Even if carbon dioxide is removed, methane's short-term impact will still cause significant warming spikes, especially in the next couple of decades (IPCC, 2023, p. 95)

Despite the erroneous assumption that carbon sequestration can compensate for methane emissions, regenerative approaches to grazing, sometimes called holistic grazing, have gained popularity (Jordon et al., 2024). Regenerative grazing generally refers to rotational grazing, with a subset of this practice known as adaptive multi-paddock grazing. Under rotational grazing, livestock are moved around sections of pasture to create alternating grazing and no grazing periods. Adaptive multi-paddock grazing goes further, exposing land to high densities of livestock for short periods, followed by long recovery intervals, often with the addition of manure.

Better management of grasslands, especially reductions in overgrazing, could potentially lead to the sequestration of 1.65 Gt CO_2e/yr worldwide or 3% of global emissions and reduce the need for fertiliser and feed (Jordon et al., 2024). However, estimates remain highly uncertain (Bai and Cotrufo, 2022). The benefits from holistic, adaptive, and other variants of regenerative grazing are small and the evidence is patchy and highly contradictory (Reinhart et al., 2021). For example, in the United Kingdom (UK), the overall technical potential for soil carbon sequestration through better pasture management practices comes down to approximately 0.7% of the country's yearly emissions over the next 20 years (Jordon et al., 2024). Other estimates show that current soil organic carbon stocks in grasslands would almost need to triple globally to offset current ruminant emissions, which is unlikely given the carbon sequestration potential in grasslands today (Wang et al., 2023).

Contrary to the assumption that carbon could be effectively stored, expanding the grazing sector could actually lead to substantial increases in methane, nitrous oxide, and land use change-induced CO_2 emissions. For instance, while converting cropland to pastureland can increase soil carbon sequestration, it will reduce the land's food production capacity, requiring the conversion of other lands to cropland elsewhere, which could lead to higher overall GHG emissions (Waite et al., 2024). Potential trade-offs from grazing interventions on grassland including biodiversity, productivity and sequestration also need to be further investigated (Bai and Cotrufo, 2022).

To summarise, at a global or regional level, soil carbon sequestration on grasslands will not offset the ruminant sector's GHG emissions, and claiming otherwise could be misleading (Wang et al., 2023). Soil carbon sequestration would only moderately contribute to reducing net livestock emissions, especially considering the relatively small percentage of livestock farmed through grazing methods (Garnett et al., 2017). Therefore, carbon sequestration linked to regenerative livestock management could be considered a co-benefit of well-managed grasslands rather than a primary solution (Mbow et al., 2022). Demand-side measures, such as reducing per capita meat consumption and minimising food loss and waste, are essential (Costa et al., 2022; Harwatt et al., 2024; Jordon et al., 2024).

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SUMMARY OF METHODS

3.1 COMPANY SELECTION AND DATA SOURCES

For this report, we investigated the sustainability reports and climate strategies of the world's 30 largest food and beverage producers by annual revenue in 2021, based on the list of the 100 largest food producers (Teal and Joker, 2022).

We examined if the 30 food and beverage producers mention regenerative agriculture, and when they did, if they provided definitions, pillars, frameworks, or targets for regenerative agriculture. Given the focus of this report on climate impact, we paid special attention to companies' expected benefits from regenerative agriculture in terms of climate outcomes. To gather data, we reviewed publicly available information from company websites and other sustainability communication materials, including sustainability reports, climate transition plans and press briefings. This allowed us to assess whether companies were implementing or planning to implement regenerative agriculture. Based on this analysis, we created a scale of company 'engagement' with regenerative agriculture, reflecting the extent to which companies are adopting this term, implementing the practice, and providing detailed information about both. Although we have attempted to gather as much information on regenerative agriculture, it is possible that some relevant details have been overlooked. This report does not provide an exhaustive overview of the use of the term in this sector, and information published after the 25th of July 2024 was not factored into this report's analysis.

3.2 ASSESSING TYPES OF ACTORS: INDICATORS INVESTIGATED

We assessed the integration of regenerative agriculture in the corporate climate strategies of the 30 largest agrifood companies using four indicators: the number of references to regenerative agriculture, the definitions provided, the existence of pilot projects, and the existence of targets and frameworks. Based on the findings from this initial assessment, we conducted a more in-depth analysis of a number of key actors in the regenerative agriculture space.

CORPORATE REFERENCES TO REGENERATIVE AGRICULTURE

We first investigated if and how often companies use the word 'regenerative' to describe certain agricultural initiatives and programs. By using a word search, we determined the number of times 'regenerative' appeared in relevant documents. These documents included either the companies' sustainability reports or their climate transition plans. In case a company had published both, we selected the

one with the most detailed overview of agricultural practices. For the word count, we included phrases like 'regenerative agriculture', 'regenerative farming' or 'regenerative practices.' However, we did not count the times where 'regenerative' or 'regenerate' was used as a synonym for land restoration.

We used the number of regenerative agriculture mentions to examine how niche or mainstream the word 'regenerative' has become within corporate discourse. It is important to note that the sheer number of mentions does not necessarily indicate that companies have more developed regenerative agriculture programs, as the length and detail of company sustainability documents can differ significantly. These findings are most insightful when analysed alongside other indicators, as highlighted below, and give some indication to what extent the term 'regenerative' is becoming conventional or remains niche.

CORPORATE DEFINITIONS OF REGENERATIVE AGRICULTURE

To investigate the extent to which companies define 'regenerative agriculture,' we employed a two-step approach: 1) checking whether they provided a definition, and 2) analysing what was included in their definition. In case companies did not explicitly define regenerative agriculture using a clear format (e.g., 'regenerative agriculture is...'), we also considered broad descriptions of what the concept means for the company, or what it entails. We included definitions provided in footnotes, when relevant. When several definitions were found across different types of sustainability communications (e.g., on a webpage dedicated to regenerative agriculture and in a sustainability report), we retained the explanation closest to a standard definition format (i.e., 'regenerative agriculture is...'). When it was highly unclear if a sentence actually constituted a definition of regenerative agriculture, we did not consider it.

Next, we compared the companies' definitions of regenerative agriculture and their broader descriptions against the practice and outcome pillars, as identified by Ewer et al. (2023) and presented in → **Tab. 1**. We also added 'improved animal welfare' to the outcome pillars, because of its centrality in some regenerative agriculture certification schemes (Regenerative Organic Alliance, 2023) and its relevance in discussions surrounding the future of the livestock industry (Waite et al., 2024). We then identified how frequently companies included each pillar in their definitions or descriptions. In cases where companies did not use the exact same wording as the listed pillars of practices and outcomes, we chose the pillar that was the most related or relevant. If we found that companies' definitions or descriptions did not match any practice or outcome pillar, we did not include them.

Definitions and descriptions were worded very differently from one company to another. For instance, socio-economic indicators, which we have grouped together as 'improved farmer livelihoods', were expressed in various ways. These ranged from

phrases like 'grower livelihoods', 'delivering benefits to farmers', 'ensuring financial profitability' and 'improving farmers' quality of life' to 'keeping farmers' business viability central in a just transition approach'. For analysis purposes, we listed all these terms under 'improved farmer livelihoods', although we acknowledge that the specific implications of these terms can vary.

PILOT PROJECTS

To identify if companies are implementing regenerative agriculture, we noted any references to ongoing pilot projects.

TARGETS & FRAMEWORKS

The final indicator that we investigated was whether companies had set quantitative targets and whether they published a regenerative agriculture framework.

For targets, we noted any type of quantitative target that the companies presented, along with the target year. These targets ranged from sourcing from a certain number of regenerative farm acres to a certain percentage of ingredients to be sourced from regenerative agriculture.

For frameworks, we included detailed descriptions of regenerative agriculture, often presented in separate documentation. This description had to cover:

- Principles, practices and/or outcomes;
- Implementation strategy: A description of how the company plans to implement regenerative agriculture, including the criteria set for regenerative agriculture, and their approach to monitoring, reporting and verification.

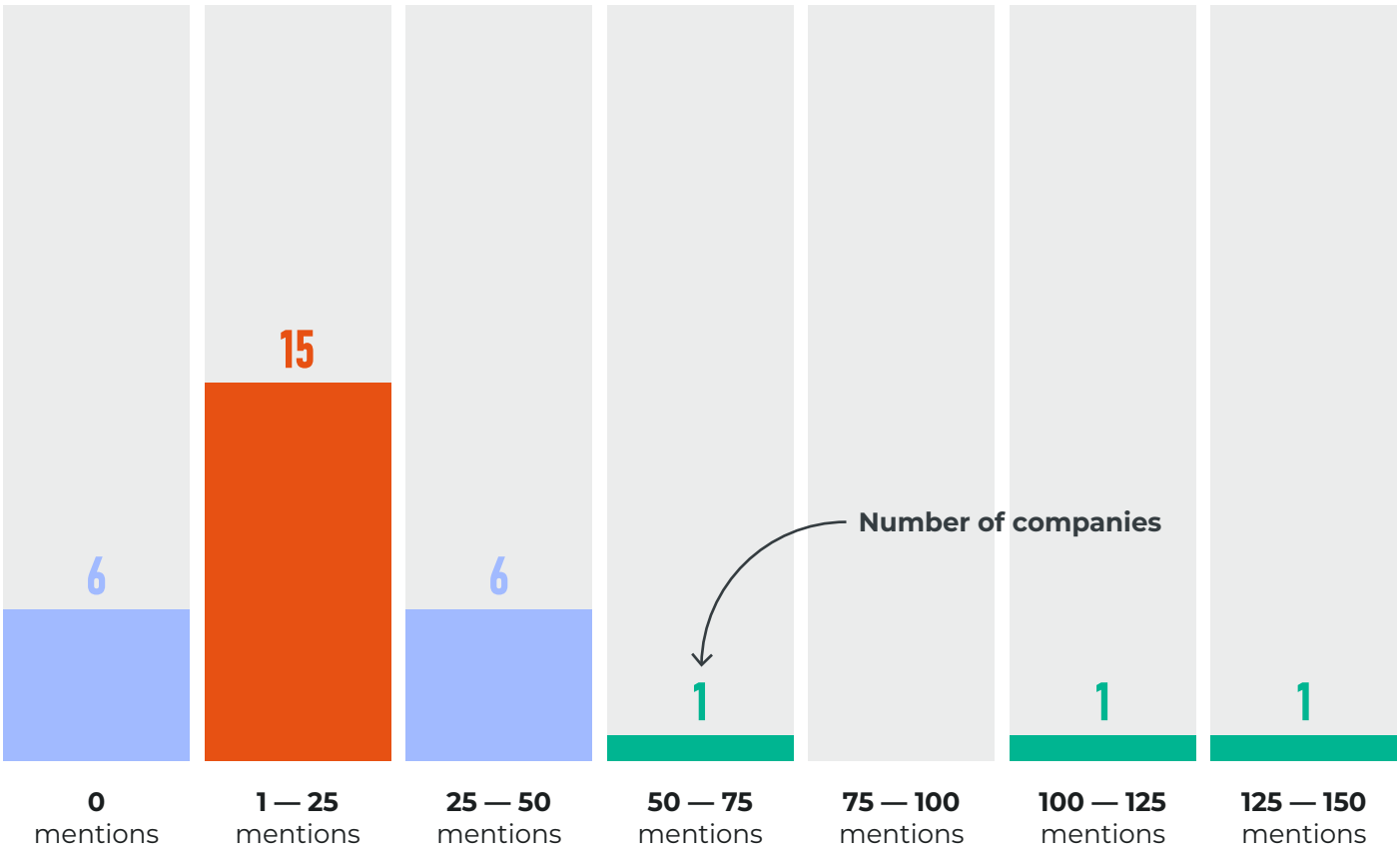
/\ 04 RESULTS

4.1 RESULTS ON THE INDICATORS

CORPORATE REFERENCES TO REGENERATIVE AGRICULTURE

More than two-thirds (24) of the companies in this report mention regenerative agriculture or similar phrases in their sustainability reports and in their climate transition plans.→ **Fig. 1** shows how often companies refer to regenerative agriculture, with a wide range — from companies mentioning it only once to almost 130 times for Nestlé and 117 times for Danone.

Fig. 1
Overview of mentions of regenerative agriculture in company sustainability reports or climate transition plans



Source: Authors.

CORPORATE DEFINITIONS OF REGENERATIVE AGRICULTURE

Of the companies analysed in the sample, 18 define what they mean by regenerative agriculture, but these definitions are often broad. Some actors use regenerative agriculture interchangeably with other terms, like sustainable agriculture (e.g., The Coca-Cola Company (Coca-Cola)) and climate-smart farming (e.g., Anheuser-Bush InBev). A few companies use the words 'regenerative' or 'regenerating' in relation to activities beyond agriculture. Unilever and Danone both refer to regenerative agriculture alongside 'regenerating nature,' which appears closer in meaning to nature restoration. Coca-Cola, on the other hand, aims to 'regenerate water'. This adds to the confusion surrounding the concept of 'regenerative agriculture'.

Some only address regenerative agriculture in vague terms. Mondelēz International, Coca-Cola and Diageo stand out for their broad definitions, which do not specify particular practices nor outcomes. For instance, Mondelēz International defines regenerative agriculture as "a holistic approach to farming which aims to produce high-quality crops while also restoring the natural rhythm of our surrounding ecosystem", despite planning to ramp up their sourcing of regenerative agriculture (Mondelēz International, 2024, p. 30).

Companies provide a wide range of regenerative agriculture definitions. These range from one sentence briefly outlining key principles to an extensive list of potential benefits. To a certain extent, there is alignment with the overview of regenerative agriculture provided in → **Section 2.1** especially concerning regenerative agriculture's focus on restoring soils and ecosystem health. Almost all companies providing outcome-oriented definitions of regenerative agriculture include increased soil health, biodiversity and water efficiency.

Tab. 2

Food and agriculture companies' definitions of regenerative agriculture

Company	Definition
Anheuser-Bush InBev (Anheuser-Busch InBev, 2023, p. 49)	'Climate-smart and regenerative agriculture is dynamic and holistic, incorporating principles such as soil fertility management, minimum tillage, cover crops, crop rotation and composting to increase yields while protecting topsoil, supporting water stewardship and enhancing biodiversity.'
Archer Daniels Midland (ADM, 2023b, p. 23)	'Archer Daniels Midland (ADM) defines regenerative agriculture as practices based on Indigenous ways of land management that are adaptive to local physical conditions and culture and include: - Maintaining living roots in soil, - Maximizing diversity – crops, soil, pollinators, Minimizing soil disturbance, - Continuously covering soil, - Responsibly managing inputs – fertilizers, pesticides.
Arla Foods (Arla Foods, 2024, p. 48)	'Regenerative agriculture focuses on improving soil health, mitigating climate change and supporting biodiversity while keeping farmers' business viability central in a just transition approach.'
Cargill (Cargill, 2023a, p. 17)	'Regenerative agriculture is a way of farming that disturbs the soil as little as possible, providing myriad positive environmental outcomes. Practices include planting cover crops during the winter, reduced or no-till planting, rotational grazing, and agroforestry. We have identified the following on-farm benefits of regenerative agriculture: - Enabling carbon sequestration in the soil, which is a natural climate solution; - Building up healthy soils, which increase resiliency and biodiversity; - Using inputs and resources more efficiently, which improves productivity; - Improving water quality and use through better soil health and more efficient irrigation technology; - Optimising fertiliser use, which often reduces costs, improves water quality, and reduces GHG emissions'.
Danone (Danone, 2024, p. 187)	'Danone is firmly committed to regenerative agriculture and promoting practices that protect soil, water, biodiversity and animal welfare, whilst also supporting farmers in a just transition toward more resilient agricultural models that protect farmer livelihoods and decent working conditions for workers.'
Diageo (Diageo, 2023, p. 83)	'Regenerative agriculture is an approach to farming that works in harmony with the natural environment to put back more than it takes out.'
Fonterra (Fonterra, 2023, p. 14)	'Good farming practices which contribute to improved outcomes for soil health, water quality, biodiversity, animal wellbeing and emissions reduction.'
FrieslandCampina (FrieslandCampina, 2024b)	'Regenerative agriculture in dairy farming aims for a natural balance between the production factors of cow and soil. It combines sometimes ancient knowledge with modern means and techniques. The farming practices contribute to healthy soil, clean water and diverse nature. This strengthens the balance between the carrying capacity of the earth and food production.'
Grupo Bimbo (Grupo Bimbo, 2023, p. 134)	'An agricultural production system that improves soil health, biodiversity and the health of productive ecosystems while at the same time improving the nutritional contribution of resources and farmers' quality of life.'

Company	Definition
Kirin Holdings Company (Kirin Holdings, 2024, p. 47)	'Regenerative agriculture aims to maximize the potential of the soil by leveraging natural cycles. Instead of prioritizing yields and exploiting soil nutrients, this approach focuses on the long-term health and sustainability of the land & community fostering rich and resilient soil. Specific methods vary among farmers and their location, but it is widely accepted that regenerative practices include a combination of sustainable farming practices, such as reducing the use of agrochemical fertilizers and pesticides, implementing soil nutritional programs, cultivating cover crops, no-till farming, etc. In addition, there are other instances where renewable energy is implemented or manure products from livestock are used as compost.'
The Kraft Heinz Company (The Kraft Heinz Company, 2024, p. 68)	'Regenerative systems that benefit soil health, biodiversity, water supply, climate resilience, and grower livelihoods.'
Mars (Mars, 2023, p. 27)	'Embracing regenerative agriculture across row and grain crops can protect soil health and biodiversity through the use of cover crops and reduced tillage, while reducing carbon emissions from soil disturbance.'
Mondēlez International (Mondelēz International, 2024, p. 48)	'Regenerative Agriculture is a holistic approach to farming which aims to produce high-quality crops while also restoring the natural rhythm of our surrounding ecosystem.'
Nestlé (Nestlé, 2024c, p. 11)	'It aims to conserve and restore farmland, its ecosystem and its key resources including soil, biodiversity, and water, delivering benefits to farmers, the environment, and society as a whole. These benefits include capture carbon in soils and plant biomass; improvements to soil health and soil fertility; reduced use of agro-chemicals and reduced net emissions of GHGs.'
Olam International (Olam International, 2024, p. 93)	'Regenerative agriculture is an approach to food production that works with nature to build and restore Natural Capital (soil, water, biodiversity and carbon) on and around farms while optimising inputs and ending harmful and destructive practices.'
PepsiCo (PepsiCo, 2023a, p. 4)	'Regenerative Agriculture is a system of farming principles and practices that seeks to create a resilient farming system by rehabilitating and enhancing the farming ecosystem. It does this by placing a heavy premium on soil health with attention also paid to GHGs, water management, agricultural inputs, biodiversity and community. It is a method of farming that aims to improve the resources it uses, rather than destroying or depleting them. At its heart, it is about ensuring financial profitability, community resilience, and ecological viability to enable farmers to keep farming into the future.'
The Coca-Cola Company (The Coca-Cola Company, 2023, p. 49)	'Regenerative agriculture is often referred to as a system of farming that focuses on positive outcomes that ensure the long-term viability of land to sustain production by working "with nature" rather than against it.'
Unilever (Unilever, 2021, p. 41)	'The overarching goal of regenerative agriculture is to go further than the 'do no harm' principle and actively improve the local environment. This is done through holistic management measures to improve and restore soil health, water quality and biodiversity.'

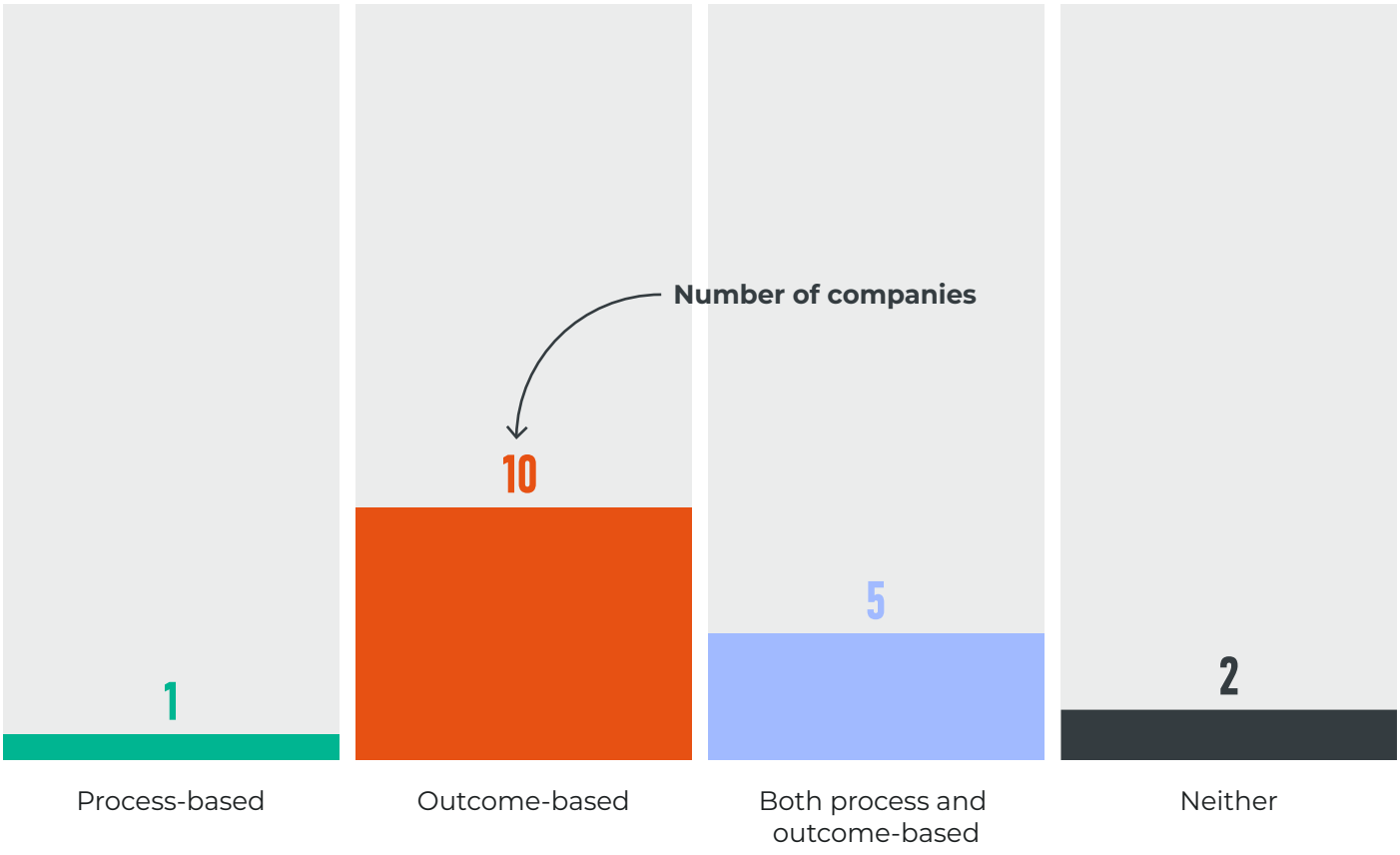
Source: Authors.

Of the 18 companies that define regenerative agriculture, the overwhelming majority use outcome-based definitions. This means that regenerative agriculture is associated with reaching certain outcomes, rather than a specific set of practices (see → **Fig. 2**). This is noteworthy given that the exact outcomes of regenerative agriculture are still contested and can vary depending on the farm location. At the same time, a focus on outcome indicators reflects the recent push to create quantitative frameworks for regenerative agriculture, aimed at better measuring and assessing progress on environmental and climate metrics.

The range of definitions shows the extent to which regenerative agriculture is still an open concept. For example, Arla Foods (Arla) explicitly acknowledges this point by referencing to Schreefel et al.'s (2020) review study of regenerative agriculture definitions (Arla Foods, no date, p. 3). Arla also notes the scarcity of scientific studies examining the impact of regenerative farming on grass based dairy systems in Europe (Arla Foods , no date, p. 3).

Fig. 2

Distribution of process-based, outcome-based, and both process- and outcome-based definitions among major food and agriculture companies



Source: Authors.

Fig. 3
Outcomes and practices mentioned in company regenerative agriculture definitions

Source: Authors.

It is clear from the sample of companies studied that a unified understanding of the processes and outcomes that make up regenerative agriculture has not yet emerged.→ **Fig. 3** shows an overview of the outcomes and processes mentioned in the companies' definitions of regenerative agriculture.

Definitions of regenerative agriculture differ in the number and types of outcomes mentioned. All companies mention improved soil health and improved biodiversity as expected outcomes from regenerative agriculture (see Appendix for a company-level checklist). Six companies mention GHG emission reduction as a goal for regenerative agriculture, which is notably lower compared to the frequent mention of other key environmental indicators. The 'improved livelihoods' outcome is

mentioned by seven companies, making it one of the key expected outcomes of regenerative agriculture among the assessed companies. This outcome is something that is not always associated with regenerative agriculture in academic definitions of the concept (Newton et al., 2020). 'Except for one pillar - improved soil health - which is included in 14 out of 18 definitions, a definition has yet to solidify among corporate actors.

These outcomes are not framed as necessary for farms to be classified as regenerative; rather regenerative agriculture is framed as possibly leading to one or more of these outcomes. It appears that companies are listing characteristics linked to regenerative agriculture, without providing a clear, overarching definition of regenerative agriculture. This lack of clarity makes it challenging to understand what companies mean by regenerative agriculture and to evaluate their claims without a regenerative agriculture framework (a separate document describing how regenerative agriculture is measured and implemented).

The diversity of definitions is also illustrated by the range of indicators not included in → **Fig. 3**. Other mentioned outcomes are climate resilience, restoration of ecosystems, improved nutritional value, enhanced food security, and reduced need for pesticides and fertiliser use.

REGENERATIVE AGRICULTURE TARGETS AND FRAMEWORK

Eight of the companies analysed in this report have separate targets and/or provide a more detailed description of what regenerative agriculture means through dedicated frameworks.→ **Tab. 3** gives an overview of the publicly available information concerning the eight companies' regenerative agriculture targets and frameworks.

Differences in units, format and definitions of what counts as 'regenerative' make it hard to benchmark progress on regenerative agriculture among companies setting quantitative targets. We could not translate these targets into percentages of total agricultural land or percentage of total sales due to insufficient information. Using measures such as hectares or 'key ingredients' also complicates the evaluation of target ambition. Only PepsiCo specifies that the land area covered by its 2030 target approximately equates to its total land use footprint. Some of these targets also have a wider scope, counting companies engaged in the transition to regenerative agriculture.→ **Section 4.3** digs deeper into these targets to better understand their ambition and how regenerative agriculture is measured and tracked.

Tab. 3
Companies' regenerative agriculture targets and frameworks

Company	Target	Implemented*	Framework
Archer Daniels Midland	4 million acres (1 acre ~ 4,050 metres²) enrolled in regenerative agriculture programs by 2025.	**2023:** 1.2 million acre (1 acre ~ 4,050 metres²) enrolled in regenerative agriculture programs.	Annual Regenerative Agriculture Report
Cargill	'Advance' 10 million acres (1 acre ~ 4,050 metres²) regenerated by 2030 in North America.	-	-
Danone	100% ingredients in France from regenerative agriculture by 2025; Sourcing 30% of key ingredients (including milk) directly from farms engaged in the transition to regenerative agriculture, by 2025.	**2023:** 38% of key ingredients sourced directly by Danone in 2023 came from farms that have begun to transition to regenerative agriculture.	For A Regenerative Future document, and Regenerative Agriculture Full Pillar 1 Scorecard
Grupo Bimbo	200,000 hectares (1 hectare = 10,000 metres²) using regenerative agriculture practices by 2030; 100% main ingredients will come from land grown with regenerative agriculture practices by 2050.	**2022:** 86,000 hectares (1 hectare = 10,000 metres²)	-
Mondēlez International	100% wheat volume needed for Europe business biscuits grown under strengthened Harmony Regenerative Charter by 2030.	-	-
Nestlé	20% key ingredients from farmers adopting regenerative practices by 2025, 50% by 2030.	**2023:** 15.2% of key ingredients procured through regenerative agricultural practices.	The Nestlé Agriculture Framework and Annexes 1 and 2
PepsiCo	Spread regenerative farming practices across 7 million acres (1 acre ~ 4,050 metres²) by 2030 (PepsiCo specifies that number is "approximately equal to 100% of the land use around the world to grow key crops and ingredients for its products").	**2022:** 900,000 acres (1 acre ~ 4,050 metres²) adopted regenerative agriculture practices.	Pepsi's Regenerative Agriculture Scheme Rules
Unilever	Scale up adoption of regenerative agriculture practices for 650,000 hectares (1 hectare = 10,000 metres²) under the Nutrition business group by 2027.	**2022:** 270,000 hectares (1 hectare = 10,000 metres²) transitioning to regenerative practices.	The Unilever Regenerative Agriculture Principles with Implementation Guides

* As claimed by company.
Source: Authors.

4.2 LEVELS OF COMPANY USE OF REGENERATIVE AGRICULTURE

Based on the results of assessing the four indicators, we found that the extent of corporate engagement with regenerative agriculture can be broadly categorised into four groups: extensive users, early experimenters, mentioners and non-users (see → **Tab. 4**). Three companies did not exactly fit into these categories and were therefore categorised as outliers.

Non-users are companies that do not use the term regenerative agriculture, and there is no evidence that regenerative agriculture is part of their climate strategy.

Mentioners are companies that mention regenerative agriculture but do not define the term. It is not clear whether regenerative agriculture will become significant part of their climate and sustainability strategies. Companies in this category may not always refer to regenerative agriculture when using the term 'regenerative'. The term may refer to a broader understanding of regenerative as a mindset, rather than a specific set of practices and outcomes.

Early experimenters are already engaged with regenerative agriculture but do not yet publish separate frameworks or set dedicated targets for regenerative agriculture use. These companies often provide a short, sometimes ambiguous definition of regenerative agriculture. They or their suppliers are involved in regenerative agriculture pilots, with a focus on investing in research rather than large-scale deployment of regenerative agriculture. They may also be involved in the same voluntary initiatives as extensive users and can be vocal about the benefits of regenerative agriculture. These companies may become extensive users in the coming years, as regenerative agriculture seems to play an important role in their overall goals — for example, some mention a desire to become a 'regenerative company'.

Extensive users significantly engage with regenerative agriculture, both in their supply chains and in voluntary corporate initiatives aimed at advancing regenerative agriculture. This engagement is visible in how these companies define regenerative agriculture, either in their reports or in separate documents dedicated to explaining the concept. They either have set targets for regenerative agriculture and/or have developed frameworks outlining how they will increase its use in their supply chains. They report the acres (or hectares) of land farmed using regenerative practices or the percentage of products sourced from farms using regenerative practices. This does not necessarily mean that extensive users implement regenerative agriculture in a highly transparent manner. → **Section 4.3** shows the variations in how extensive users choose to define, measure and report on regenerative agriculture.

Outliers do not fit neatly in either of the four categories. Two companies, The Kraft Heinz Company and Fonterra, provide regenerative agriculture definitions but do not have pilot projects, while Heineken has a pilot project but does not define regenerative agriculture.

Tab. 4
Categorisation of companies' engagement with regenerative agriculture

Category	Indicator				Companies	№
	Mention regenerative agriculture	Provide definition	Implement (pilot) project(s)	Dedicated targets and/or frameworks		
Extensive users **Significantly engage** with regenerative agriculture.	✓	✓	✓	✓	Archer Daniels Midland, Cargill, Danone, Grupo Bimbo, Mondēlez International*, Nestlé, PepsiCo, Unilever	8
Early experimenters **Engage** with regenerative agriculture, **but do not publish separate frameworks nor have dedicated targets** for regenerative agriculture use.	✓	✓	✓	○	Anheuser-Bush InBev, Arla Foods, Coca-Cola, Diageo, FrieslandCampina, Kirin Holdings Company, Mars, Olam International	8
Mentioners **Mention** regenerative agriculture, but do not define the term.	✓	○	○	○	Asahi Group Holdings, Associated British Foods, JBS Foods, Starbucks, Tyson Foods	5
Non-users **Do not refer** to the term regenerative agriculture, no evidence that regenerative agriculture is part of climate strategy.	○	○	○	○	CJ Cheiljedang, FEMSA, Lactalis International, Saputo, WH Group Limited, Yili Group	6
Outliers Companies that **provide regenerative agriculture definitions but do not have pilot projects** or **have pilot project but do not define** regenerative agriculture.					Fonterra, Heineken, The Kraft Heinz Company	3

Source: Authors.
* Mondēlez International does have framework, but this is not publicly available.

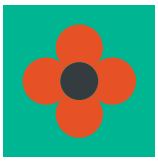
4.3 A DEEPER LOOK AT EXTENSIVE USERS

Archer Daniels Midland →

ADM aims to have 4 million acres enrolled in regenerative agriculture programs by 2025 (ADM, 2023b, p. 9). However, it is unclear what share of ADM's total sourcing this target represents. The target is presented as one of its key initiatives under the biodiversity pillar of its sustainability strategy, and regenerative agriculture is one of 17 sustainability pillars. ADM's global regenerative agriculture efforts are detailed in its 2023 Regenerative Agriculture Report. Its strategy is built on five practices (ADM, 2023a, p. 5):

- Minimising soil disturbance
- Maintaining living roots in soil
- Continuously covering bare soil

Maximizing diversity with an emphasis on crops, soil microbes and pollinators



Responsibly managing inputs, including nutrients and pesticides

Farmers wanting to have their farms certified under ADM's 're:generations' program can choose between incentives based on practices or outcomes (ADM, 2023a, p. 5). The program covers practices such as using cover crops, maintaining living roots, and no-till or strip-till methods. For outcomes, it includes reducing farm carbon intensity through changes in fertiliser use and fuel or energy consumption changes, achieving a proper nitrogen-balance, and managing the use of certain biological inputs by reducing fertiliser use while maintaining yields (ADM, 2023a, p. 8).

The program does not measure soil organic matter, instead calculating estimated carbon sequestration using modelling. Specific details on the type of model used by ADM for these estimates are not provided.

ADM partners with the Farmers Business Network (FBN) for monitoring and data collection. FBN assists producers in the process of gathering field-level data and then measures and verifies the practices implemented on farms (ADM, 2023a, p. 9).

Cargill →

Cargill commits to advancing regenerative agriculture practices across 10 million acres in North America by 2030 (Cargill, 2023a, p. 24), while operating in 70 countries around the world. However, Cargill does not provide a separate document detailing how it defines, measures or tracks regenerative agriculture, nor what counts as an acre of regenerative agriculture. The lack of clarity makes it difficult to evaluate the scope of their commitment and what share of Cargill's total sourcing is covered by this target.

Through its platform Cargill RegenConnect developed in partnership with Regrow, Cargill connects farmers with carbon markets, enabling them to earn payments based on the amount of soil carbon they sequestered (Cargill, 2023b). However, it remains unclear how these credits are used or who buys them. Based on the available information, one could understand that Cargill acts as a facilitator between farmers and the consumer packaged goods industry (Klein, 2021). It also remains unclear if Cargill counts these removals towards achieving its own targets. The program uses Regrow to monitor progress, measures the positive environmental outcomes of changes in agricultural practices, and verify these outcomes (Regrow, no date). Regrow calculates total carbon sequestration using remote sensing and modelling to estimate soil carbon levels and quantify GHG emissions and reductions (Regrow, 2022). The practices approved under this methodology include cover cropping, reduced or no tillage and nutrient management. Cargill also mentions regenerative farming in its BeefUp program, which aims to reduce emissions from its beef supply chain (see **→ Box 2** in **→ Regenerative beef and dairy** for further analysis).

Danone →

Danone pledges to source 100% of its ingredients in France from regenerative agriculture by 2025, and aims to have 30% of 'key ingredients' sourced from farms transitioning to regenerative agriculture by the same year (Danone, 2021a, p. 7, 2024). Danone is the only company in our analysis that has a specific target to reduce methane emissions.[1] However, it is unclear what share of Danone's total sourcing is covered by this target. The company does not define 'key ingredients', only stating that this category includes ingredients "such as fresh milk, soy, oats and almonds" (Danone, 2024, p. 187). Preserving and regenerating nature is one of the three pillars of its sustainability strategy, which covers pioneering and scaling regenerative agriculture and leading the way for regenerative dairy farming models (Danone, 2024, p. 160). Danone has outlined its approach to regenerative agriculture in two documents: the Danone Regenerative Agriculture Handbook and an accompanying scorecard. This document details how it assesses farmers' level of adherence to regenerative agriculture practices. Danone's approach to regenerative agriculture rests on three pillars (Danone, 2021a, p. 5):

1 Danone has a target to reduce methane emissions from fresh milk by 30% by 2030, against a 2020 baseline.

Restoring soil

Supporting the next generation of farmers and farm workers

Respecting animal welfare

To measure progress on regenerative agriculture, Danone uses a 3-level framework based on a scoring system of 0-100 for each of the three pillars. The details for each pillar are published in separate documents. The scoring break-down for the Soil Health Pillar is (Danone, 2021b, p. 6):

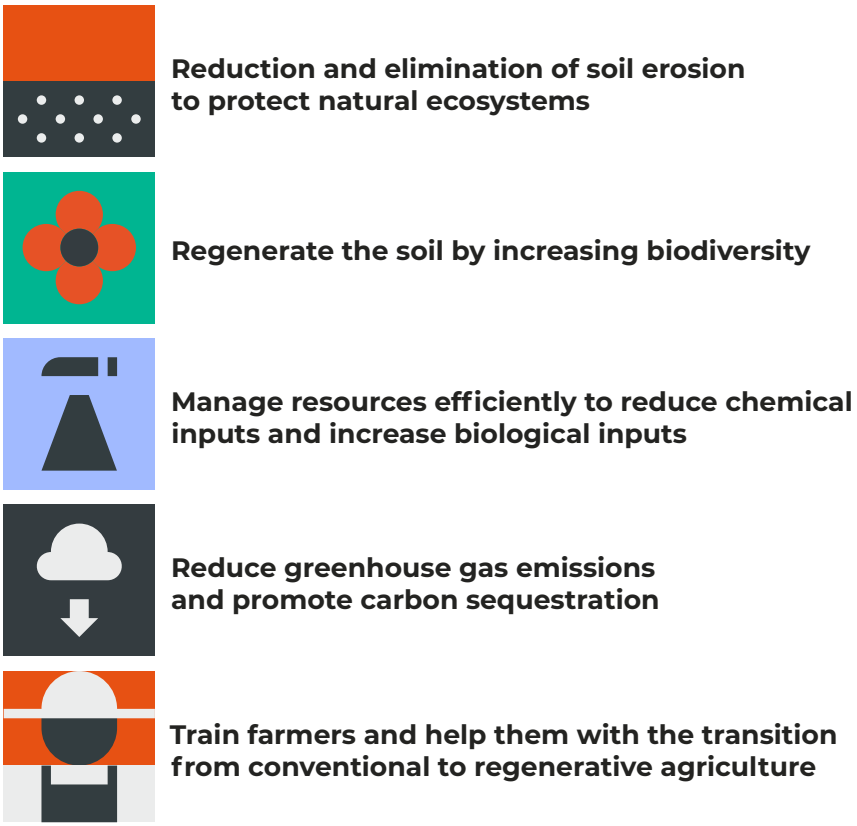
- Initiated: farmers score 40-59 points.
- Advanced: farmers score 60-89 points.
- Best in class: farmers score more than 90 points, with a maximum score of 100 points.

The scorecard requires farmers to measure progress across four categories: soil, manure, biodiversity, water, using 11 criteria (Danone, 2021b, p. 9). Danone affirms that its Regenerative Agriculture Framework is a key lever in its climate roadmap to reduce its GHG footprint through increased carbon sequestration in soils specifically (Danone, 2024, p. 187). Farmers are required to monitor soil organic matter, but they do not need to calculate the percentage of soil organic matter (Danone, 2021b, p. 9). Danone does not specify the distribution of its farmers across the levels of the 3-level framework.

To measure indicators from regenerative agriculture management, Danone outsources gathering data on soil health to Sustainable Environmental Consultants (Danone, 2021a, p. 8). Danone specifies that they are working to ensure that reported outcomes are supported by data and validated by third parties, but it is unclear if this applies to its entire regenerative agriculture program as of today (Danone, 2021a, p. 8).

Grupo Bimbo →

Grupo Bimbo seeks to achieve 200,000 hectares of wheat cultivated through regenerative practices by 2030 and to source 100% of 'key ingredients' from regenerative farming practices by 2050 (Grupo Bimbo, 2023, p. 134). Grupo Bimbo does not specify what it means by 'key ingredients' and it is unclear what share of Grupo Bimbo's total sourcing is covered by this target. The company does not have a separate framework for regenerative agriculture, but has published the pillars guiding its approach on its website (Grupo Bimbo, no date):

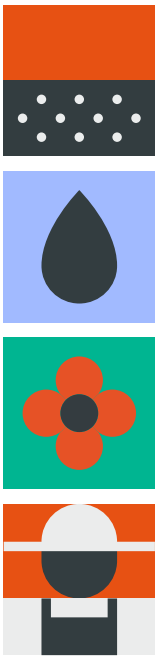


Mondēlez International →

Mondēlez International aims to source 100% of the wheat volume needed for Europe business biscuits from farms adhering to the strengthened Harmony Regenerative Charter by 2030, which is a revised version of its sustainability framework, called the Harmony Charter (Mondelēz International, 2024, p. 36). It is unclear what share of Mondēlez International's total sourcing is covered by this target. Increasing the adoption of regenerative agriculture is one of its four climate risk strategies (Mondelēz International, 2024, p. 22). At the end of 2022, around 98% of the wheat needed to produce biscuits across Europe was grown under the previous version of the Harmony Charter, meaning that its regenerative agriculture target builds on this existing base. However, Mondēlez's updated Harmony Charter, which would provide more information on how it measures regenerative agriculture, is not publicly available.

Nestlé →

Nestlé aims to source 20% of its 'key ingredients' from farmers adopting regenerative practices by 2025, and 50% by 2030 (Nestlé, 2024a, p. 3). However, it remains unclear what this represents in terms of Nestlé's overall sales. The target is presented as one of its eight key sustainability commitments. Nestlé's tagline in its most recent sustainability report is "Advancing regenerative food systems at scale" (Nestlé, 2024a, p. 1). Nestlé provides more detailed information concerning regenerative agriculture in its Agriculture Framework, which gives an overview of regenerative practices, guiding principles and tools and metrics. The four pillars covered by Nestlé's approach to regenerative agriculture are (Nestlé, 2024b, p. 10):



Soils and soil health

Water

Biodiversity

Farmer livelihoods

To measure progress on regenerative agriculture, Nestlé uses a 3-level framework, which relies on its Farm Assessment Tool (FAT), the details of which are published in a separate document (Nestlé, 2024b, p. 6):

- For Level 1, or 'Engaged', farmers will need to score 25% on the FAT.
- For Level 2, or 'Advanced', farmers will need to score 50% on the FAT.
- For Level 3, 'Leading', farmers will need to score 75% on the FAT.

The FAT scoring is based on practice Key Performance Indicators (KPIs), which includes metrics such as the duration of soil cover, the number of crops in rotation and farmer participation in training programs. Nestlé develops FATs for each crop or ingredient. One of the KPIs also covers the frequency of soil sampling and analysis but does not require results from sampling and analysis.

Farmers must meet specific criteria to achieve different levels of certification. Only 'Leading' farmers need to demonstrate evidence of a proven increase of soil organic matter. The other two levels cover regenerative agriculture practices, meaning that outcomes like soil health, yield, biodiversity levels, or soil organic matter are not measured. Nestlé clarifies that farmers qualifying for Level 1 'Engaged' are included in the calculation of its regenerative sourcing target, and that most of its farms meet this first level (Nestlé, 2024b, p. 4). This target also only covers 'key ingredients' (i.e., fresh milk and dairy derivatives, green coffee, cereals and grains, vegetables, cocoa, palm oil, sugars, meat poultry and eggs, fish and seafoods). Farm verifications are conducted based on a sampling strategy (Nestlé, 2024b, p. 5). Nestlé does not elaborate more on how it monitors progress.

PepsiCo →

PepsiCo commits to spreading regenerative farming practices across 7 million acres by 2030 (PepsiCo, 2023a, p. 5). PepsiCo specifies that this is approximately equivalent to the land area currently used to the ingredients it sources. PepsiCo details its approach to regenerative agriculture in its Regenerative Agriculture Scheme Rules document. PepsiCo's strategy is built on five outcome pillars (PepsiCo, no date, p. 3):

Soil health

Climate change mitigation and adaptation

Watershed health

Biodiversity

Livelihoods & Women's Empowerment

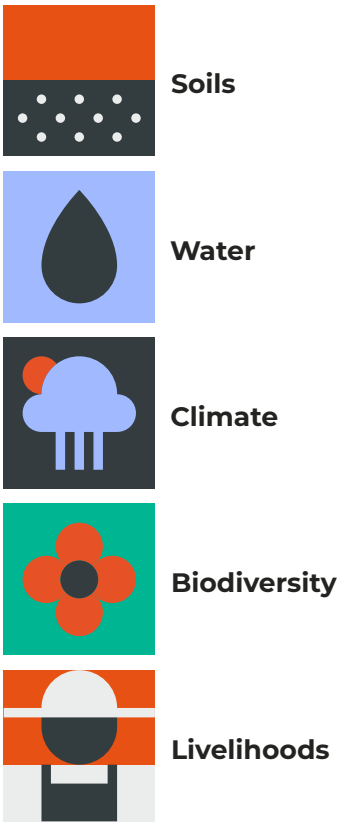
According to its Regenerative Agriculture Scheme document, PepsiCo's regenerative agriculture program includes two categories: 'Engaged' acres and 'Regenerative' acres. An acre is categorised as 'Engaged' if it adopts two or more regenerative farming practices. To count towards a 'Regenerative' acre, a supplier must show "quantified improvements" in at least two of the environmental outcome areas, with preference for GHG emissions to be one of those outcomes. So 'Engaged' acres are evaluated on practices, while 'Regenerative' acres are evaluated on outcomes. Notably, the program excludes livelihoods and women's empowerment from these outcome areas, despite its sustainability report specifying that livelihood improvement is included in the assessment (PepsiCo, no date, p. 4). This mismatch between its sustainability report and regenerative agriculture scheme documents suggests a lack of clarity in how 'quantified improvements' is measured and reported (PepsiCo, 2023a, p. 4). We could not find information confirming which was true, or what is meant by 'quantified improvements.'

The company specifies a preference for GHG emissions to be one of the two pillars, but this is not obligatory. The climate change and mitigation pillar includes three components: increasing resilience to climate change impacts, carbon sequestration and reduction of emissions. It is unclear if farmers need to demonstrate improvements in both soil carbon sequestration and emission reductions or just one of these components. PepsiCo also has a separate Positive Ag Supplier Playbook, which is not meant to outline how it evaluates regenerative agriculture but suggests outcomes and practices suppliers can implement in their value chains, if they choose to. In this document, PepsiCo states that the GHG emission goal includes both carbon emissions and sequestration (PepsiCo, 2023b, p. 18). Yet, in another section of the Playbook, it suggests that a farm can qualify as regenerative by reporting improvements in either reducing GHG emissions or increasing soil sequestration, alongside progress in another pillar (PepsiCo, 2023b, p. 33).

The assessment of regenerative agriculture impacts is done using 'qualified' tools, which can be employed either directly by the farmer or by a second party assessor. The data collected is subject to Data Quality Assurance, which should be carried out by an implementation partner, a supplier to PepsiCo or by PepsiCo itself (PepsiCo, no date, p. 7). Suppliers are required to report on their progress annually (PepsiCo, 2023b, p. 37).

Unilever →

Unilever aims to help protect and regenerate 1.5 million hectares (around 3.7 million acres) of land, forests and oceans by 2030 (Unilever, 2024b, p. 46). Unilever also has a specific regenerative agriculture target for its Nutrition business group to scale-up regenerative agriculture on 650,000 hectares (approximately 1.6 million acres) by 2027 (Unilever, 2024a, p. 23). The company specifies that this represents 50% of its land footprint in its "Nutrition" branch (Unilever, 2024a, p. 23). Scaling up regenerative agriculture and low-carbon dairy is one of its ten action areas in its 2030 climate transition action plan (Unilever, 2024a). It has published a set of Regenerative Agriculture Principles which are still in a trial implementation phase (Unilever, 2021). These principles outline practices and metrics that can be used by its suppliers. However, it is unclear exactly if or how Unilever measures progress against the outcomes mentioned under each of the five pillars included in the document. The pillars included under regenerative agriculture are (Unilever, 2021):



Unilever's regenerative agriculture framework includes regenerative specific metrics for each of its five pillars, such as measuring Soil Organic Matter or Soil Organic Carbon and reducing the overall crop carbon footprint. The company stated that these regenerative metrics, which total 19 in the framework, are not substitutable. This means that all goals need to be met for a farm to count as regenerative under Unilever's standards (Unilever, 2021, p. 19). We could not find

information on whether the 270,000 hectares Unilever reported as 'transitioning towards regenerative agriculture' in 2022 were measured against the full set of 19 metrics outlined in the framework, however the formulation 'transitioning to' implies that farms are not fully regenerative (Unilever, 2024a, p. 23). Unilever also explains that its regenerative agriculture principles are meant to "inspire" its business, divisions, brands, suppliers and peers and describes that it will use these principles to "set up programmes with selected suppliers for key crops" (Unilever, 2021, p. 6).

4.4 REGENERATIVE AGRICULTURE AS A TOOL FOR EMISSIONS REDUCTIONS AND CARBON SEQUESTRATION

REGENERATIVE AGRICULTURE FOR EMISSIONS REDUCTIONS

Four food and agriculture companies match their regenerative agriculture targets with their emission reduction strategies. This means that although companies promote regenerative agriculture as a key component of their climate strategies, they do not explicitly report on how many emissions they expect to reduce through regenerative agriculture. When they do report, they frequently combine planned and achieved emission reductions with removals through soil carbon sequestration (see → **Tab. A4** in the Appendix for a full list of reduction and removal targets and reporting).

Grupo Bimbo is the only company that expects significant emission reductions from regenerative agriculture, projecting a 28% reduction in Scope 3 carbon emissions by 2030 (Grupo Bimbo, 2023, p. 129). Danone also plans for regenerative agriculture to lead to a 15% reduction in GHG emissions from fresh milk in France by 2025, compared to 2017 levels. Other companies either do not link their regenerative agriculture targets to emission reductions, or anticipate only a minor contribution from these practices to their overall emissions reductions. For example, Unilever plans for regenerative agriculture to deliver a 4% reduction in emission reductions by 2030. For other companies, the planned reductions are small or hard to quantify as a percentage of overall emissions reductions. In most cases, companies do not report removals and reductions from regenerative agriculture separately, nor do they specify if implementing regenerative agriculture at scale will lead to increases in one or the other.

Some companies' regenerative agriculture frameworks cover interventions like improved manure and fertiliser management. These practices, if implemented at scale, can significantly reduce on-farm GHG emissions. However, only Danone requires its most advanced (Level 3) regenerative agriculture farms to implement a nutrient management plan to optimise fertiliser use (Danone, 2021b, pp. 14–16).

Nestlé requires coffee producers to apply organic fertilisers, compost or biochar on 100% of the field acreage and to fertilise based on soil analyses, also allowing for synthetic fertilisers to be used although more efficiently (Nestlé, 2024b, p. 8). Also, both measures together are only requirements for its 'leading' (level 3) farmers and it does not have similar measures for other ingredients. Other companies only mention reducing or optimising fertiliser use as a component of regenerative agriculture but do not include measurable targets. Overall, regenerative agriculture is often mentioned as a measure to reduce GHG emissions, but it is unclear how these programs will contribute to climate mitigation.

REGENERATIVE AGRICULTURE FOR EMISSIONS REMOVALS

Although most companies refer to the broader environmental benefits from regenerative agriculture, 18 of the 24 companies who mention regenerative agriculture emphasise carbon sequestration as a key component of regenerative agriculture.

Fig. 4

Company mention of soil carbon sequestration in relation to regenerative agriculture

Source: Authors.

Some companies like ADM present soil carbon sequestration as a key measure alongside emission reduction measures to address Scope 3 emissions (ADM, 2023b, p. 29). The extensive users identified in → **Section 4.2** tend to clearly associate regenerative agriculture with soil carbon sequestration and position it as an important motivator for implementing regenerative agriculture. Danone also recognises soil carbon sequestration alongside reduction measures as a key lever of its 1.5°C roadmap to reduce GHG emissions (Danone, 2023, p. 167). However, other companies are more cautious. Unilever, for example, highlights that its "primary objective, especially in the initial years, is to reduce emissions at the farmer level" while acknowledging the potential of soil carbon sequestration as a future tool (Unilever, 2024a, p. 23).

A subset of companies has set soil carbon sequestration targets in their climate transition plans, but references to these targets often remain vague (see → **Tab. A4** in the Appendix for a full overview of soil carbon sequestration targets). Companies that report emissions reductions through regenerative agriculture pilots or programs rarely explain how they measure or calculate soil carbon sequestration. Some companies like Cargill calculate their emissions using modelling instead of soil sampling, which can lead to inflated results (see → **Section 2.2** on the limits of modelling soil carbon sequestration).

REGENERATIVE BEEF AND DAIRY

Nine food and agriculture companies analysed in this report rely on or plan to rely on regenerative agriculture for reducing net emissions from livestock, specifically beef and dairy products. Four companies only have pilot programs but aim to scale up regenerative practices in the coming years, while for others the scale of projects is unclear. JBS Foods has not yet started its program.

Regenerative livestock management programs include measures like local and deforestation-free feed, improved manure management, and experimental measures to reduce methane emissions from enteric fermentation (the process through which cows produce methane). One company, Fonterra, only mentions planting trees along paddock margins or on non-productive land as part of its initiatives.

Most of these companies likely source their products from a mix of grazed and housed livestock. Consequently, most regenerative beef or dairy claims are often based on using both regeneratively or more sustainably grown feed, and on adaptive multi-paddock or rotational grazing methods. Employing the term 'regenerative' can be misleading when used to describe feeding livestock with 'regenerative' feed, because it can mean a wide range of practices, not only rotational grazing practices. Companies generally do not differentiate between practices nor do they clarify what 'regenerative' feed is, except for Nestlé and Danone.

Eight of nine regenerative farming programs are linked to expected increases in soil carbon sequestration rates, while the one company who does not mention soil carbon sequestration, Fonterra, links it to above ground carbon dioxide removal (through tree planting). None of the companies mention the need to reduce livestock numbers to properly address methane emissions. Instead, regenerative methods are presented as a means to offset methane emissions through soil carbon sequestration.

Four dairy companies are involved in the C-Sequ initiative. This initiative developed a Lifecycle Assessment method for calculating carbon sequestration in regenerative dairy farms. It allows companies to set their own accounting principles for offsetting their emissions without using soil sampling and direct measurement options (Scherger, 2022). This could lead to reduced accountability for climate action and inflated results if these methodologies overestimate actual carbon sequestration and bypass more reliable measurement methods such as soil sampling (Scherger, 2022).

Companies selling beef and dairy products appear to be using the concept of regenerative agriculture to change the narrative around livestock's climate impacts (see → **Box 2** for a detailed case-by-case analysis). Companies like Unilever and Tyson Foods use terms like 'lower-carbon dairy' and 'climate-smart beef' to describe livestock farmed with 'regenerative' agriculture practices. One company, Arla, claims that regenerative agriculture will turn cows into a 'force for good'. This narrative could be misleading as it doesn't account for the industry's substantial methane emissions.

Box 2

Regenerative beef and dairy

Regeneratively managing livestock often refers to regenerative grazing, but companies in this report do not necessarily have only grazing cows. This means that when companies refer to regenerative beef or dairy, they could be referring to: 1) Grazed livestock which has been managed through regenerative methods; 2) Livestock that has been fed using regeneratively farmed crops.

The grazing sector contributes to 13% of ruminant meat and 6% of ruminant milk production (Herrero et al., 2013). As you will see below, when companies in this sample refer to regenerative beef or regenerative dairy, they are most likely intending to increase the amount of regenerative feed used for the livestock in their supply chains. In these cases, the measures implemented for regenerative beef and dairy will be the same as for regenerative crops, and the effect on overall GHG emissions from beef and dairy is highly unclear. This is not always transparently communicated. Some companies mention that they are looking into reducing emissions from dairy or beef products through regenerative agriculture practices, but without mentioning if this means transitioning towards regenerative grazing or changing feed production practices.

Extensive users →

Cargill

Cargill intends to deploy regenerative grazing through its BeefUp program and to scale up regenerative farming in cattle feed production (Cargill, 2021). Cargill expects carbon sequestration to be promoted through both practices. Cargill explains on its BeefUp website that “research suggests that an acre of grassland in rotational or adaptive multi-paddock system can absorb more carbon than in grasslands that are not managed this way” (Cargill, no date).

Danone

Danone’s regenerative agriculture scorecard includes specific impact indicators for its dairy production, covering both regenerative grazing and feed production. Concerning regenerative grazing, Danone measures the proportion of land under temporary or permanent pasture or meadow (Danone, 2021b, p. 12). Danone does not require protein feed for its animal feed to be grown using regenerative agriculture methods. Danone requires 60% to 100% of protein to be sustainably produced, including imported non deforested certified soy, on-farm produced in Europe or the US or soy produced in low deforestation risk areas, alternative proteins, or grass (Danone, 2021b, p. 20). Danone links its entire regenerative agriculture framework to soil carbon sequestration gains and affirms that its regenerative dairy programs will contribute to “reducing greenhouse gas emissions from farms and/or increasing the rate of carbon sequestration in soils” (Danone, 2024, p. 189).

Nestlé

Nestlé intends to address dairy emissions through regenerative agriculture. In its Farm Assessment Tool, Nestlé includes additional criteria for dairy, covering indicators for both crops and for pasture, which we have interpreted to mean Nestlé will integrate both regenerative grazing and regenerative feed for livestock. Farmers can implement crop rotation, or they can implement multispecies pasture on farm or rotational grazing (Nestlé, 2024b, p. 7). Measurements covered by Nestlé's framework for dairy include frequency of soil sampling and analysis, but do not yet require farmers to report increases in soil organic matter (Nestlé, 2024b, p. 11). The frequency and soil sampling indicator is one of many different practices farms can choose from. Yet, Nestlé includes caring for grassland to store more carbon using regenerative agriculture and organic fertilisers as one of its emissions reduction measures in its 2030 climate roadmap (Nestlé, 2023, p. 13). It expects 3.2 million tonnes of CO_2e to be saved through this measure, as much as from cutting methane emissions through digestion and nutrition changes.

Unilever

Unilever is currently piloting regenerative agriculture practices through its Lower Carbon Dairy Programme on 17 farms through its Ben & Jerry's brand (Unilever, 2024b, p. 44). Unilever aims to have a significant portion of its global dairy volume to be sourced from farms implementing regenerative agriculture practices by 2030 (Unilever, 2024a, p. 23). Unilever claims that the pilot program will "use a mixture of new technology and regenerative agriculture practices to bring the GHG emissions from [17] of the company's dairy farm suppliers down by half the industry average, by the end of 2024" (Unilever, 2022). It appears from its website that the pilot will be relying on three methods: using feed additives to reduce methane emissions, breaking down manure, and using feed grown through regenerative agriculture methods. Unilever does not mention regenerative grazing methods, but expects that growing more grass and other feed crops using regenerative agriculture methods will "also capture carbon from the air and feed it into the soil" (Unilever, 2022).

Early experimenters →

Arla Foods

Arla's regenerative farming pilot will cover organic dairy farms, conventional dairy farms with summer grazing, and fully housed dairy farms (Arla, no date, p. 5). We interpret this to mean that regenerative methods will cover both regenerative grazing methods, and using feed grown using regenerative agriculture methods. Arla says that the focus is on implementing practices that mimic ecosystem complexity and functioning, for instance through multi-paddock grazing, but it is unclear how this will be implemented for fully housed farms. Arla claims that "regenerative farming demonstrates how farmers, and their cows can be a force for good to deliver a positive impact on the planet, animals and people" (Arla, no date, p. 3). While Arla does not currently count carbon sequestration from regenerative dairy practices in its GHG emissions, it states that the main focus of its regenerative agriculture pilot is to improve soil quality and carbon storage in the dairy system (Arla Foods, 2022, p. 26).

FrieslandCampina

FrieslandCampina will implement its first regenerative agriculture pilots in 2024. It does not expand on what regenerative agriculture will cover, but it specifies that 83.1% of its member dairy farmers in the Netherlands apply partial pasture grazing, meaning it could potentially implement regenerative grazing practices (FrieslandCampina, 2024a, p. 58). The company also emphasises the role of increasing soil carbon sequestration in land. FrieslandCampina affirms that when "CO_2 is sequestered for a long period of time (in the form of carbon) in the soil and in landscape elements, dairy farmers make a contribution to lowering greenhouse gas emissions" (FrieslandCampina, 2023, p. 11). The company initiated a 10-year project in the Netherlands focused on carbon sequestration using permanent grassland (FrieslandCampina, 2024a, p. 41).

Mentioners →

JBS Foods

JBS Foods has not yet implemented any regenerative livestock practices, but will invest USD 100 million by 2030 in research and development projects to scale regenerative farming, including carbon sequestration, which it will count towards its scope 3 emissions reductions (JBS Foods, 2021). JBS Foods also seeks to drive carbon sequestration and regenerative agriculture through several pilot programs, including a partnership with the Soil and Water Outcomes Fund (JBS Foods, 2023, p. 45).

Tyson Foods

Through its Climate-Smart Beef Program, Tyson Foods is working with farmers who are "implementing agricultural practices that research shows to enhance the natural carbon sink of agricultural soils, improve soil health and ideally reduce overall costs and improve farmer resilience" (Tyson Foods, no date). Tyson Foods

mentions regenerative agriculture and this program on the same page of its sustainability report but does not specifically link both (Tyson Foods, 2023, p. 39). Tyson Foods adds that its Climate-Smart program is “the first big step towards achieving GHG emissions reduction in our beef value chain” (Tyson Foods, no date). It appears that Tyson Foods will be implementing these practices at the feed level and does not mention grazing and aims to reach 100% of feed grown using climate-smart practices (Tyson Foods, no date).

Outliers →

Fonterra

Fonterra believes that “dairy has a regenerative future” (Fonterra, 2023, p. 6). One of the main ways it will approach regenerative agriculture is through planting trees along paddock margins and non-productive land (also called afforestation). Fonterra expects that approximately 8% of emissions intensity reduction will come from carbon removals through what it calls a “regenerative approach” (Fonterra, 2023, p. 20). Fonterra does not mention regenerative grazing nor regenerative feed. Fonterra uses the word ‘regenerative’ as a mindset as well as a set of agriculture practices, and sees this mindset as a starting point for “planet positive dairy that nourishes the world” (Fonterra, 2023, p. 33).

/\ 05 DISCUSSION

As shown in → **Section 4.1**, regenerative agriculture is increasingly becoming a key component of sustainability strategies for major food and agriculture companies. More than three quarters of the companies in this report mention the concept. Eighteen companies provide some form of a definition of regenerative agriculture and are implementing pilot programs to test regenerative agriculture practices. Eight companies are actively pursuing regenerative agriculture as part of their emission reduction strategies.

At first glance, the uptake of regenerative agriculture among major food and agriculture players marks a positive shift towards a more sustainable agriculture industry. For instance, the increased focus on regenerative agriculture has led companies to promote certain practices like planting cover crops or increasing fertiliser efficiency, which are proven to have a positive effect on the environment and the climate (Paustian et al., 2019; Schlesinger, 2022). Furthermore, all companies mention soil health as a key outcome in their definitions of regenerative agriculture, bringing attention to an important part of the biological ecosystem that has until recently been overlooked in conventional intensive agriculture. Some companies, like Danone, even include some of the more ambitious components of regenerative agriculture such as eliminating chemical inputs, although this is currently only a requirement for the most advanced category of its regenerative agriculture program. Companies also integrate a range of socio-economic indicators in their definitions and frameworks of regenerative agriculture, pointing to a larger consideration of farmer livelihood and welfare within corporate applications of regenerative agriculture.

Although this shift is encouraging, the uptake of regenerative agriculture among large food companies has yet to point to a real transformation in food production practices. Companies are using watered-down definitions of regenerative agriculture, while continuing business as usual. Regenerative agriculture tends to give an outsized importance to soil carbon sequestration, while key measures like reducing pesticides or fertilisers are left out. Beef and dairy companies are also using regenerative agriculture to distract from the need to reduce livestock numbers. Taken together, these concerns risk undermining the credibility and effectiveness of regenerative agriculture initiatives while the focus on regenerative agriculture may distract from the urgent need to significantly reduce the sector's GHG emissions.

5.1 COMPANIES USE A WATERED-DOWN DEFINITION OF REGENERATIVE AGRICULTURE TO CONTINUE BUSINESS-AS-USUAL

Despite the popularisation of the term, there is no agreement over what regenerative agriculture means. Corporate definitions are often vague or ambiguous, and it remains unclear how regenerative agriculture will lead to significant emissions reductions under current definitions. While some companies assessed in this report claim that they are pushing for more ambitious agricultural practices, even the most advanced companies face challenges in scaling regenerative agriculture to achieve meaningful impact.

Our findings on regenerative agriculture definitions, frameworks and targets suggest that many companies treat regenerative agriculture as a buzzword. The lack of an agreed definition has already resulted in companies making unsubstantiated claims through their regenerative agriculture pilots and programs. Even when companies set quantitative regenerative agriculture targets, these allow for significant flexibility or are not ambitious enough for the level of change needed to restore agricultural systems worldwide. Moreover, it remains unclear what the companies' regenerative agriculture targets mean in relation to all their farming practices. Despite several companies claiming that they want to source all their ingredients from regenerative agriculture programs, there is little evidence that any company is on track to reach that goal within the timeframe of their climate transition plans.

Companies have watered down regenerative agriculture to leave out its more transformative elements. Corporate regenerative agriculture programs rarely involve a holistic transformation at the farm level and instead resemble more classic sustainable farming frameworks, but with an added emphasis on soil carbon sequestration. Whereas regenerative agriculture was meant as a concept to redesign the entire agricultural system through, in part, a focus on soil health, companies are currently using it as a substitution measure or as an add-on to current agricultural systems. For instance, companies do not always include reducing or eliminating chemical inputs in their definitions or frameworks of regenerative agriculture – despite this element being a key component of early approaches to regenerative agriculture and crucial for reducing agricultural emissions (Gao and Serrenho, 2023; Changing Markets Foundation, 2024). Those who do mention the need to reduce fertiliser and pesticide use most often do not specify further measurable targets.

In an effort to solve issues around the lack of a singular regenerative agriculture definition, recent corporate-led initiatives such as the Sustainable Agriculture Initiative (SAI) aim to narrow down the definition of regenerative agriculture. It is

still highly unclear whether these initiatives will help clarify the scope and impact of regenerative agriculture. Fourteen companies (including two subsidiaries) specify that they are founding members of the SAI initiative in their reports but do not elaborate more on if and how they will align with the SAI's regenerative agriculture definition. Furthermore, the SAI has been criticised for its narrow climate criteria, its focus on increasing carbon sequestration as an outcome on climate, and for only requiring suppliers to show progress in two of four pillars of regenerative agriculture identified by the SAI as important, highlighting the need for independent regenerative agriculture frameworks (Changing Markets Foundation, 2024).

5.2 SOIL CARBON SEQUESTRATION IS GIVEN MORE IMPORTANCE THAN EMISSIONS REDUCTIONS UNDER REGENERATIVE AGRICULTURE

Several companies explicitly frame soil carbon sequestration as a key measure to reduce net GHG emissions, and some claim to have stored carbon through regenerative agriculture pilots or programs. Despite the enthusiasm for regenerative agriculture's role in soil carbon sequestration, the broader implications of how these practices are being integrated into climate strategies remain complex, especially when considering the allowances made by the Science Based Targets initiative's (SBTi) recent Forest, Land and Agriculture Guidance (FLAG).

The SBTi's FLAG guidance, published in 2023, allows for land-based carbon dioxide removal (CDR) to count towards GHG emission reductions and realisation of net zero targets (SBTi, 2023, p. 34). This has enabled companies to aggregate removals and reductions, allowing them to use land-based removals such as soil carbon sequestration while continuing with business-as-usual production practices. This approach can obscure the actual progress being made in the agricultural transition (NewClimate Institute, 2024).

Including land-based CDR for target achievement is problematic because emission removals do not equal emission reductions. Both of them are needed to align the industry with 1.5°C pathways. Land-based CDR such as soil carbon sequestration and tree-planting should supplement rather than substitute the necessary deep and immediate emission reductions (Deprez et al., 2024). Furthermore, promoting less scientifically well-founded pathways, including some pursued by food companies under the regenerative agriculture umbrella, can give the false impression that they will negate the need for real emissions reductions measures, while also undermining support for other more viable CDR pathways, like tropical and temperate forest conservation and reforestation (Buma et al., 2024).

Some companies are starting to claim removals through soil carbon sequestration, while others indicate that they intend to place more focus on sequestration soon. When mentioning regenerative agriculture, companies also tend to conflate emissions removals and reductions. These companies claim that regenerative agriculture practices will reduce GHG emissions through soil carbon sequestration. No company mentions or has measures to address the issue of permanence associated with land-based CDR, particularly soil carbon sequestration (see → **Section 2.1**).

Finally, companies often do not require farmers participating in their regenerative agriculture programs to measure increased soil carbon sequestration. If farmers are required to measure it, it is unclear exactly how many 'regenerative' farms measure and report on soil organic carbon. Only two companies, Danone and Nestlé, systematically require farmers to measure soil organic carbon levels through soil sampling. Just Nestlé requires farmers to show a measured improvement in soil carbon sequestration levels, and this is only a requirement for its most advanced farmers, which currently represent a minority of participating farmers. This suggests that companies' claims regarding soil carbon sequestration may not only distract from the urgent need for immediate emissions reductions but may also be misleading. Without proper measurement methods, such as soil sampling, it is difficult to substantiate significant carbon removal claims.

5.3 REGENERATIVE AGRICULTURE FOR BEEF AND DAIRY MAY DIVERT FOCUS FROM OTHER ACTIONS NEEDED IN THESE SECTORS

Regenerative beef and dairy programs suggest companies are turning towards soil carbon sequestration to reach their emission reductions targets instead of reducing livestock numbers. The beef and dairy industry has adopted the terms 'regenerative grazing' and 'regenerative beef' to describe practices that often fall short of meaningful emission reductions. Very few of the pilot programs and practices in the beef and dairy sector are linked to the regenerative grazing movement, of which potential impacts on net GHG emissions are only small or uncertain. In addition, these programs often include improved manure management or experimental technologies, such as innovative feed. Such practices aim to reduce emissions from enteric fermentation, rather than addressing the main cause of the industry's emissions: large volumes of livestock.

There are no credible pathways to meet the temperature goals of the Paris Agreement that allow the livestock sector to continue current trends. A majority of experts agree that livestock emissions and numbers need to peak before 2025,

and GHG emissions reductions must be achieved without increasing the number of farmed animals or compromising animal welfare (Harwatt et al., 2024). While increasing soil carbon sequestration in pastures can sometimes reduce net GHG emissions, it is far from a 'silver bullet' for the livestock industry and will only be relevant for grazing livestock (Waite et al., 2024).

And yet, several companies explicitly mention they intend to count soil carbon sequestration towards their emission reduction targets, and it is not always specified whether this sequestration will occur on grasslands or croplands further down the value chain. The descriptions of regenerative frameworks and pilot programs among beef and dairy companies present soil carbon sequestration as a key measure to meet the 1.5°C Paris target. Companies are also using regenerative grazing to portray grazing livestock as having lower net GHG emissions even though grazing increases the land-use footprint of the livestock industry, leading to an overall larger GHG footprint for beef and dairy (Waite et al., 2024).

Most companies avoid directly addressing methane emissions from enteric fermentation. They prioritise better grazing management, claiming that it will reduce the overall impact of the industry on the climate and the environment. Only one company assessed in this report, Danone, has a methane reduction target in place. Some even use the word 'regenerative' to reframe livestock as having a postive impact on the climate. An increase in livestock numbers will result in increased nitrous oxide and methane emissions from enteric fermentation or from added manure applied to soils under regenerative practices. This framing implies that beef and dairy could help restore habitats and ecosystem services, which is highly unlikely and misleading.

/\ 06 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The majority of the largest food and agriculture companies refer to regenerative agriculture in their sustainability reports and in their climate transition plans, and some have dedicated webpages to the concept. Corporate actors mainly focus on regenerative agriculture's (positive) impacts on soil health, biodiversity and farmer livelihoods. Soil health is critical for functions such as carbon sequestration, water retention, and overall resilience of the agricultural system. Biodiversity is at the core of an infinite number of ecosystem services. It is therefore crucial and commendable that companies are pursuing practices that are supposed to sustain and enhance those indicators. In addition, since the agrifood sector needs to rapidly transform to keep global emissions in line with the temperature goals of the Paris Agreement, a just and feasible transition for farmers is required. A regenerative agricultural system that focuses on farmer livelihoods and community resilience, which many corporate definitions of regenerative agriculture include, takes this into consideration.

However, referring to regenerative agriculture in their sustainability reports or climate transition plans does not necessarily mean that companies are using the concept to effectively reduce emissions at the scale and speed required. Our analysis reveals that the lack of a common definition of regenerative agriculture has enabled companies to interpret regenerative agriculture in various ways, often leaving out certain key components of the concept. Moreover, the lack of a common definition limits the accountability that can be placed on companies who refer to regenerative agriculture in their climate strategies. Although industry-led initiatives have started forming common definitions of regenerative agriculture, it is yet unclear how these will be adopted, and these have already been criticised for their lack of ambitiousness and stringency.

While regenerative agriculture is often presented by companies as a silver bullet, our analysis shows that companies frequently treat it as an add-on to their existing practices rather than a holistic transformation of conventional farming. We find that companies use a range of watered-down definitions of regenerative agriculture, which leads to varied and potentially ineffective implementations that may not address the need for systemic change. The word 'regenerative' implies that soils, ecosystems and communities are made new, or restored to their previous state (IPES-Food, 2022). It goes beyond circularity and beyond sustainability, with the ultimate goal to create more good than bad. However, agrifood companies are currently using the concept of regenerative agriculture to continue conventional agriculture, but with a few (ambitious) measures such as no-till or cover cropping. Our results suggest that large agrifood companies are frequently referring the concept 'regenerative agriculture' to appraise minimal actions in their climate

strategies. Moreover, few companies attribute significant emissions reductions to their regenerative agriculture programs. It is therefore highly unclear to what extent regenerative agriculture will help companies reach their emission reduction targets, if at all, or to what degree companies are actually counting on significant emission reductions.

Soil carbon sequestration is often highlighted as the primary benefit of regenerative agriculture in climate strategies. In this regard, regenerative agriculture is being conflated with carbon farming, but companies generally do not present quantitative evidence of significant emission removals. They also do not accompany soil carbon sequestration claims with stringent measurement and verification systems. Moreover, soil carbon sequestration is not a permanent form of CDR. Especially in light of the livestock industry, where concepts such as 'regenerative grazing' are picking up speed, this is highly contentious. Here, we find that regenerative agriculture and in particular soil carbon sequestration are concepts used to continue intensive, large-volume livestock farming, without evidence- and science-based emission reductions or permanent removals. Increasing soil carbon sequestration will only, at best, compensate for a small amount of the industry's emissions and faces the same issues of permanence, additionality and measurement accuracy as other forms of land-based CDR.

6.2 RECOMMENDATIONS

Regenerative agriculture is growing in popularity and has the potential to contribute to the agriculture sector's transition towards a more circular, biodiverse, resilience and just farming system. Regenerative agriculture could also minimise the negative environmental and biodiversity impacts of excessive fertiliser and pesticide use if their use was reduced through regenerative agriculture. However, **we identify the need for clear guidelines and definitions in relation to regenerative agriculture**, so all relevant parties – corporate actors, policy makers, advocacy groups, consumers, scientists – can differentiate between impactful and ambitious regenerative agriculture commitments and greenwashing. As others have argued before, a common definition of regenerative agriculture could help pave the way for regenerative agriculture that goes beyond business as usual, focusing rather on meaningful farm ecosystem restoration, climate mitigation and resilience. Such a definition would need to combine practices and outcomes and treat soil carbon sequestration as one of the many co-benefits of increased soil health, not as its main outcome. A common definition would also be beneficial by outlining exactly how regenerative agriculture can lead to GHG emission reductions, if that should indeed be the goal of regenerative agriculture.

Secondly, companies that intend to use regenerative agriculture to reduce GHG emissions must clearly and transparently articulate how these reductions will be achieved. They should quantify expected reductions, tie their regenerative agriculture targets to emission reduction targets and accompany their frameworks with stringent measurement and verification systems. Companies should also be reporting emission reductions and removals separately; removals from soil carbon sequestration should not count towards GHG emission reduction targets.

Thirdly, actors who advocate for regenerative agriculture, including civil society and researchers, should use caution when emphasising its impacts on soil carbon sequestration and focus on how regenerative agriculture can be used to reduce agricultural emissions. This is especially true for the meat and dairy industry, where claims that carbon sequestration in pasture soils neutralises methane emissions from livestock distract from the need to reduce livestock numbers.

Finally, standard-setters and developers of sector guidance, including the SBTi's FLAG guidance, allow for land-based CDR in the supply chain to count towards the achievement of emission reduction targets and net-zero targets. Although such removals are necessary on a global scale, the claim of neutralisation on a company scale comes with high risk of low permanence. Land-based CDR as a result from regenerative agriculture is currently allowing companies to not implement effective emission reduction measures, although emission reductions in the sector are crucial. **It is recommended that standard-setters and similar actors set clear, science-based limits to the extent to which land-based CDR can be used for target achievement, or demand separate removal and reduction targets, for enhanced clarity and accountability.**

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APPENDIX

Tab. A1
Data sources

Company	Sources
Anheuser-Bush InBev	Anheuser-Bush InBev's 2022 ESG report (2023)
Archer Daniels-Midland	ADM's 2022 sustainability report (2023) ADM's 2023 regenerative agriculture report (2023)
Arla Foods	Arla Foods' webpage on its Regenerative Farming Pilot Farm Network (no date) Arla Foods' Climate check report (2022) Arla Foods' 2023 Annual report (2024)
Asahi Group	Asahi Group's 2023 sustainability report (2024)
Associated British Foods	Associated British Foods' 2023 ESG report (2024)
Cargill	Cargill's 2023 ESG report (2023)
CJ CheilJedang	CJ CheilJedang's 2022 ESG report (2023)
Danone	Danone's 2023 Universal Registration Document (2024) For a regenerative future document (2021) Danone's regenerative agriculture scorecard for pillar 1 (2021)
Diageo	Diageo's 2023 Annual report (2023)
FEMSA	FEMSA's annual report (2024)
Fonterra	Fonterra's Climate Roadmap (2023) Fonterra 2023 ESG report (2024)
FrieslandCampina	Friesland press release: 'FrieslandCampina launches pilot to accelerate regenerative agriculture' (2024) FrieslandCampina's 2023 Annual report (2024) FrieslandCampina's 2023 ESG report (2024)
Grupo Bimbo	Grupo Bimbo's 2022 Annual report (2023) Grupo Bimbo's webpage on regenerative agriculture (no date)
Heineken	Heineken's 2023 ESG report (2024)
JBS Foods	JBS Foods' 2022 sustainability report (2023) JBS Foods' website article, 'JBS Makes Global Commitment to Achieve Net-Zero Greenhouse Gas Emissions by 2040' (2021)
Kirin Holdings Company	Kirin Holdings Company's 2023 ESG report (2024)
Lactalis	Lactalis' 2023 sustainability report (2024)
Mars	Mars' Net Zero Roadmap (2023)
Mondelēz International	Mondelēz International's 2023 ESG report (2024)
Nestlé	Nestlé's 2023 sustainability report (2024) Nestlé's net zero roadmap (updated in 2023) Nestlé's agriculture framework (updated in 2024) Annexes 1 and 2 of Nestlé's agriculture framework (2024)
Olam International	Olam International's 2023 Annual report (2024)

Company	Sources
PepsiCo	PepsiCo's 2022 ESG Summary PepsiCo's Positive Ag supplier playbook (June 2023) PepsiCo's regenerative agriculture scheme rules (no date)
Saputo	Saputo's 2023 ESG report (2024)
Starbucks	Starbuck's 2023 ESG report (2024)
The Coca-Cola Company	Coca-Cola's 2022 sustainability report (2023)
The Kraft Heinz Company	The Kraft Heinz Company's 2023 ESG report (2024)
Tyson Foods	Tyson Foods' 2022 sustainability report (2023) Tyson Foods' webpage, 'Our Path to Climate-Smart Beef' (no date)
Unilever	Unilever's Regenerative Agriculture Guide with Implementation Principles (2021) Unilever press release, 'Ben & Jerry's plan to reduce dairy GHG emissions' (2022) Unilever's climate transition plan (2024 update) Unilever's 2023 Annual report (2024)
WH Group Limited	WH Group Limited's 2023 ESG report (2024)
Yili Group	Yili Group's 2023 ESG report (2024)

Source: Authors.

Tab. A2
Anticipated practices included in corporate regenerative agriculture definitions

Company	Reduce or eliminate soil tillage	Permanent soil cover with cover crops/minimise bare ground	Crop rotation and diversification	Increase water percolation/ water resource management principles	Integrating animals	Green manures	Add compost	Avoiding or eliminating synthetic inputs
Anheuser-Bush InBev	+	+	+				+	
Archer Daniels Midland	+	+						+
Cargill	+	+		+	+			+
Kirin Holdings Company	+	+			+	+		+
Mars	+	+						
Olam International								+

Source: Authors.

Tab. A3
Anticipated outcomes included in corporate regenerative agriculture definitions

Company	Enhanced ecosystem services	GHG emission reduction	Improved biodiversity	Improved livelihoods	Improved freshwater use and oceans	Improved productivity	Improved agriculture system resilience	Improved soil health	Improved animal welfare
Anheuser-Bush InBev			+		+	+		+	
Archer Daniels Midland								+	
Arla Foods	+	+	+	+ (farmer's business viability)				+	
Cargill	+	+ (from reduced fertiliser use)	+		+	+	+	+	
Danone			+	+ (farmer livelihood and working conditions)	+		+	+	+
Fonterra	+	+	+		+			+	+
FrieslandCampina			+		+			+	
Grupo Bimbo	+	+	+	+ (farmer quality of life)	+			+	
Kirin Holdings Company	+			+ (sustainability of the land & community)			+	+	
Mars	+	+	+					+	

Company	Enhanced ecosystem services	GHG emission reduction	Improved biodiversity	Improved livelihoods	Improved freshwater use and oceans	Improved productivity	Improved agriculture system resilience	Improved soil health	Improved animal welfare
Nestle	+		+	+ (benefits to farmers)	+			+	
Olam International	Unclear (restore 'carbon')	Unclear (restore 'carbon')	+		+			+	
PepsiCo	+	+	+	+ (financial profitability, community and farmer resilience)	+			+	
The Coca-Cola Company							+		
The Kraft Heinz Company			+	+ (grower livelihoods)	+		+	+	
Unilever			+		+			+	

Source: Authors.

Tab. A4
Claimed emissions reduction and carbon sequestration from regenerative agriculture practices among food and agriculture companies

Company	Claimed emission reductions and/or removals from regenerative agriculture in most recent reporting year	Planned emission reductions and/or removals from regenerative agriculture	Claimed emission removals through soil carbon sequestration only in most recent reporting year	Planned emission removals through soil carbon sequestration only
Archer Daniels Midland	0.253 $MtCO_2e$ fewer emissions than the benchmark in 2022 (reductions)		Participating acres sequestered 0.1155 $MtCO_2e$ in 2022	
Arla Foods		3% emissions reduction per kilo of milk thanks to carbon farming by 2030 (vs 2015)		1% by 2030 (vs 2015)
Cargill	1.7 $MtCO_2e$ 'reduced intensity of supply chain' as of 2022 from BeefUp program	2.4 $MtCO_2e$ 'reduced intensity of supply chain' by 2030 from BeefUp program		0.044 tCO_2 annually from one pilot project with Taco Bell, running from 2022 to 2030
Danone		15% reduction in GHG emissions from fresh milk in France by 2025 (vs 2017)	0.5 $MtCO_2e$ in 2020	
Grupo Bimbo		28% reduction of Scope 3 carbon emissions by 2030		
Mars		0.6 $MtCO_2e$ reduced by 2030 from regenerative agriculture for crops (vs 2015)		0.4 $MtCO_2e$ by 2030 (vs 2015)
Nestlé		5 $MtCO_2e$ by 2030 from cover cropping, fertiliser use and crop rotation (vs 2021), 3.2 $MtCO_2e$ from grassland sequestration from dairy by 2030 (vs 2021)	3.2 $MtCO_2e$ from grassland sequestration for dairy	
PepsiCo		At least 3 $MtCO_2e$ by 2030 (unclear if removals are included)	More than 0.33 $MtCO_2e$ as of 2022	
Unilever		4% of targeted emission reductions by 2030 (vs 2021)		

Source: Authors.
*$MtCO_2e$ = Million tons CO_2 equivalent

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