Heal soil, heal soul:
Enhancing regenerative agriculture, cover cropping, and farmer and community wellbeing in four Kansas counties

by

Jacob A. Miller-Klugesherz

B.A., Bethel College, 2017
M.A., Kansas State University, 2019

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Sociology, Anthropology, and Social Work
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Abstract

Conventional agriculture continues to contribute to soil degradation, biodiversity loss, agri-chemical devastation, and emissions, especially in the U.S. corn-soybean belt. Regenerative agriculture (RA) has emerged as a social movement to remedy these degraded agroecosystems by emphasizing integrated soil health principles, especially cover crops. While pitched as good for farmers, fewer studies examined the extent to which RA is good for the health and wealth of farmers, their families, and community members. Moreover, while RA studies profess reciprocal values between the health of the soil and the health of the farmer, they are more conceptual than empirical. Therefore, I asked two questions. What was the nature of the socio-structural interrelationships between the health of soils and the health of souls – of farmers and communities – in four Kansas counties (RQ1)? How did those Kansas farmers experience transitions to regenerative agriculture principles and practices (RQ2)? To answer, I used Flora et al.'s (2016) Community Capitals Framework to understand how farmers and nonfarm community members function in the current system and while transitioning away from it. This framing informed reflexive thematic and narrative analyses of 73 interviews with Kansas farmers, agricultural experts (in extension, crop insurance, conservationism, input sales), and community leaders. I also performed descriptive (cross-sectional and longitudinal) analyses of data germane to interviewee's experiences to better contextualize them. The socio-structural interrelations between the health of soils and farmers were complex and multifaceted. In PT – where I lived for two-thirds of my life – 22 interviewed participants expressed differing approaches to agriculture-development eco-symbiotic tensions: primary-occupation farmers couched bridging with development as parasitic and bonding with other farmers as competitive, whereas non-primary-occupation farmers and community leaders expressed commensalism and

mutualism experiences with bonded and bridged networks (Chapter 2). Those same participants explained why cover crop rates increased in PT, and descriptive analyses revealed that 1997-2022 county-level trends of herbicide application rates and expenses corresponded with changes in the primary cropland type from hay(lage) to corn-soybean systems and accelerated greenhouse gas emissions (Chapter 3). Finally, 51 interviewed farmers from Harvey, McPherson, and Reno Counties experienced the transition to regenerative agriculture as a new way of seeing (Chapter 4). Transitioning farmers used the discourse of addiction to describe industrial agriculture, experienced regeneration as a recovery process from the subsidy-fueled production treadmill and underwent shifts in their identities as 'good' farmers away from 'others' (industrial farmers). Overall, interrelationships among and between six agents—farmer identity & wellbeing (soul); family & community life quality; farm-level contexts & influences; county-level & structural contexts & influences; regenerative principles in practice (soil); and overall agroecosystem vitality—ranged from literal to metaphorical and direct to indirect. Soil health encompassed all soil health principles, particularly advancing cover cropping within corn-soybean systems. Soul health involved physical, mental, spiritual, familial, and communal factors. Farm-level contexts and influences formed the most literal and direct relationships to various aspects of soil and soul health. Farmers recognized tradeoffs (e.g. 'spray v. spade'), as well as certain values lost and gained when transitioning from industrial to regenerative agriculture, which was often difficult but more than necessary and worthwhile.

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List of Abbreviations and Acronyms

Acronym	Full name (source or context)
AAFNs	Alternative Agri-Food Networks
AEA	Advancing Ecological Agriculture
AFT	American Farmland Trust
AoM	Agriculture of the Middle
c.	Century
CA	Conservation Agriculture
CC(s)	Cover Crop(s)
CCF	Community Capitals Framework
CHT	Chemical Herbicide Treadmill
CTIC	Conservation Technology Information Center
DNDC	Denitrification–Decomposition
-cides	Herbicides, fungicides, nematicides, pesticides, and other chemical treatments designed for the purpose of killing.
EPA	Environmental Protection Agency
ERS	Economic Research Service (USDA)
EU	European Union
FAO	Food and Agricultural Organization (EU)
GCFI	Gross Cash Farm Income (USDA ERS)
IA	Industrial Agriculture
IRB	Institutional Review Board
NASS	National Agricultural Statistics Service (USDA)
NIFA	National Institute of Food and Agriculture (USDA)
OpTIS 2.0	Operation Tillage Information System 2.0 Database
PCEDC	Pottawattamie County Economic Development Corporation
PT	Pottawatomie County, Kansas
PWI	Personal Wellbeing Index
RA	Regenerative Agriculture
RN	Reno County, Kansas
RQ(s)	Research Question(s)
SARE	Sustainable Agriculture Research and Education (USDA NIFA)
SC	Social Capital
ToP	Treadmill of Production
UN	United Nations
U.S.	United States of America
USDA	United States Department of Agriculture

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God. All glory goes to Him.

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Blanket acknowledgement. Inevitably, the more people I include the more people I leave out. Therefore, I extend acknowledgment to all those who were not mentioned, to the hundreds of people who have invited me into their life and, in some way, shaped me for the better. Thank you for being you.

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Dedication

To Miranda, Daniel, and Micah.

Epigraphs

"All go to the same place; all come from dust, and to dust all return."

– Ecclesiastes 3:20, *The Holy Bible* (New International Reader's Version, 1998)

"Healthy Soil = Healthy Food = Healthy People"® = Healthy Community

– The Rodale Institute (with addition)

"The health of soil, plant, animal and (hu)man is one and indivisible."

– Sir Albert Howard

"Land is not merely soil, it is a fountain of energy flowing through a circuit of soils, plants, and animals…community included."

– Aldo Leopold

"Soil is the great connector of lives, the source and destination of all. It is the healer and restorer and resurrector, by which disease passes into health, age into youth, death into life. Without proper care for it we can have no community, because without proper care for it we can have no life."

– Wendell Berry

"I dream of a world where the process of growing food regenerates the land, revitalizes rural communities, and facilitates a world where food improves our health."

– John Kempf

"When people, land and community are as one, all three members prosper; when they relate not as members but as competing interests, all three are exploited. By consulting nature as the source and measure of that membership… [agriculture should] save soil from being lost or poisoned, while promoting a community life at once prosperous and enduring."

– Former mission statement of The Land Institute

“My Story of Home”

I am 15 acres of Kansas flint hills,
Konza prairie my exposition.

I am a steady, winding creek.
Its silent roar smoothly soothed me to sound sleep,
comforted not by the rush of traffic, but the rush of water.

Not rushed but eagerly engaged,
my family rooted us in the place.

We grew our values in gardens, trees, pastures,
painted with more green than gray.
Blue jays and red cardinals colored our feeders. It was their home too.
We raised our ideals by raising chickens, cows, & pigs.

My 15 acres cushioned my boisterous bounce,
my rising action, my sports story.
What was once a corn field
we converted into a baseball field,
my very own field of dreams.
We cleaned our barn’s hay loft and fastened three basketball goals.
My very own arena, the creaky boards and chirping swallows my fans.

We created our home in-house.
My parents the builders of
our merry-go-round, shed, tree house, and actual house.

By building home,
they built me.

They cemented into me that
hands are for working,
heart is for loving,
brain is for critical thinking,
entire body, measured compassion.

As I spend the better part of my life
moving around, chasing fast knowledge, and searching for climaxes,
my only resolution will be home, because
I am home, and it is me.

- Jacob Miller (2018b)

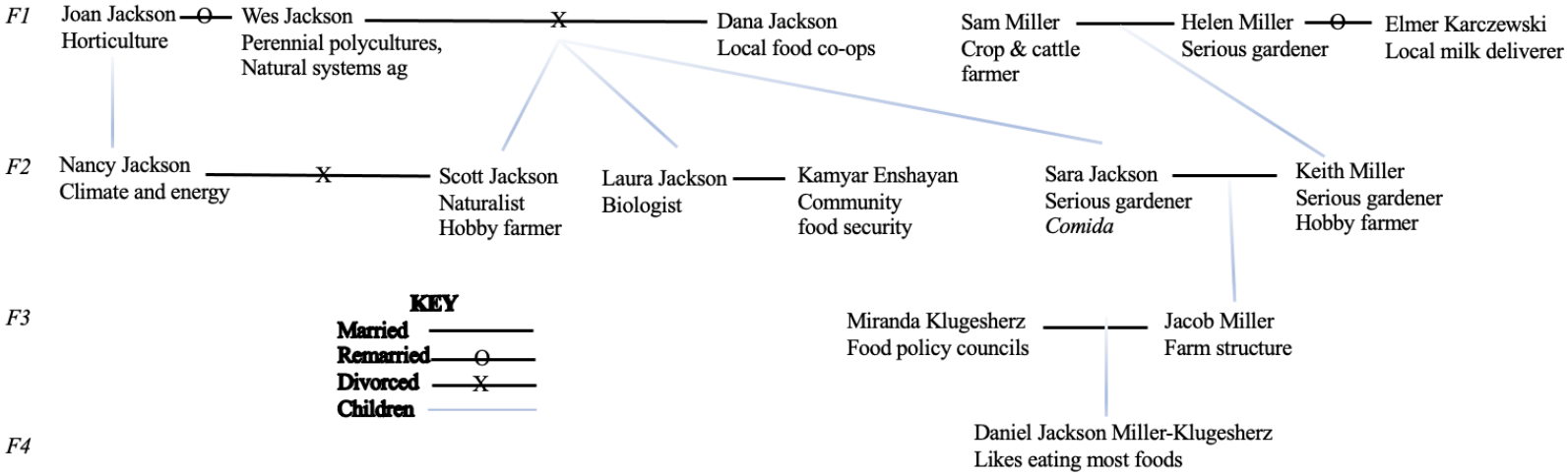
Preface

From my upbringing's roots grew this dissertation. My parents, Keith Andrew Miller and Sara Jackson Miller, have been high school teachers for a combined 71 years at Rock Creek Jr./Sr. High School in St. George, Kansas. I lived with my parents during adolescence (5-18 years old, 2000-2013), and while living in Pottawatomie County's (PT) Blue Township from 25 to 31 (2020-2026), I frequently visit their place. They have long lived on 15 acres of Flint Hills Konza prairie in the Pottawatomie Township of PT, and make agricultural use of the land, as their parents did with their land. Although my parents' operation could meet the USDA's definition of a farm, which is "any place that has or normally could have the potential for at least $1,000 in sales from agricultural commodities,"[1] they never registered a farm number. Growing up, we had the potential to do at least $1,000 in sales but instead donated the food that we could not process, store, and consume ourselves within a calendar year. We tended fruit tree orchards, bountiful gardens, hens, and hay fields. Bounded by a winding creek and featuring pastures dotted with rocky limestone, the land allows for semi-subsistence farming.

Both sides of my family have lived and breathed the culture of alternative agriculture in various ways (Figure i). A sixth-generation Kansan, I am first cousins three times removed from Dwight D. Eisenhower. I am also the eldest grandson of Wes Jackson—co-founder of The Land Institute (Salina, KS) and star of *Prairie Prophecy* (M. Johnson, 2026)—and have regularly worked with him on his 30 acres. In many ways, I won the lineage lottery.

[1] All currency in this dissertation is in US$.

Figure i. Truncated Family Tree Showing Members' Food and Farm Influences on Me



For parsimonious reasons, this family tree is incomplete; I truncated its descriptions and omitted members. However, it demonstrates the extent to which my family influenced my passion for alternative agriculture, food, and community. In my dissertation, I cite work from Wes, Dana, and Laura Jackson. During extended family dinners, we engage in fiery, radical, and visionary discussions of the moral, ethical, and socially (re)produced crises caused by the industrialized U.S. agri-food system. And then we have pie. Homemade crust with homegrown blackberries, cherries, peaches, or apples, of course. I have always loved to grow and eat nutritious food. I share my love of food with the love of my life—my life partner, Miranda Miller-Klugesherz, is the founder and executive director of the Kansas Food Action Network. While I have focused on food production, she focuses on access. We complete the food cycle and one another.

My upbringing was idyllic and privileged. I always had what I needed. That did not mean that I did not have to work hard. Through sweat equity, I internalized the literal and metaphorical connections between the health of the soil and the health of the soul. Because farming has never been my parent's primary occupation, they can go at their own pace and grow what they please without pressure to earn an income. In effect, farm tasks feel like more play for me than work.

Agricultural activities rekindle, and properly channel, my past toddler whims of mashing mudpies in the garden and then improving the house exterior with muddy streaks on a rainy day.

In 2017, I earned a B.A. (dual major in Communication Studies and Literary Arts) from Bethel College in North Newton, Kansas. While there, I was surrounded by Mennonite traditions, norms, and customs that permeate the culture within Harvey (HV), McPherson (MP), and Reno (RN) counties. I grew familiar with the towns, their people, and the agrarian way of life. I was fortunate to interview people from the counties where I was raised by my parents (PT), where I attended college (HV), and where I raised a family (PT).

From my upbringing and experiences I have gained a sharper attunement to the inexhaustive metaphorical and literal relationships between the health of the 'soil' and the 'soul.'

'Soil' is a metonymy for living geo-, eco-, and biological systems that are the source – not substrate – for food production. Soil health includes the health of organic matter, tilth, aggregation, micro bacteria, etc., but also the natural processes that sustain and regenerate the soil. Sun, sweat, earth, wind, plants, grass, water, skills, tools, equipment, resilience creation, creative destruction, and time away from screens—these are essential feeders of my soul.

"Soul" is a metonymy and metaphor for the health, wealth, and overall wellbeing of those engaged in and (in)directly affected by farming. It includes the wellbeing of those working in food production, processing, preservation, transportation, retail, and consumption. A wide net, soul health is negotiated in seemingly mundane acts, such as buying local beef, participating in farmers markets, donating extra produce, and tossing excess zucchinis into open vehicle windows in the summer. These activities do just as the word 'agri*culture*' suggests—they build and sustain culture, community, and society, feeding our stomachs and our souls.

Because this dissertation is a product of my upbringing, it is reflexive, but not ethnographic. As I already teased, I preface each chapter with a previously published poem that foregrounds and previews chapter themes. Together, the six poems emit themes of home, nature, place, environment, agriculture, and self-discovery. They emote my journey of better understanding soil and soul health, and the interrelationships within and among them. This journey will never be complete, and I am glad for it. Ongoing discoveries make life exciting.

I hope that the findings presented in this dissertation can inspire readers to help regenerate degraded agricultural systems and landscapes, which can, in turn, nurture healthy individuals, families, and communities. May it encourage individual and systems-wide shifts from ego to eco, from hubris to humility.

Chapter 1 - Introduction

The triple crisis of climate change, biodiversity loss, and land degradation permeate every human-environment exchange (UN FAO, 2025). As we humans try to survive this inconvenient apocalypse that we have created, we are forced to ask hard questions about the speed, size, scale, and scope of managing our interventions in the larger living world (W. Jackson & Jensen, 2022, p. 46; Jensen & Jackson, 2022). Encompassing all four 's' terms is a perennially difficult and morally-wrought 'ought' question for which we have no answers: how should we eat? More specifically, how should we recreate our agri-food systems to become much less socially and ecologically detrimental? Agri-food systems include the ways in which humans produce, process, transport and consume food, which combined accounted for 80% of deforestation, 29% of greenhouse gas emissions, and the leading share of biodiversity loss (Chandrasekhar et al., 2022). Emissions within farm gate and from agricultural land expansion contributing to the global food system represented 16–27% of total anthropogenic emissions (IPCC, 2020, p. 13).

Our consumption patterns have degraded soil, the source of food production. Nearly 33% of the world's arable land has been lost to erosion or pollution in the last 40 years (GCSF, 2015), and the UN FAO (2022) warned that 90% of Earth's topsoil was at risk of erosion by 2050. Under 'business as usual' scenarios, 6.17 million more square miles of land (the size of South America) was projected to be degraded by 2050 (Augustinus et al., 2022, p. 148). To remedy, UN Sustainable Development Goal 15.3 wanted to, "by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land degradation-neutral world" (Crossman, 2018, p. 3).

A narrower 'who' is most responsible for leading the necessary changes to meet these goals. The nations of the global North, which represent only 19% of the global population, are

responsible for 92% of the damage caused by climate breakdown (Hickel, 2020, p. 115). By 2030, the South will suffer 92% of total global costs, reaching $954 billion (p. 117).

I further narrow the boundary of accountability and responsibility to a more specific 'we'—actors in the U.S. agri-food policy. In 2021, the U.S. agriculture sector alone contributed to 5.7% of global agriculture emissions (Schroeder, 2023). Of the ~3.1 million square miles of U.S. land area, we significantly altered 22% for use as cultivated cropland and pastures (Sleeter et al., 2018, p. 207). In 2022, direct greenhouse gas emissions from the agriculture sector accounted for 9.4% of total U.S. greenhouse gas emissions (U.S. Environmental Protection Agency [EPA], 2025, p. 2). Accounting for 75% of U.S. N_20 emissions (which are up to 300 times as potent as CO_2) were livestock manure deposition, nitrogen-fixing plant growth, and synthetic/organic fertilizer application, mainly from soil microbes that digest excessive nitrogen fertilizer (J. Lynch et al., 2021). This EPA estimate did not take into account emissions from land clearing and fertilizer production, and therefore underrepresented agriculture's share of emissions (Sanborn, 2022).

There have been several other, well-known negative impacts of the agri-food system that deserve space and attention (Brevik et al., 2018, 2020; Kanissery et al., 2019, 2020), and several people critically calling for its reimagination and transformation (e.g. Anderson et al., 2020; Berry, 1996; Kempf et al., 2020; Lamine et al., 2021; Lappé, 2010; Provenza, 2018; Shiva, 2022). There have been a series of alterative agriculture movements, including natural systems agriculture, conservation agriculture, sustainable agriculture, agroecology, regenerative agriculture, organic agriculture, and regenerative organic agriculture.

More recently, the regenerative agriculture (RA) 'movement' has exploded (G. Brown, 2018; Dahlberg, 1994; Day & Cramer, 2022; Masters, 2019; Strickler, 2021). RA is grounded in

what is good for soil ecology (e.g. minimum tillage, cover crops, crop rotation and diversity, and rotational grazing), and RA fields have had increased soil carbon, organic matter, moisture, biodiversity, and microbial function (Burgess et al., 2019; Regenerative Agriculture Foundation, 2023).

RA has deep roots in indigenous agricultural traditions (Carlisle, 2022; Miller-Klugesherz, 2022; Schweizer, 2022). RA is also a "social movement that focuses the contribution of farming to CO_2-equivalent emissions and environmental degradation and, importantly, involves farmers themselves advocating for change through field days, seminars and virtual meetings" (Burns, 2020, p. 201). RA can be just as or more profitable than conventional agriculture systems (LaCanne & Lundgren, 2018a). No-Till on the Plains and the Soil Health Alliance, among other organizations, promote RA across Kansas. Farmers in Kansas predominantly grow commodity crops and lag behind other states in growing specialty crops that are consumed by Kansans.

Although several definitions exist, I defined RA as *a socially (re)produced ecological and biological system for growing food and restoring degraded soil and landscapes* (modified from Brown, 2018, p. 11). Widespread RA adoption is crucial for recreating U.S. agri-food systems, and further adoption could perhaps aid adaption to future socio-ecological crises. While the promulgation of RA discourses could help transform agriculture and communities, its discourses may run ahead of verifiable regenerative results and realities, reify industrial techniques, and/or justify corn-soybean systems, especially as RA scales. A functional analysis of how agricultural practices support and sustain community life—containing a critique of the dominance of the conventional, industrial U.S. agri-food system—can help us better understand

how RA practices affect the wellbeing of farmers, their families, and communities. Enter, the Community Capitals Framework (CCF).

Community Capitals Framework

Communities can steward Earth's working landscapes by harnessing various forms of 'capital,' or the resources people invest into communities to create more resources for the future (Emery & Flora, 2006). CCF helps identify the resources and assets that exist within a community, and includes seven interrelated capitals (Deller, 2013; Emery et al., 2013; Gutierrez-Montes et al., 2013): Natural, Cultural, Built, Human, Social, Political, and Financial (C. B. Flora et al., 2016),[2] defined in Table 1.1Table 1.1. . Together, they advance the three aims of a healthy ecosystem, social inclusion, and economic security (C. B. Flora, 2023, p. 20).

Table 1.1. Definitions of Community Capitals

Capital	Definition
Natural	Resources such as air, land, water, minerals, oil, and the overall stability of ecosystems. Forms the basis for all other capitals.
Cultural	Language, symbols, mannerisms, attitudes, competencies, and orientations of local community members and groups.
Built	Buildings and infrastructure systems within a community.
Human	Knowledge, skills, health, and physical ability of community members.
Social	Social networks, associations, and the trust they generate among groups and individuals within the community.
Political	The ability to engage external entities in efforts to achieve goals and the ability and power to access and influence the distribution of resources.
Financial	Available financial savings, income, investments, and credit at the community-level that is instantly accessible.

Source: C. B. Flora et al., 2016, p. 13.

CCF has been used to assess how the various capitals relate to sustainable agriculture (Butler & Flora, 2006; C. B. Flora, 1995, 2011; Warren et al., 2001), participatory agri-ecological and agri-environmental schemes (Arnott et al., 2021; Kansanga et al., 2020),

[2] I order the capitals this way here to introduce a pneumonic device that I created which both aids in its recollection and encapsulates a central purpose of CCF: Nurture Change By Helping Several People Flourish.

community-supported agriculture (Furness et al., 2022), and cooperative models (Hale & Carolan, 2018; Harvie, 2019; Tuna & Karantininis, 2021). However, to my knowledge, it has not yet been used in the context of RA.

CCF has been notoriously difficult to operationalize. As an example, consider Social Capital (SC), which some scholars argue is merely a proxy for motivated individuals (Cope et al., 2016). For individuals to engage in social interactions, become members in groups and associations, and participate in collective action, a sense of trust is required as well as the acknowledgment that trust will be reciprocated; i.e. "trust lubricates social life" (Putnam, 2000, p. 21). Still, Social Capital is a useful conceptual tool. Community interactions within social networks occur through *bonding*—homogeneous connections, typically within the community—*bridging*—heterogeneous connections, even outside the community (C. B. Flora et al., 2016, p. 16; J. L. Flora, 1998)—and *linking*—ties between individuals and groups in hierarchical relationships (Woolcock, 2001, p. 72). Even the best Social Capital operationalizations (e.g. Chetty et al., 2022; Chetty et al., 2022a, 2022b) neither fully capture all its dynamics nor account for specific variables that overlap with other capitals; for instance, scholars commonly fuse Political-Financial, Financial-Built, and Social-Cultural Capital analyses. Given the fluidity of CCF boundaries and perennial difficulties with Capital operationalizations, I used CCF as an organizing framework to conceptually organize the secondary variables I aggregated and to aid in chapter analyses and discussions.

In sum, using the CCF with a simultaneous critique of IA can help realize healthier paths forward for farmers and community members. CCF does not seek to justify or perpetuate the current system; rather, it is a way to meet its stakeholders where they are at, and to better

understand the wide range of RA transitions that farmers and communities can make (Gosnell et al., 2019a; Miller-Klugesherz & Sanderson, 2023; Pathania et al., 2024).

Although a majority of CCF research is functional, a fraction use critical perspectives (Grenfell, 2014, p. 156; D. L. Jackson, 2005, p. 250; Pigg et al., 2020, p. 148). Community capital accrual is not simply additive. Industrial agriculture (IA) can siphon capital stocks, especially Natural and Financial, from communities, subtracting their overall wellbeing. In the next section is an extended critique of IA spanning all capitals, but primarily Political-Financial (political economy critique).

Industrial agriculture critique

IA is a chemically-fed and biotechnology-driven agri-food system that encourages economies of scale in production, creates new markets for consumption, applies patent protection to genetic information, and features global trade (Kimbrell, 2002). It is well-documented that IA is largely responsible for our social, ecological, and climatic crises (Philpott, 2020; R. Wallace, 2016). Clapp (2025, p. 70) traced the history of IA and agribusiness concentration via mergers and acquisitions from the 1860s to present, pointing out how agribusiness changed domestic socio-economic dynamics. Replacing horses with tractors meant that farmers would no longer need to set aside fields to grow feed, maintain separate buildings to house their livestock, or pay laborers to care for the animals or tend cropland, resulting in future tractor cost lock-ins and labor displacement (p. 73).

IA intensified during the 1940s through 1960s when the third agricultural revolution – dubbed the ‘green revolution’ – resulted in a significant crop yield increase, especially in wheat and rice (Patel, 2013; Pingali, 2012). This was in large part thanks to the breeding work done by technological ‘wizard’ and ‘father of the green revolution, agronomist Norman Borlaug (C. C.

Mann, 2018). There are several other excellent detailed analyses of the green revolution (Cleaver Jr., 1972; Pellegrini & Fernández, 2018; Shiva, 1991), but they do not need repeated here. Just know that IA profoundly reshaped agriculture's character while levying dire ecological, social, and cultural costs (Berry, 1996; W. Jackson, 2010).

IA exponentially intensified during the 1970s and 1980s. However, at the time, not all social science scholars believed productive intensification and capital extraction of farm life and labor would continue. For instance, drawing on Marx's conception of "production time" (time it takes to produce a commodity) and "labor time" (how much labor is injected into production), Mann & Dickinson (1978, p. 472) argued that natural limits in the farm production process meant that there would always be a sizeable gap between labor and production in agriculture. In other words, no amount of spent labor time could rush a seed to grow faster once a farmer planted in the ground.

Historically, Financial Capital needed to shrink the production-labor time gap to keep accumulating. Combine that perspective with the fact that farm machinery spends several months in a shed, idle and depreciating, and that rot risk makes crops less suited to capitalist exchange timelines, and it made sense why the authors concluded agriculture would be a "burden" to capitalists (p. 475). As they reasoned in their oft-quoted line, "capitalist development appears to stop…at the farm gate" (p. 467). But instead of stopping, it smashed through the gate and took everything it could. Why? There were several reasons, including larger socio-economic crises, large-scale market forces bifurcating farm type, size, and income, and government subsidization of industrial capitalist encroachment on farmstead subsistence.

Implicit in every aspect of industrialization is a nonlinear acceleration beyond natural limits, and economic crises often accelerate this capital accumulation (Beck, 1992; Klein, 2008).

Without provocation, several of the farmers I interviewed brought up, unprompted, the lasting impacts of the 1980s farm crisis, which was characterized by widespread farm foreclosures, social hardships (Belyea & Lobao, 1990; Meyer & Lobao, 2003), and "was ungodly hell" (Weingarten, 2018). Less labor and more land meant the farmers who stayed in the profession had few other options but to take on bigger equipment and more inputs, which enhanced agriculture industrialists' pocketbooks and lobbying power (Lobao & Meyer, 2001).

Since the 1980s farm crisis, concentration and consolidation have exacerbated (Whitton & Carmichael, 2024). *Concentration*—where fewer companies gain more ownership/control over the production-consumption process—and *consolidation*—where fewer farm owners acquire more farmland—have both shown to have negative effects on community wellbeing (Heffernan et al., 1999; Hendrickson et al., 2014; Hendrickson & Heffernan, 2005). MacDonald's (2020) assessed trends in farm consolidation and bipolarization since the 1980s farm crisis, finding that farm consolidation grew larger, became more persistent, and levied effects that were "widespread across commodities" (p. 374).

The market rewarded farmers getting smaller or bigger but not staying in the middle (Guptill & Welsh, 2014). The agriculture of the middle (AoM) is a structural market phenomenon, defined by one measure as an operation posting $50,000-500,000 in annual gross cash farm income (Stevenson et al., 2008, p. 7). As farmsteads were stripped of subsistence and grew ever more dependent on agribusiness companies promoting IA, they evolved similar and intertwined patterns: farms consolidated while agribusiness companies concentrated, which negatively impacted communities (Lyson et al., 2008). For example, Estabrook (2012) investigated how a select few agribusinesses in the modern tomato industry sacrificed quality for quantity, scalability, power concentration, and seed market control, which influenced what

tomatoes farmers grew and how they grew them. In effect, farm sector concentration increased rural out-migration, rural poverty, and economic inequality (Crowley & Roscigno, 2004; Lobao et al., 2008).

The U.S. federal government doubled down on policies favoring IA practices and bifurcated market forces. Government subsidies, especially direct commodity payments and crop insurance, have propped up a handful of commodity crops and largely gone to the biggest, wealthiest farmers. Between 1995-2021, of the total $478 billion in U.S. federal farm subsidies, the top 10% of farm subsidy recipients received 78% of total subsidies and the top 1% received 27%, while the smallest 80% of recipients collectively received only 9% of subsidies (Schechinger & Faber, 2023, p. 2). These data indicate that AoM farmers, especially those closer to the top 10%, were squeezed the most. Moving into the top 10% would benefit them more, further incentivizing production intensification. Farm subsidies stopped benefitting the farmers themselves. By sector, the largest subsidy beneficiaries were those in the business of supplying inputs, buying commodities, and being vertically integrated into all agri-food system stages, including production (P. H. Howard, 2016). Together, these trends showed that subsidies reinforce the advantages of businesses and larger-scale operations at the expense of mid-sized and smaller operations, their farmers, and their surrounding communities.

It is crucial to realize how mechanisms within Social, Political, and Financial Capitals reinforce one another and encourage further industrialization and bipolarization. Government subsidies fuel the treadmill of production (ToP). The ToP explains how "the constant search for economic growth leads to advanced economies being stuck on a treadmill, where their wellbeing is not improved by economic growth, yet the impacts of this pursuit of growth causes massive, unsustainable environmental damages" (Curran, 2017, p. 28). In the lineage of Cochrane (1958,

1993, 1996), several scholars revisited the interrelated treadmills of production, pesticides, and technology (Arbuckle & Kast, 2012; Czyżewski et al., 2019; Suppan, 2020; Ward, 2008). The differentiated distribution of government subsidies incentivize the ToP's continual 'spin' (Carolan, 2022, p. 10; P. H. Howard, 2016, p. 121; Sanderson & Hughes, 2019). ToP is a powerful theory because the metaphorical signification is closely tethered to a material origin, making it work in several contexts. As Carolan, 2022 (p. 8) put it, "those who have invested in new technologies are essentially running in place. They might be producing considerably more, but because of shrinking profit margins, they are not profiting wildly from these increases in productivity." Subsidizing IA practices speeds up farmers going nowhere.

IA subsidization undermines public health. "In a very real way, for each dollar we spend buying commodities from a farmer, we give a second dollar to our health care system to treat us for the consequences of the food we eat" (Meter, 2021, p. 22). Subsidy-fueled government programs created a structure of food security at the expense of food sovereignty, stripping foods of their nutrition (Lappé, 2010, p. 57; Provenza, 2018, p. 161). Agribusiness companies and their powerful lobbyists want it this way because the agri-food system they have designed works for them. They have learned to profit handsomely from selling the ill and the cure, offering false solutions that create future problems for them to swoop in and 'solve.' Closely akin to wartime industry behemoths selling bullets and bandages, giant, vertically-integrated agribusinesses sell poisons and pills at our peril.[3]

[3] Bayer-Monsanto is a prime example. Individuals' exposure to their flagship herbicide glyphosate (Roundup®) increased their risk of developing non-Hodgkin's lymphoma by 41% (Emeh, 2023; Haghighi, 2023; Zhang et al., 2019). This evidence and more like it led to a series of individual and class action lawsuits (Sundblad, 2025). Meanwhile, Bayer (2021) developed *copanlisib* and *rituximab* oncology treatments for non-Hodgkin's lymphoma. The Save Handloom Foundation (2025, p. 3) said, "in a world of mega-mergers and billion-dollar buyouts, the lines between harm and healing blur. When one company controls both the problem and the prescription, public health becomes collateral damage in the race for profit." Because companies like Bayer-Monsanto boast annual profits in the multi-billions, they can absorb lawsuit settlements against them in the multi-millions.

Besides inertia, a key reason why IA continues as conventional has to do with foundational myths among Corn Belt farmers, which draw on post enlightenment ideas of nature, security, and modernity to perpetuate productivist behavior, claim resources for conventional commodity agriculture, and impede widespread AAFN adoption (A. L. Hall, 2024). Corn and soybeans are used in a litany of consumer products, including processed foods, plastics, medical products, and hand sanitizer (Chadde, 2024). Yet cheap corn and soybean subsidized food commodities are linked to cardiometabolic risk factors such as obesity (Alston et al., 2008; Do et al., 2020). Most of the hydrophobic and lipophilic compounds in common agricultural herbicides are resistant to being metabolized in humans, a key reason why herbicides are considered a human carcinogen and a severe disruptor of endocrine and immune systems (Brevik & Burgess, 2012, p. 94). Our agri-food system is heavily industrialized, subsidized, and puts farmers on an unsustainable treadmill. In short, the U.S. has designed a sick agri-food system.

Literature Review: Efforts to Heal Sick Agri*cultural* and Social Systems

There are several processual flows, exchanges, and interconnections between the agri-food system with other subsystems (Figure 1.1). With this diagram front of mind, I consulted guides on how to develop an effective literature review (Baumeister & Leary, 1997; Petticrew & Roberts, 2006). Over the course of my program, I identified, collected, and indexed 2,519 total sources in Zotero, a citation manager, to consult and/or review.[4]

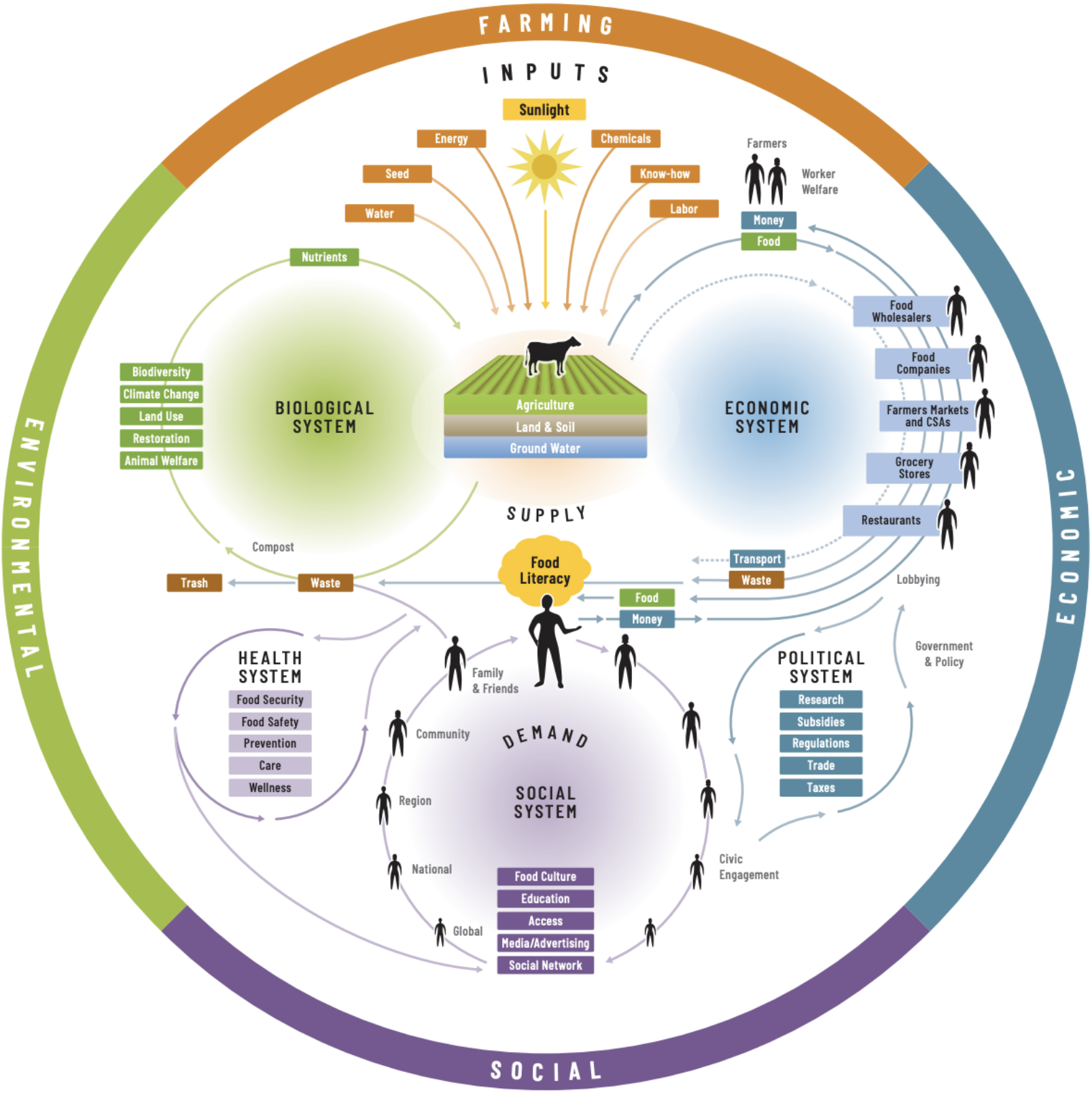
Sources spanned 19 literature veins, sorted into three total bodies (Table 1.2): (1) theories and methods; (2) Soils (Natural Capital focus); and (3) "Souls"[5] (overall wellbeing with Human,

[4] 'Consulted' meant, at minimum, that I read the abstract, added tags, and indexed the source. I did not include all consulted sources in analysis or citations. 'Reviewed' entailed fully reading, annotating, and citing sources.
[5] Throughout, "souls" is not meant literally or in a religious sense, but as a metaphor & metonym communicating an (im)material form of consciousness that is not irreducible to, but includes, one's identity, health, wealth, and overall wellbeing.

Cultural, Social, Political, Financial, and Built Capital foci). Of those 19, I primarily used four to construct the literature review[6]: (1) cover crops; (2) regenerative agriculture and soil health; (3) farmer attitudes, identity, and the good farm(er); and (4) farmer wellbeing. The literature review proceeds in two sections: healthy soils, and healthy souls.

[6] In Table 1.3, I listed the software that I used for various aspects of the research process.

Figure 1.1. Flows and Exchanges within and between the Agri-Food System and Biological, Economic, Social, Health, and Political Subsystems



Source: WorldLink (2020), shared under a CC-BY 4.0 license.

Table 1.2. Literature Bodies Consulted and/or Reviewed (Full List)[1]

Literature body (*N* = 2,523)	*n* sources
Theories and methods	
Agricultural sociology	187
Community Capitals Framework	193
Qualitative methods: participant interviews & thematic analyses	47
'Soils' (Natural Capital focus[3])	
Agriculture (conventional, historical, data)	236
Alternative agriculture	181
Agriculture of the middle	35
Agroecology	39
Climate change	206
Cover crops[2]	252
Natural systems agriculture & perennial crops	88
Organic agriculture	113
Regenerative agriculture and soil health[2]	347
Sustainable agriculture	69
'Souls' (Human, Cultural, Social, Political, Financial, and Built Capital foci[3])	
Farmer attitudes, identity, good farm(er)[2]	87
Farm structure (e.g. concentration, consolidation) & global food regime	118
Farmer wellbeing[2]	107
Federal subsidies	31
Pottawatomie County, Kansas	94
Rural wellbeing & development	93

Notes: [1]There was content crossover between grouped bodies, but the references were not double counted; [2]Primary bodies used for the literature review; [3]General capital of focus by most literature, but not exclusively.

Table 1.3. Tools and Software Used for Research

Resources used (databases, libraries, software, programs)	Used to…
Google Chrome, ERIC, JSTOR, DOAJ, WorldCat, Web of Science, Sociological Abstracts, ProQuest, Google Scholar, Taylor & Francis online, ResearchGate, & institutional interlibrary loan	research and review literature and relevant theories.
Atlas.ti (25.0.1), Zotero citation manager, Natural Reader, and Microsoft Word, OneDrive	aggregate, code, note-take, and cite literature.
Microsoft Excel, RStudio, & IBM SPSS premium (v. 29.0.2.0) (descriptive analyses, like factor/cluster, and regressions) & IBM Amos (v. 29) (path analyses)	assemble, store, and analyze data.
Arc GIS, Maptitude©, Canva, & Google Sheets	visualize, map, and analyze data.

Healthy soils: Regenerative agriculture and cover crops

Soil health describes the continued capacity of a soil to function as a vital, living ecosystem that sustains plants, animals, and humans (Brevik et al., 2020, p. 11; Doran & Parkin, 1994). Degraded soil, resulting largely from intensive farming practices, is low in organic matter, meaning it does not retain water as effectively and leaves communities vulnerable to climate shocks such as droughts, wildfires, and water shortages (Abán et al., 2025; Save Soil, 2024). Soil quality directly influences the quality and quantity of food that can be produced, as soils provide essential macro- and micro-nutrients and attenuate environmental pollutants (Singh et al., 2017).

The idea of soil health is not new. Before the arrival of Europeans to North America, Indigenous peoples protected local ecosystems and preserved biodiversity through farming practices, including living mulch, intercropping, and polycultures ('Three Sisters') (Handayani & Prawito, 2010; Heim, 2020; Kumar, 2023; Kumar & Choudhury, 2024; A. J. Wallace, 2022). Ethnopedology—the study of how indigenous peoples perceive, classify, appraise, and manage soils (Kumar, 2023)—remains a crucial area of study to help ensure that RA transformations advance racial and economic justice, not appropriation or colonization. Still, every culture consults their own soil health leaders. Sir Albert Howard (1943, 1946, 2010) was a leader of the British organics movement, and the first westerner to publish research on traditional agricultural techniques in India and China. In 1946, Lady Eve Balfour founded The Soil Association with colleagues because they were concerned about the health implications of widespread post-WWII farm intensification.

Contemporary U.S. RA advocates stress the benefits soil health for human and public health. Soil health is an integral component of RA and the "One Health" paradigm (Montgomery et al., 2024, p. 2), and a growing number of farmers, policymakers, practitioners, and advocates

are embroiled in multiple, ongoing efforts to regenerate degraded landscapes (Regenerate America, 2022c, 2022b, 2022a; Schreefel et al., 2020; Toensmeier & Herren, 2016). For instance, educator, author, popular podcaster, and Advancing Eco Agriculture (AEA)[7] founder John Kempf engages with RA speakers, leaders, and audiences, and makes RA innovations accessible to wide audiences and non-agronomists. As AEA's website reads, RA management systems can:

> regenerate producer profitability and create economic incentives for producers; produce crops that are inherently resistant to possible infections by insects, bacteria, fungi, nematodes and viruses, eliminating the need for pesticides; produce food that can regenerate public health, with an elevated content of immune compounds that transfer plant immunity to livestock and people, providing food as medicine.

Indeed, RA systems have been found not only to provide ecosystem services, but also provide social and financial benefits for the community (Day and Cramer 2022; Newton et al. 2020; Schreefel et al. 2020, p. 6).

Under the broad RA umbrella are a plurality of definitions, place-based origins, genealogies, and discourses (Burgess et al., 2019, p. 8; O'Donoghue et al., 2009). Case in point, Jayasinghe et al.'s (2023, p. 29) systematic review found 60% of RA articles did not provide a clear RA definition. They considered RA an ethos, encompassing a spectrum ranging from foundational beliefs to validated practices. Bless et al. (2023, p. 10) identified five agricultural narratives—organic, conservation, sustainable intensification, agroecology, and regenerative—and their geographical origins, founding actors, social-ecological triggers, challenge to industrial

[7]AEA touts SAP analyses and is a leading provider of folier applications, which should include clean water, plant nutrients, plant biostimulants (seaweed, hormones, enzymes…), microbial biostimulants (fulvic acids, humic substances…), microbial inoculants, and surfactants.

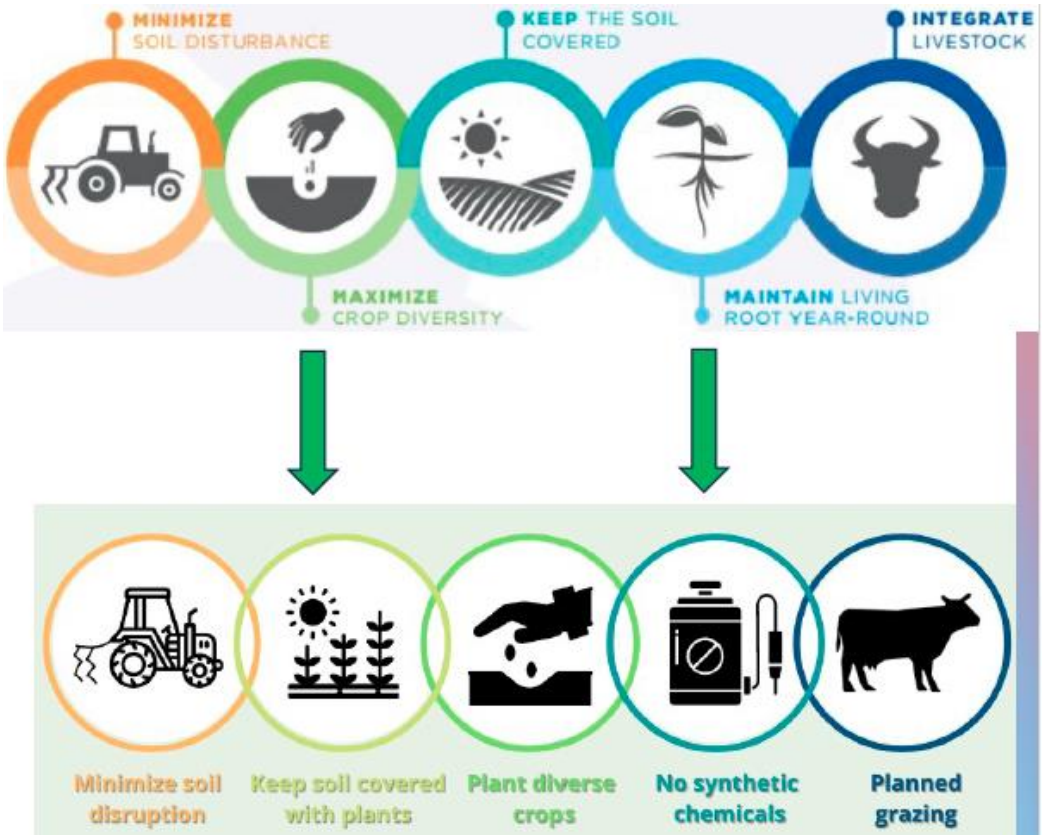
agriculture, and status. Gordon et al. (2023) consulted nine discourses that contribute to RA's storyline: Restoration for Profit; Big Picture Holism; Regenerative Organic; Regrarian Permaculture; Regenerative Cultures; Deep Holism; First Nations; Agroecology and Food Sovereignty; and Subtle Energies. They continued that varying RA discourses result in its four "tensions" of genealogy and holism, equity and power, definition, and departure (p. 1835). Another verification of the definition tension came from Newton et al. (2020, p. 7), who systematically reviewed scholar and practitioner definitions of RA and found five RA definition types: none offered; outcome-based; process-based; combined process- and outcome-based definitions; or definitions with multiple processes and/or outcomes.

Privileging a plurality of RA narratives allows for diversity (Page & Witt, 2022), placed-based context (Bless et al., 2023; Loring, 2021; Pascucci, 2020; USDA, 2021), and differences among the practices and narratives falling under the RA label, for which there are several certifications (KTG, 2025; RFSI, 2022). On the note of certification, A Greener World's (2025) "Certified Regenerative by AWG" defined RA as "a set of planned agricultural practices that ensure the holding is not depleted by agriculture practices, and over time the soil, water, air and biodiversity are improved or maintained to the greatest extent possible." While certification definitions like this one typically focus on Natural Capital benefits, RA is a more holistic concept spanning all of the community capitals, and should be considered sociologically (Burns, 2020).

So, on the one hand, RA multiplicities allow for breadth. On the other hand, RA's definitional ambiguity allows agri-business corporations to shape discourses to their own ends, which can lack depth or nuance and lead to cooptation and greenwashing (Giller et al., 2021, p. 16; Gordon et al., 2023, p. 1845).

For these reasons, it is important to always begin RA discussions with a definition, followed by principles. Therefore, as stated before, I advance the following RA definition, adapted from Gabe Brown (2018, p. 11): *a socially (re)produced ecological and biological system for growing food and restoring degraded soil and landscapes*. This process-based definition compliments the Plan-Do-Study-Act, which provides a structure for iterative testing of changes and incorporating feedback to improve a system's soil health quality (Cover Crop Strategies, 2024). It assesses farmers' practices based on five principles enacted on a continuum (Page & Witt, 2022), from industrial (0 – most extractive) to regenerative (5 – least extractive) (Anderson & Rivera-Ferre, 2021).

Figure 1.2. From Common to Preferred RA Principles: Moving from Reducing Synthetic Agrochemicals (Above) to Eliminating Them (Below)



Sources of images: LandscapeDNA (n.d.) (above) and Health Care Without Harm (2025) (below); shared under CC-BY 4.0 licenses.

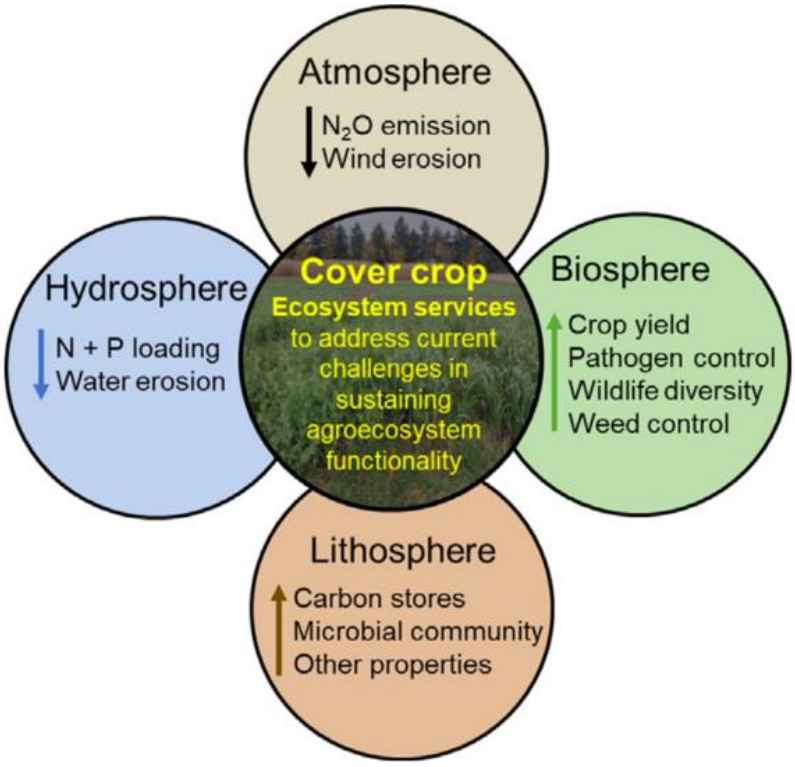
The five principles used by Fuhrer and Brown are most common in RA circles (Figure 1.2Figure 1.2). However, they allow for the possibility of suppressing and/or terminating cover crops with chemical herbicides, which are associated with harmful human and ecological health impacts. Therefore, I advance RA principles that trend more organic than regenerative (Jadhav, 2021; VCP, 2022). It is ideal to replace "maintain living roots year-round" (4th principle) with "no synthetic chemicals." "Maintaining living roots year-round" can be considered implicit to "keep the soil covered" (3rd principle), and the former's omission allows for minimum tillage practices if necessary and when appropriate.

These preferred principles are imperfect, and many farmers view 'spray or spade' for CC termination/suppression and/or weed control as an unavoidable necessity. Ultimately, principles and their catch-all, abstracted labels like 'regenerative' or 'organic' are most useful when contextualizing, inquiring, and certifying the ongoing, on-ground farm management practices, and learning from farmer's direct experiences in a particular place.

Because process-based definitions are currently "common and are perhaps the norm" (Newton et al., 2020, p. 8), adopting a process-based definition has implications for RA policymaking, for certification programs (Savory Institute, 2023; Staton et al., 2024) and carbon sequestration payments (Lal, 2019, 2020). There are several policy recommendations to advance regenerative agriculture within the current political system (NSAC, 2021, 2024; Sharma et al., 2022). However, programs rely on farmers to report measurable progress in regenerating soil health (Fenster et al., 2021; Fuhrer, 2016). Popular soil health tests include the Haney and Regen Ag Lab Certified tests (Understanding Ag, 2021), though they can be expensive and time consuming to mandate and scale.

CCs can maximize soil cover, plant and animal biodiversity, and the presence of living roots in the soil, which together total more than half of the generally agreed-upon soil health principles (Brown, 2018; Fuhrer, 2019; USDA NRCS, 2021). A proven ecological management practice (USDA NRCS, n.d.-a), CCs have several beneficial agri-ecological functions for the ecosphere's four spheres (Figure 1.3). Since antiquity, farmers in ancient China, Greece, and Rome have used CCs (or 'green manure'), for which there has been recent, renewed interest (Magdoff & Van Es, 2021, p. 137).

Figure 1.3. Cover Crop Benefits for the Ecosphere's Four Spheres



Source: Van Eerd et al., 2023, p. 1; shared under a CC-BY 4.0 license.

CCs have been shown to decrease a soil's susceptibility to compaction, temperature, and erosion (Adetunji et al., 2020; Huang et al., 2025; Jacobs et al., 2022a), and increase soil aggregate stability, *N* concentration, and soil water content (Blanco-Canqui et al., 2011; Blanco-Canqui et al., 2012). Producers in the Western corn belt perceived diverse cropping rotations as an adaptive strategy to cope with marginal lands (Wang et al., 2021), and CC adoption was

positively correlated with crop diversification and no-till adoption among U.S. soybean farmers in 2012 (Lee & McCann, 2019), indicating that CCs are often implemented by farmers who already use other conservation practices.

Perennial groundcovers, which are planted once and persist for multiple years in working lands where annual crops are grown (Raman, 2021, p. 4), could be another way to regenerate degraded agricultural landscapes (Bartel et al., 2024; K. J. Moore et al., 2019; Strohmeier et al., 2021). For instance, farmers can implement a "solar corridor crop system," drilling or solid seeding crops in broad, widely-spaced row strips ('corridors') that facilitate CC establishment for year-round soil cover (Kremer & LeRoy Deichman, 2014).

Despite the benefits of annual and perennial CCs and their increased adoption in the past decade, U.S.-wide CC adoption rates have remained in the single digits (Zhou et al., 2022). CCs are no silver bullet. In fact, if managed incorrectly, they can exacerbate emissions; e.g., in one study, legume cover crops enhanced yield by 16% but raised N_2O emissions by 36.2% (He et al., 2025). However, farmers can decrease CC emissions by incorporating no-tillage, deficit irrigation, and diversified crop rotations (e.g. CC mixes, ideally representing all four functional plant groups). CCs require farmers to have complex management knowledge and specialized equipment (Acharya et al., 2019, p. 2; Koehler-Cole et al., 2023; Kreitzman et al., 2022, p. 179). It can take years for CC benefits to accrue, but farmers incur extra costs immediately (Deines et al., 2023), one reason why farmers have called for greater CC economic incentives and/or more diverse crop and livestock markets (Bergtold et al., 2017; Roesch-McNally et al., 2018). That 72% of dairy operations and 89% of cow-calf operations with CCs reported harvesting or grazing at least some CC acreage suggested that their forage value may have helped drive adoption on those acres (Bowman et al., 2024). CCs are most popular in the Eastern U.S.; one reason could

be that it experiences greater annual average precipitation than in Central and Western U.S., increasing the likelihood of successful germination.

If more farmers are to plant more CCs, they will need subsidized. EQUIP payments can help incentivize RA practices such as cover crops, tree/shrub establishment, crop rotation, grassed waterway, filter strips, and so forth (Hayes, 2023, p. 2), though they are paltry compared to commodity subsidies. Building on the federal Pandemic Cover Crop Program, the COVER Act of 2023 (H.R.8527), introduced by Sen. Casten (2023), would have provided a $5 per acre crop insurance discount to farmers who plant CCs, but it did not pass subcommittee and was not reintroduced.

Soil health, RA, and CCs are undoubtedly good for the soil. But are these practices good for the farmer? It depends. Because farming is an inherently difficult occupation, CC practices that are more complex, time intensive, and costly can dissuade farmers from implementing them. But for farmers who can afford CC investments, take a long-term view, and lean into the learning curve, the changes can be transformative for their operation solvency, identity, and overall wellbeing. For instance, transitioning to RA practices strained farmers' existing social relationships while drawing them into new and previously neglected ones, including the more-than-human relations necessary for building soil health (Snorek et al., 2024).

The next section elaborates on the health of the 'souls' that steward soil health. It explores literature on U.S. farmer wealth, health, and identity. While it includes a few sources on these topics in the context of RA transitions, it mostly focuses on farmers in general (conventional and alternative).

Healthy souls: Farmer wellbeing and identity

"Souls" is a metonymy and metaphor for farmers' overall wellbeing, including health and wealth, and identity. Farming finances have become increasingly perilous (Carolan, 2022; Philpott, 2020). Over the past decade, the share of farmers reporting net farm income losses has increased, as well as the amount of reported losses (Key, 2019). Consider, from 1996-2017, the average U.S. farmer returns on corn acres accounting for operational costs (Meter, 2021, p. 57): they only made a profit in eight of those 22 years. This means that during the other 14 years, farmers spent more money raising their crops than they earned by selling them, resulting in an aggregate loss of $524 per acre (p. 58). According to USDA economists, in 2018, total net cash income from producing crops and livestock fell to $4 billion, lower than Great Depression–era levels; moreover, Midwestern farmers lost more than $60 per acre growing corn and gained only $10/acre growing soybeans (p. 34). Continuously buying industrial inputs can negatively impact farmers' Financial Capital (Soper, 2020). For example, one-third of the fertilizer applied to grow corn in the U.S. each year simply compensates for the ongoing loss of soil fertility, leading to more than a half-billion dollars in extra costs to U.S. farmers every year (Jang et al., 2021).

In general, farmer wellbeing has been studied in several contexts: male farmer's worsening health (Roy et al., 2013, 2014); -cide exposure (Andersson & Isgren, 2021; Barranco & Shihadeh, 2015; Beard et al., 2014a; Beseler & Stallones, 2008; Christie et al., 2015; Greenpeace, 2015); agricultural crimes (Smith, 2020); lack of access to health insurance and childcare (Hassink et al., 2016; S. Inwood, 2017; Rissing et al., 2021); changes in larger and international agricultural structures (Barranco & Shihadeh, 2015; Belyea & Lobao, 1990; Bondy & Cole, 2019; Goldsmith, 2001; Lorenz et al., 2000; Meyer & Lobao, 2003); job satisfaction (Meijboom & Stafleu, 2016; Muri et al., 2020; Vayro et al., 2020); agri-environmental schemes

(Saxby et al., 2018); climatic and environmental changes (Daghagh Yazd et al., 2019; Ellis & Albrecht, 2017; Gunn et al., 2021; Holler et al., 2020); aging, exit, and retirement and their impact on farmer identity and transition plans (Bacsu et al., 2017; Bice & Eichhorn, 1968; Contzen et al., 2017; Laberon et al., 2019; Peel et al., 2016; Riley, 2016b); and unsafe working conditions (A. Hall, 2007; McDuffie et al., 1995).

The rise in U.S. farmer suicides has been especially troubling (Bhattacharyya et al., 2020; Bissen, 2020; Bjornestad et al., 2021; Iyer, 2009; Meek & Khadse, 2022; Norrod, 2021; Ringgenberg et al., 2018)[8], as reported in popular outlets (Begnaud, 2017; Gutierrez, 2019; Kilgannon, 2018; Kristof & WuDunn, 2020; Perdue, 2018; Weingarten, 2018). Applying Durkheim's [1897] (2005) typology, there are two types of suicide: "egoistic"—not feeling a sense of belonging to their community[9]—or "anomic"—dramatic social and economic upheaval, like farm consolidation, concentration, declining net farm incomes, or debt. Suicide is ultimately a psychological and individual decision, but the larger, surrounding social structure of industrial, monocropping farming influences individual and community responses (Thompson & Barrera, 2019). In 2019, the Kansas Department of Agriculture launched a "Kansas Ag Stress" website to provide Kansas farmers with mental health resources, including helping farmers find a mental health provider, a 24/7 crisis text line, and a suicide prevention line. By doing so, they helped meet an urgent need, raising greater awareness and resources to help mitigate the overwhelming stress that farmers face.

[8] Studies use the CDC's associated federal Standard Occupational Classification (SOC) groups and/or the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI).
[9] Farmer wealth and Social Capital health can go together: "the economic viability of modern, capital-intensive farms increases when these farms are situated in multi-farm communities characterized by lasting social networks" (Gezelius, 2014, p. 223).

Farmer wellbeing is closely intertwined with farmer identity. Wellbeing is shaped by a farmer's identity cocreated with their friends, neighbors, community, and religious/spiritual beliefs (Farrell, 2015). Farming is an identity derived from a moral way of life (Bell, 2018), such that to farm the soil is to "farm the self" (Bell, 2004, p. 122). Thus, inherent in farming are moralized concepts of what it means to be a 'good' farmer (Riley, 2016a; Stock, 2007; Sutherland, 2013), which is usually conceived in terms of demonstrating a "high level of competence in the performance of professional farming activities" (Burton et al., 2021, p. 129).

The 'good farmer' concept is dynamic, geographically dependent, and has evolved over time (Riley, 2016a). Burton et al. (2021, p. 68) categorized its evolution into three broad periods[10]: (1) 'untidy farming' working with nature (14th-17th c.); (2) 'tidy farming' featuring the rise of drill husbandry, productivism, and 'feed the world' discourses (18th-19th c.); and (3) alternative agriculture movements critiquing the tidy farming paradigm (1970s-1980s), which emerged as the conventional model. Identity and farming are inseparable. Case in point, although the NASS Ag Census uses formal terms like "owner," "operator," and "tenet" to categorize, classify, and measure operational tenure and typology, "farmer" is still preferred because of the identities, livelihoods, and values communicated by that word. Who they are is what they do.

Overall farmer wellbeing – characterized by wealth, health, and identity – influences the wellbeing of the surrounding communities, in direct and indirect ways. Even though most non-farmers usually do not interact with a farmer or touch farmland, all share the same biome—we breath the same air and drink the same water. Plus, farmers exert a much larger influence and impact on land use than most (sub)urbanites, and for that reason farmers occupy a privileged

[10] These three periods of the 'good farmer' identity chronologically correspond with the three agrarian revolutions (Paige, 1978). If the fourth agriculture revolution (Akinkuotu, 2023) is indeed here—characterized by precision ag, generative AI technology, autonomous equipment, and more—then a fourth 'good farmer' period may too be underway, though it is too soon to know for sure.

position in their community. Farmers feed us and impact our surrounding ecosystems. In many ways, we are only as healthy as our farmers.

In a follow-up to *Theory U,* Otto Scharmer (a German farm kid) & Kaufer (2025, p. 29) began with soil to metaphorically describe their 'social field' concept:

> You could think of a social field as a social system *with interiority* or, perhaps, a social system *with a soul*… [Theory U] aims to bridge the three divides (ecological, social, and cultural/spiritual). All social contexts are characterized by a specific *relational quality*. Just as the quality of the soil determines the quality of the harvest, the underlying quality of the social field – the quality of the relationships in the space – shapes the quality of the practical results in social systems. Relationships include relationships to others, to nature, and to ourselves.

Sapiens systems of soils and societies are fundamentally intertwined, interdependent, and symbiotic. Scharmer & Kaufer (2025, p. 90) reminded that the etymological origins of 'humus,' 'humanity,' and 'humility' are all the same, deriving from the Indo-European *ghom-*, meaning 'earth' or 'ground.' Humility is grounded, not elevated or arrogant. We creatures, then, should be "humbled to nourish the earth that nourishes us" (p. 91).

Nourishment ultimately connects the health of the soil and the health of the soul (Provenza, 2018). We are social creatures evolved for deep, meaningful connections to one another and to the earth. We seek grounded transcendent. We need nature, good food, communities, and pursuit of the divine to keep our minds and bodies nourished. It is easy to acknowledge and accept nourishment as essential, but it is much more difficult to transition to different ways of being, living, and doing that more closely align with the demands of the critical realities we face. Transitioning to RA may be hard, but it may also be more than necessary.

Rationale and Research Questions

RA is contextual, nuanced, and advances a holistic systems approach (Kelley, 2022, p. 7). It is an agriculture rooted in the recognition of omnipresent nature-human connections and interrelated wellbeing among all. Some scholars have made religious or spiritual conceptual connections between regenerating soils and regenerating souls (Gosnell, 2021a, 2021b; VanWinkle & Friedman, 2017). These efforts have attempted to unite aspects of the empirical dimension (soil) with those in the actual and real dimensions (soul). Like all humans do, farmers reify general and occupation-specific narratives, metaphors, myths, and moralities (Baumer, 2025, p. 43; Farrell, 2015; A. L. Hall, 2024). RA's process-relational ideas grow from deep ancestral roots. For instance, in *Genesis 2:7* of The Holby Bible, humans were formed from the dust of the Earth, breathed on by God, and became living souls, the immaterial essence of a living being (O'Driscoll, 2023; Zahnd, 2018). Scholars have extended the regeneration of agriculture has to encompass the regeneration of socio-economic systems (e.g. Ibrahim et al., 2017; Pretty et al., 2025), uniting non-human and human health.

Despite RA's grounding as a holistic movement aiming to heal the planet, places, and people, a majority of empirical studies only examine its benefits for the health of the soil (natural capital, agronomic, and/or agri-ecological analyses). Few studies have analyzed how management practices have impacted the health farmers and non-farmer community members, even though these types of studies can crucially advance RA discourses and actions.

Given the inseparability of soil and soul health, the paucity of studies on their interrelations, and the necessity to advance an agriculture that heals both, it was crucial for me to pursue a research agenda that posed the following questions. To what extent can social and structural relationships between 'soils' and 'souls' be empirically proven within and between

communities in Kansas? How do farmers' practices and principles affect the health of the agri-ecosystem they inhabit, their operation, their family, and their community? How do specific eco-social contexts influence soil health and farmer and community wellbeing? Specifically, I proposed the following two research questions (RQs).

RQ1

What was the nature of the social interrelationships between the health of soils and the health of souls – of farmers and communities – in four Kansas counties?

RQ2

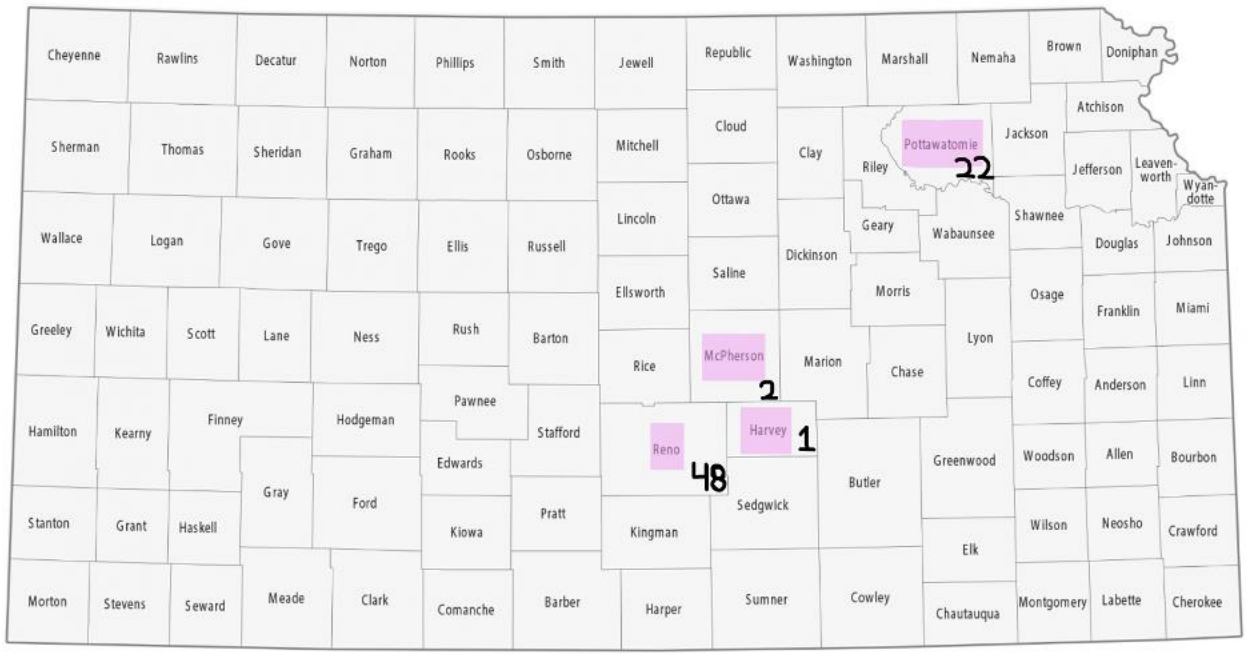
How did those Kansas farmers experience transitions to regenerative agriculture principles and practices?

To explain how I answered these questions, I detail my methodology.

Methodology

I primarily used qualitative research methods featuring reflexive thematic analysis of interview experiences, contextualized with descriptive analyses of secondary data. I purposefully chose the four counties of Pottawatomie, Reno, Harvey, and McPherson, but primarily the former two since they were where 96% of interviewees lived, worked, and/or farmed (Figure 1.4).

Figure 1.4. The Four Kansas Counties Where *n* of the 73 Total Interviewees Lived, Worked, and/or Farmed



Reflexive thematic analyses of interview transcript data

I followed all protocols for ethical research with human subjects, and the research was approved by Kansas State University's Institutional Review Board (IRB). That I was a life-long Pottawatomie County resident added experiential richness, reflexivity, and a certain positionality. However, I did not conduct ethnographic research.

To obtain the data analyzed in Chapters 2 and 3, I conducted—from December 20, 2023 to May 19, 2024—semi-structured, in-person interviews with 22 PT interviewees using purposeful and snowball sampling techniques (S. Campbell et al., 2020; Palinkas et al., 2013). I primarily sought out CC users, but also CC experts (in extension, federal conservation, agronomy, input sales, and crop insurance) and/or community leaders (purposeful). At the end of interviews, I asked for recommendations of other potential interviewees (snowball). That I had previously known five of the interviewees introduced minimal purposeful sampling bias and can be considered a limitation. There were 18 farmers and 4 non-farmers, and 10 of the 18 farmers

also held leadership positions in agricultural and/or community organizations. We conversed in vehicle cabs, barns, pastures, and during chore-time. On average, interviews lasted nearly two hours. With an average of 1,183 operated acres and a median of 1,010, the sample more than doubled PT's 2022 average farm size of 493.03 acres (USDA NASS, 2024b, p. 245). Once again, I assigned respondents pseudonyms to ensure their anonymity.

Table 1.4. Descriptive Statistics of Interviewees from Pottawatomie, Reno, McPherson, and Harvey Counties (*N* = 73)

Description, Item	*n*	Avg	Meaning and context
Male	68	85.29%	That most were white males limited generalizability but made the sample comparable to the larger population demographics.
White, non-Hispanic	73	100%	
Average acres farmed?	59	1,762	More than doubled Kansas' 2022 average farm size of 804 acres.[1]
Irrigate?	62	38.71%	0=no; 1=yes. Over one-third irrigated.
Engage in direct marketing?	67	22.39%	0=no; 1=yes. Under one-fourth direct marketed products.
Substantial off-farm income?	64	46.88%	A proxy for a 'part-time' or 'non-primary occupation' farmer.
Which best describes your farm enterprise's profitability?	56	5.26	1=large loss; 2=moderate loss; 3=small loss; 4=breaking even; 5=just making a profit; 6=moderately profitable; 7=highly profitable
In general, are you profitable?	56	91.07%	0=no; 1=yes
How likely are you to leave farming in the next 5 years? (farm exit)	57	2.34	1=very unlikely; 2=unlikely; 3=somewhat unlikely; 4=somewhat likely; 5=likely; 6=very likely
Overall life satisfaction	56	8.21	How satisfied are you with your life overall? 0=I feel no satisfaction at all; 10=I feel completely satisfied (Cummins et al., 2003)
Standard of living	55	8.32	How satisfied are you with your _____?
Health	56	7.69	How satisfied are you with your _____?
Achieving in life	56	7.95	How satisfied are you with your _____?
Personal relationships	56	8.06	How satisfied are you with your _____?
Safety	56	8.83	How satisfied are you with your _____?
Part of community	56	7.79	How satisfied are you with your _____?
Future security	54	7.93	How satisfied are you with your _____?
Spirituality/religion	55	8.55	How satisfied are you with your _____?
Personal Wellbeing Index Total	57	70.81	Average total score out of 90, or a 78.67% overall satisfaction level.

[1]USDA NASS, 2024, p. 3.

For the data represented in Chapter 4, I conducted semi-structured interviews (all but two in-person) with 51 farmers—from June-August 2021 and January-February 2022—who resided within McPherson (*n* = 2), Harvey (*n* = 1), and Reno (*n* = 48) counties near the Cheney

Reservoir. Using purposive sampling (Bernard, 2017), I initially interviewed 24 farmers who were enrolled in a RA pilot program, which was supported by General Mills, a multinational food corporation. To further extend and diversify the group of interviewees, I asked farmers in the initial group to identify others in the region who were interested in or trying to add RA practices to their operations. I found the 27 other farmers using snowball sampling (Noy, 2008). I assigned respondents pseudonyms to ensure their anonymity. I collected interviewees' demographics, farm characteristics, and personal wellbeing survey scores purely for descriptive purposes (Table 1.4).

I followed the six steps of reflexive thematic analysis (Braun & Clarke, 2006; Byrne, 2022; Knott et al., 2022, p. 5; Naeem et al., 2023; Vanover et al., 2021), as detailed below.

1. **Become familiar with the data**. I initially used Otter.ai to transcribe interviews, then checked its transcriptions against the recordings for accuracy and edited the former as needed. While doing so, I became more familiar with the data.
2. **Generate initial codes.** Going through the transcripts a second time, I used inductive coding to search for key words/phrases and generated initial codes (Bingham, 2023, p. 2), both for complete sentences/thoughts and entire paragraphs (meta codes). This ensured thorough, inclusive, and comprehensive coding (Braun & Clarke, 2006, p. 36). I also used Atlas.ti's AI code suggestion feature to generate a separate list of codes.
3. **Search for emergent themes.** While searching for emergent themes, I compared my initial codes against those generated by Atlas.ti's AI code suggestion feature and the paragraph-level 'meta' codes. I revised, combined, and eliminated codes, checking them against one each other and back to the original data; in this way, themes iteratively evolved.

4. **Review themes.** I reviewed themes to ensure they were internally coherent, consistent, and distinctive. I compared data points and codes, and then condensed codes into categories, categories into themes, and themes into findings (Charmaz, 2024).
5. **Define themes.** Defining entailed assigning a code name label, full definition based on inclusion and exclusion criteria, and an exemplary quotation (DeCuir-Gunby et al., 2011, p. 138).
6. **Name themes**. For the last step, I named the finalized codes. To ensure that naming codes did not stem from my prejudices and prior experiences, I explicitly recognized my presuppositions, set them aside, and incorporated rival positions (Bailey, 2008).

Descriptive analyses of secondary data to contextualize thematic analyses

I used descriptive analyses to help contextualize thematic analyses, and to compare the descriptives of interviewee samples to the county-level trends. I aggregated data from several sources, available in the *3C dataverse: Community capitals, cover crops, & conservation agriculture in the U.S. Corn-Soy Belt v. 2.2* (Miller-Klugesherz & Flora, 2025).[11] The *3C dataverse* was geographically bounded by the Corn-Soybean Belt region, and includes 315 total variables aggregated from 33 governmental, nongovernmental, and nonprofit sources (Table 1.5). Though I collected and consulted all variables, I only included a portion in my analyses.

Dissertation Outline

Each chapter addresses both research questions to varying extents. I primarily answered RQ1 in Chapters 2 and 3, and RQ2 in Chapter 4. In Chapter 2, I examined how rapid commercial and residential development in exurban and suburban Pottawatomie County was associated with

[11] These data reflect three population levels: (1) Individual farm operations (11.11%), (2) Aggregated, county-level farm data for farm operations or farmland (area/acres, whether crop, pasture, woodland, or a combination thereof) (52.38%), and the (3) entire county, including farmers and nonfarmers (36.51%). Of the 315 variables, 262 were unique, while 53 had the same measurement but were reported for a different year.

improved wellbeing but has also fragmented agricultural land use and impeded farm viability. In Chapter 3, I explored what those farmers were looking for in cover crops, contextualized with county-level farmland use and chemical herbicide trends. In Chapter 4, I found that a majority of interviewed farmers in Reno, Harvey, and McPherson counties experienced regeneration as a recovery process from the subsidy-fueled production treadmill, and that they experienced shifts in their identities as 'good' farmers away from 'others' (industrial farmers).

Having introduced the theoretical framework, literature review, rationale and research, methods, and outline, I now turn to Chapter 2.

Table 1.5. Data Sources Consulted in the *3C Dataverse*

Acronym	*Full*	*Year(s)*
ASARB Census	Association of Statisticians of American Religious Bodies' U.S. Census of Religion	2020
CDC's	Center for Disease Control	2019
BRFSS	Behavioral Risk Factor Surveillance System	2020
EPHTN	National Environmental Public Health Tracking Network	2021
NCHSS' NMF	National Center for Health Statistics' Natality and Mortality Files	2016-2020
TS&DR's SVI	Toxic Substances and Disease Registry's Social Vulnerability Index	2020
Chetty et al.'s	Raj Chetty and colleague's (2018, 2022)	2017
SCI	Social Capital Index	2022
OA	Opportunity Atlas	2020
CHR&R, by UW-M's PHI	County Health Rankings & Roadmaps, developed by University of Wisconsin-Madison's Population Health Institute	2023
CTIC, TNC, & Regrow Ag's	The Conservation Technology Information Center, Regrow Ag, and The Nature Conservancy	2017, 2019
DNDC	Denitrification-Decarbonization model	
OpTIS 2.0	Operational Tillage Information System 2.0	
FA's MTMG	Feeding America's Map the Meal Gap	2020
MIT's ED&SL	Massachusetts Institute for Technology's Election Data and Science Lab	2020
NOAA's NCEI	National Oceanic and Atmospheric Administration's National Centers for Environmental Information	2023
PRISM at NACSE	PRISM Climate Group, Northwest Alliance for Computational Science & Engineering	2017
U.S. Census	United States Census Bureau	
ACS 5-yr	American Community Survey five-year population estimates	2017-2021
BPS	Building Permit Survey	
GF	Gazetteer Files	2023
IAP	Income and Poverty	2021
OQM	Operational Quality Metrics	2020
SAHIE	Small Area Health Insurance Estimates	2020
SAIPE	Small Area Income and Poverty Estimates	2023
USDA	United States Department of Agriculture	
ERS' CTP,	Economic Research Service's County Typology Codes,	2015
FEA, &	Food Environment Atlas, &	2019-2020
RUCC	Rural Urban Continuum Codes	2013, 2023
NASS' Ag Census	National Agriculture Statistics Service's Census of Agriculture	2017, 2022
NRCS' GDG,	Natural Resources Conservation Service's Geospatial Data Gateway,	2017,
WSS	Web Soil Survey	2014
U.S. DoC	United States Department of Commerce	
NIST	National Institute of Standards and Technology	2023
REIS	Regional Economic Information System	2023
U.S. DoL's BLS	United States Department of Labor's Bureau of Labor Statistics	2021
U.S. EPA's SDWIS	United States Environmental Protection Agency's Safe Drinking Water Information System	2021
USPS	United States Postal Service's two-letter state abbreviations	2023
Xia et al. 2021	Xia, Kwon, & Wander's (2021) 30-year, county-level corn nitrogen fertilizer rates	1987-2017

“Stumped”

Ten pines once lined our Kansas home.
Now rotten stumps needed axed out.

There’s nostalgia, yes. Old-age quivers, sure.
But more so, a better understanding of time.
For each notched, hacked, and hauled piece,
pieces of my childhood.

time
shading summer sun beams beckoning brow sweat
time
raking fire-hazard needles
time
using its branches to climb onto the roof for a first kiss
time
family dog’s final resting shade
time
trees’ breezes breathe in every ‘hello!’ and ‘take care!’,
the time between each grows longer,
time
in a form ever-changing.

From seed to sapling
to sun-synthesizer to stump to dust,
pine’s floating feelings
root me in place.

Dandelions and fescue dance
on pine graves,
new roots intertangle with old.
Beauty of a brimming beginning all too familiar.

Axe me and I’ll tell you,
I’m a pine.
Mind sharp as its needles,
every memory a new ring,
and roots as grounded as an upbringing
that can never be hauled away.

- Jacob Miller (2019b)

Chapter 2 - Challenges to production agriculture in Pottawatomie County, Kansas

Abstract

Pottawatomie County, Kansas, features Flint Hills prairie, Oregon Trail history, lots of livestock, and commodity crop production. In 2023, it posted the highest population growth rate in Kansas, with high rates of community wellbeing and exurban and suburban sprawl. For farmers who have depended on maintaining and adding contiguous farmland to their operations, it has become increasingly difficult for them to compete with the prices that residential and business developers offer for farmland. Primary-occupation farmers also feel threatened by concentrated farm sales, redistricting, and an expanded county commission. I used Flora et al.'s (2016) community capital framework to assess rising tensions between and among stakeholders with interests in farming and nonfarm stakeholders with interests in development. Social capital—which includes social trust, networks, and shared values that people can cultivate and use to improve their livelihoods—was especially germane. To better understand the nature of social capital within and between the two stakeholder groups, I integrated the eco-social symbiotic spectrum (ranging from mutualism to competition) to perform a reflexive thematic analysis of 22 semi-structured interviews. Interviewees shared their experiences with, and perceptions of, the changing county dynamics, revealing how different symbiotic relationships influenced social capital accrual. Interviewees' perceptions largely depended on their occupation. Primary-occupation farmers viewed their relationships with development stakeholders as parasitic, with the latter benefiting from the former, and their relationships with other farmers as competitive, undermining their social capital. Conversely, secondary-occupation farmers and community leaders expressed commensalism and mutualism with their networks. To ease tensions among stakeholder groups,

the county and/or certain townships could implement property tax reforms—to reduce the degree to which farmland owners subsidize exurban and suburban expansion—and invest in more locally produced specialty crop infrastructure.

Keywords

Community Capitals Framework; Development; Eco-Social Symbiosis; Pottawatomie County, Kansas; Primary-Occupation Farmers; Qualitative Methods; Social Capital, Wellbeing

Highlights

- Rapid commercial and residential development in exurban and suburban Pottawatomie County has associated with improved wellbeing but has also fragmented agricultural land use and impeded farm viability.
- Two social trends contextualize added pressure on farmers. First, farm sales increasingly concentrated. Second, compared to pre-2024, redistricting and the addition of two board members gave greater representative power to people in exurban and suburban places than those living on the lion's share of PT farmland.
- Taking an eco-social symbiosis approach to assessing Social Capital stocks, I analyzed the relationships between and among farming and development stakeholder groups.
- Through a reflexive thematic analysis of 22 interviewees (farmers and/or agricultural and/or community organization leaders), I identified each groups' perceptions and experiences with themselves (bonding) and one another (bridging).
- Primary-occupation farmers of larger operations expressed parasitic relationships with development stakeholders and competitive land rent and purchase relationships with other farmers. They felt pressured to expand and/or intensify production. Secondary-occupation farmers of smaller operations espoused commensalism & mutualism.

Introduction

The expansion of exurban and suburban development into historically agricultural areas has emerged as a defining challenge for U.S. farmers and rural communities in the 21st century (Gazillo & Paterson, 2025; Meijerink & Roza, 2007; Satterthwaite et al., 2010). Nonfarmers and commercial/residential developers continually seek to purchase farmland (Halperin, 2023). Xie et al. (2023) projected that, by 2040, if "development continues at the same pace…this increase would collectively result in 18.2 million acres of agricultural land lost and fragmented" (p. 16).

Land use transitions can disrupt agricultural economies, erode farming communities' social cohesion, exacerbate rural-urban tensions, and shift local policy priorities away from land stewardship (Clark et al., 2014; C. B. Flora et al., 2016, p. 338; Tickamyer, 2006, p. 419). Commercial and residential development reshapes social, economic, and environmental conditions for farmers and nonfarmers alike (An et al., 2011; S. M. Inwood & Clark, 2013; Oberholtzer et al., 2010).

I investigated how these tensions manifested in one rapidly changing locale: Pottawatomie County (PT). In 2023, PT recorded the fastest population growth among all 105 Kansas counties (Self, 2023). PT's economic and social changes, driven in part by agricultural research and biosecurity investments, created the complex context for interactions between two groups: (1) stakeholders with interests in farming, and (2) nonfarm stakeholders with interests in development.

Given these tensions and dynamic social forces, I asked: *How have farming and development stakeholder groups perceived and experienced the emerging relationships between and among them*? To answer, I integrated the community capitals framework's (CCF) concept of

social capital with the eco-social symbiosis spectrum to analyze the character of these stakeholder relationships.

By performing a reflexive thematic analysis of 22 semi-structured interviews, I revealed how farmers' occupation type (primary versus secondary) influenced perceptions of stakeholder groups. This knowledge can give PT and other community leaders improved insights into their leadership situations and contexts, enabling them to more effectively balance the complex considerations for advancing mutualism and community wellbeing.

Theoretical Framework

The theoretical framework included the community capitals framework integrated with social capital and eco-social symbiosis.

Community Capitals Framework (CCF)

Communities can help steward Earth's working landscapes by harnessing various forms of 'capital,' or the resources people invest into communities to create more resources for the future (Emery & Flora, 2006). Flora et al.'s (2016) CCF incorporated the aims of a healthy ecosystem, vital community, and social wellbeing, and has been used to take stock of resources in counties experiencing economic and social changes. CCF was an appropriate theoretical framework for PT given that its residents experienced significant increases in housing stock and new business infrastructure, economic activity, population, and wellbeing, while being surrounded by agricultural farmland. According to the Pottawattamie County Economic Development Corporation (PCEDC) (2022), 75% of PT's land was in farmland in 2022.

CCF is a functional framework with seven capitals (Table 1.1). I found it most suitable to analyze the dynamic relationships between agricultural production and commercial and residential development. CCF has been used in varied agricultural contexts, including sustainable

agriculture (Butler & Flora, 2006; Flora, 1995; Flora, 2011; Warren et al., 2001), participatory agroecological and agri-environmental schemes (Arnott et al., 2021; Kansanga et al., 2020), community-supported agriculture (Furness et al., 2022), and cooperative models (Hale & Carolan, 2018; Kustepeli et al., 2023; Mohammadi et al., 2024; Tuna & Karantininis, 2021).

Social Capital and Eco-Social Symbiosis

Although I initially considered all seven capitals when framing my research plan and questions, social capital (SC) emerged as the most applicable capital for analyzing the tensions among people in production agriculture and commercial and residential development. SC is at the heart of sustainable community development (Halstead et al., 2022; Mattessich, 2009), and includes social trust, networks, and shared values that people can cultivate and use to improve their livelihoods (Ostrom & Ahn, 2003; Putnam, 1995). SC networks can bond, bridge, or link (Cofré-Bravo et al., 2019), as explored in the following paragraphs.

Bonding SC involves closed, dense networks featuring strong ties within homogenous groups (Putnam, 2000, p. 23). Relationships between farmers are considered bonding SC, and tend to be based on shared experience, idea development, equipment sharing, and high-level knowledge exchange (Cofré-Bravo et al., 2019, p. 55; Fisher, 2013, p. 20). SC has been found to improve farmer wellbeing (Cavatassi et al., 2012, p. 554), and shared trust exhibited an important influence on farmers' management decision-making (Fisher, 2013, p. 16).

Bridging SC has shown to bolster people's mutual relationships outside of their homogenous groupings (Agnitsch et al., 2006; McDaniel et al., 2021). The formation of interconnected networks of related businesses and organizations ("clusters"), along with the expansion of agriculture-linked industries and increased employment and spending, can strengthen a community's SC (Adhikari et al., 2018, p. 266). Because SC is a private and public

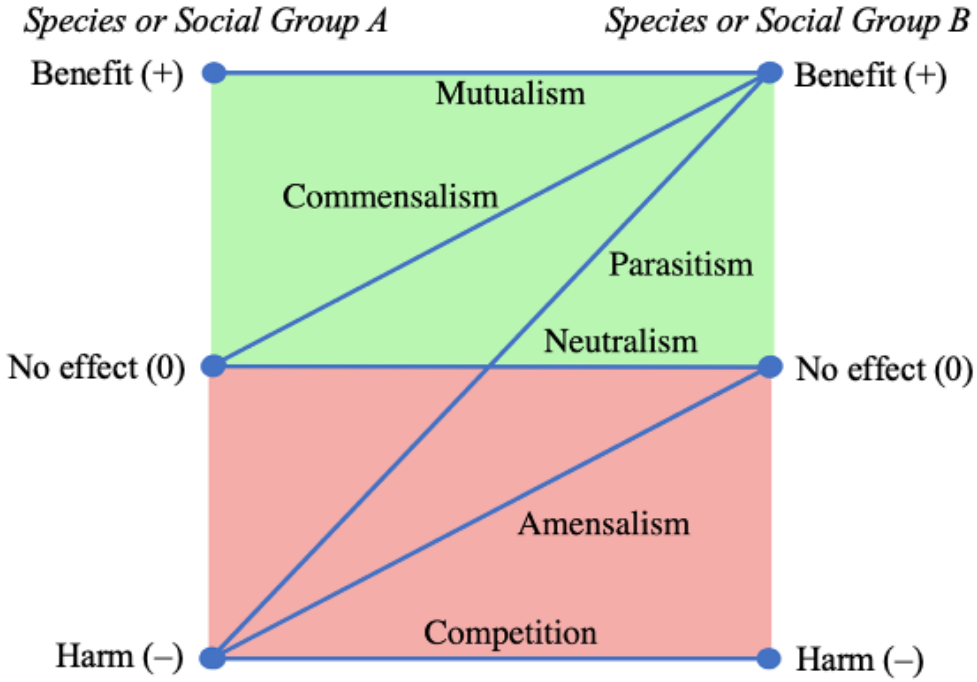
good (M. Ibrahim et al., 2017, p. 9), it serves as a conduit for communal activities (Future Farmers of America [FFA], county fairs, farmers markets) that bridge the divide between nonfarmers and farmers; for example, when nonfarmers reported positive direct relationships with farmers, their support for agriculture was stronger (Sharp & Smith, 2003). Of course, the strength of bridging SC depends on occupation type (Gómez-Limón et al., 2014, p. 17). Among farmers, bridging SC helps them gain new kinds of information, build social cohesion, and engage in collective action (Fisher, 2013, p. 15).

Linking SC refers to ties between individuals and groups in hierarchical relationships ((Johnston & Mellor, 1961; Woolcock, 2001, p. 72). The PT farmland-development situation is embedded in and is heavily influenced by the global agri-food system (Carolan, 2022, p. 28), federal commodity subsidy programs (Bruckner, 2016), and crop insurance policies, all of which shape farming by rewarding productivity maximization (Yu et al., 2018).

To best conceptualize the mechanisms that form SC in the context of natural agroecosystems, I incorporated the concept of 'eco-social symbiosis' to better understand the eco-social dynamics occurring between and within human networks and natural ecologies (Bao, 2023; Walton et al., 2024, p. 13). Symbiosis originally referred to the long-term relationships between different species (Margulis & Lovelock, 1981), "is unavoidably cross-disciplinary" (Peacock, 2011, p. 224), and has been used to analyze within-species networks. Scholars have integrated SC frameworks with evolutionary theory to explore the complex inter- and intra-actions of matter, culture, and sociality (Hird, 2010). For instance, there have been at least 16 socio-ecological sustainability frameworks integrated with CCF (Panzarella et al., 2023), and scholars have called for more studies on socio-ecological ethics and policies (Elsen, 2018;

Hirvilammi & Helne, 2014; Quilley, 2009). The six-pronged eco-social symbiosis spectrum ranges from mutualism to competition (Figure 2.1).

Figure 2.1. Eco-Social Symbiotic Relationship Spectrum



Background

Pottawatomie County (PT) is located northeastern Kansas and features native prairie and Flint Hills, products of the late Pleistocene. The Tuttle Creek reservoir forms its Western border while the Kansas River and Interstate 24 shape its southern border. Since early European settlement, alterations in the agrarian landscape have influenced transitions in the region's political economy (Middendorf et al., 2008, p. 206). According to the KU Institute for Policy & Social Research (2023), in 2023, 26,382 people resided in PT, its largest recorded population. Compared to 2023 population trends for the other 104 Kansas counties, PT had the steepest annual increase at +17.3% (Self, 2023). Sanderson (2019, slide 9) projected PT to grow 59.2% by 2044. Most growth in PT has occurred along the southern border. In 2011, 70.80% of PT residents lived in the four most populous townships—Blue, Wamego, Saint George, and Saint

Mary's (U.S. Census Bureau, 2023)—but by 2023, 74.98% did (Table 2.1). Population increases have concentrated in the Blue and Saint George townships. In part thanks to PT's rapid population and economic growth, nearly every human wellbeing measure increased since 1997 (Table 2.2). In 2023 Pottawatomie County ranked as the second healthiest of all 105 counties (County Health Rankings & Roadmaps, 2023). When performing this study, I had lived in PT for two-thirds of my life and knew people practicing commodity and specialty agriculture.

Table 2.1. Township Populations as a Percent of Pottawatomie County, Kansas's Total Population,[a] 2010–2023

Subdivision[d]	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Wamego[2]	24.39	24.61	24.45	24.39	24.25	24.16	24.13	24.01	23.88	23.81	22.37	22.55	22.35	22.19
Blue[1]	14.20	13.76	14.00	14.15	14.23	14.30	14.34	15.11	15.18	15.23	19.43	19.07	19.33	19.55
Saint George[4]	15.91	15.75	15.89	15.95	16.13	16.38	16.50	16.82	17.15	17.34	17.73	17.82	17.96	18.11
Saint Mary's[3]	16.92	16.68	16.74	16.69	16.59	16.51	16.33	16.09	15.93	15.78	15.12	15.38	15.26	15.13
Louisville[3]	3.74	3.93	3.82	3.84	3.52	3.74	4.63	4.49	4.86	5.27	3.96	3.69	4.04	3.89
Mill Creek[5]	4.71	5.26	4.99	4.71	5.31	4.88	5.00	5.49	5.04	4.45	3.78	3.75	3.43	3.56
Emmett[5]	1.99	2.66	2.28	2.27	1.62	1.16	1.33	1.39	1.61	1.63	1.78	3.41	3.14	2.99
Rock Creek[5]	3.45	2.74	2.76	2.96	2.78	2.75	2.50	2.26	2.12	2.71	2.73	2.16	2.18	2.27
Pottawatomie[5]	2.80	3.13	3.34	3.78	3.81	3.87	3.83	3.25	3.10	3.06	2.71	2.43	2.13	2.08
Grant[5]	1.25	1.25	1.34	1.26	1.21	1.40	1.47	1.09	1.04	0.96	0.93	0.98	1.40	1.65
Blue Valley[5]	1.60	1.91	1.74	1.78	1.53	1.62	1.50	1.51	1.38	1.59	1.50	1.58	1.36	1.69
Belvue[3]	1.71	1.44	1.56	1.49	1.54	1.82	1.96	2.35	2.70	1.99	1.55	0.99	1.16	0.95
Lone Tree[5]	1.01	1.83	1.48	1.34	1.55	1.46	0.96	0.81	0.81	0.83	0.90	0.71	1.08	1.13
Shannon[5]	1.26	1.10	1.53	1.19	1.37	1.12	1.08	0.89	0.85	0.97	1.01	1.20	1.00	1.13
Union[5]	1.04	0.80	0.98	0.82	0.86	0.94	0.66	0.55	0.76	0.98	0.94	1.38	0.93	0.98
Green[5]	0.86	0.44	0.48	0.64	0.60	0.53	0.79	0.67	0.76	0.81	0.84	0.65	0.93	0.66
Sherman[5]	0.55	0.75	0.46	0.68	0.65	0.68	0.60	0.69	0.36	0.29	0.50	0.63	0.71	0.77
Clear Creek[5]	0.65	0.43	0.49	0.44	0.76	0.89	0.73	0.84	1.02	0.64	0.59	0.45	0.47	0.20
Lincoln[5]	0.55	0.44	0.46	0.43	0.44	0.42	0.44	0.47	0.43	0.47	0.37	0.24	0.36	0.35
Saint Clere[5]	0.34	0.12	0.00	0.00	0.03	0.03	0.07	0.05	0.06	0.04	0.19	0.15	0.13	0.11
Center[5]	0.49	0.35	0.62	0.53	0.70	0.63	0.41	0.38	0.39	0.52	0.54	0.45	0.33	0.38
Vienna[5]	0.40	0.46	0.45	0.53	0.41	0.55	0.61	0.64	0.43	0.42	0.32	0.16	0.16	0.10
Spring Creek[5]	0.18	0.17	0.15	0.13	0.09	0.16	0.13	0.15	0.16	0.22	0.22	0.16	0.15	0.13

Data source: U.S. Census Bureau, 2024.

[a] Cells shaded in green indicate the year with the largest % of the total PT population, whereas red shaded cells indicate the year with the smallest %.
[b] County commission Districts 1 through 5.

Table 2.2. Human Wellbeing Variables, Percent Change (%Δ), 2010-2024

Variable	% Δ[a]	Years[b]	*Linear r^2*
Low birthweight[1]	-21.21	2010-2024	0.235
Poor or fair health[2]	13.16	2010-2024	0.437
Adult obesity[2]	32.97	2010-2024	0.572
Uninsured[3]	-30.58	2010-2024	0.346
Unemployed[4]	-24.38	2010-2024	0.257
Child poverty[5, 6]	-25.45	2010-2024	0.301
High school graduation, including equivalency[5]	-12.42	2015-2022	0.811
Some college (no degree) or associate's degree[5]	-2.96	2015-2022	0.578
Bachelor's degree or higher[5]	16.38	2015-2022	0.871
Graduate or professional degree[5]	24.56	2015-2022	0.798
Median household income (June 2024 inflation-adjusted)[5, 6]	9.48	2010-2024	0.590
Population[6]	22.12	2010-2023	0.695

[a] For variables 'low birthweight' through 'child poverty,' negative %Δ indicate improved wellbeing. Conversely, for variables 'HS graduation' through 'median household income,' negative %Δ indicate worsened wellbeing.
[b] Using the Community Health Rankings and Roadmaps datasets, I compiled all available data within these ranges. Using the coefficient of determination for the linear regressions (r^2) – a goodness-of-fit indicator – I assessed variance across ranges.
Data sources: [1]National Center for Health Statistics' National Vital Statistics System – Natality Files; [2]Center for Disease Control's Behavioral Risk Factor Surveillance System; [3]Small Area Health Insurance Estimates; [4]U.S. Department of Labor's Bureau of Labor Statistics; [5]U.S. Census Bureau's Small Area Income and Poverty Estimates; and [6]U.S. Census Bureau's American Community Survey Five-Year Estimates.

For PT's rural residents and farmers,[12] the changes brought by population growth were simultaneously exciting and threatening. Growth brought new talents, ideas, economic opportunities, and ways of being, but "the influx of people and businesses [could] alter the style and pace of life that originally made these areas appealing" (D. L. Brown & Swanson, 2003, p. 31). Growth in population accompanied growth in the annual earnings of nonfarmer residents, allowing them to offer higher bids for land.

[12] I used "farmer/farming" terminology – rather than USDA's terminology of 'producer' or 'operator' – to convey the entangled identity and culture of the farm occupation and not limit farmers to the products they produce (Vayro et al., 2020).

The PT Board of County Commissioners recognized these tensions in 2019 when they adopted Kendig Keast Collaborative's "Plan Pottawatomie County 2040," the county's first strategic plan since 1994. While its language was generally supportive of farmland preservation, the plan offered "potential revisions" to PT's quarter-quarter rule (p. 12), a popular form of cluster zoning. Moreover, the local newspaper asked 2024 county commission candidates, "What are your plans for preserving farm ground while also creating development opportunities and jobs throughout the county?" (Goodman, 2024).

I identified two potential reasons for the mounting tensions between stakeholder groups, which together provided an important background for understanding the situation in PT. First, larger socio-economic forces pressured primary-occupation farmers to expand their scale and intensify their production. Second, the Board of County Commissioners redistricted and added two commission seats in 2024, a change that effectively reduced farmers' representative power.

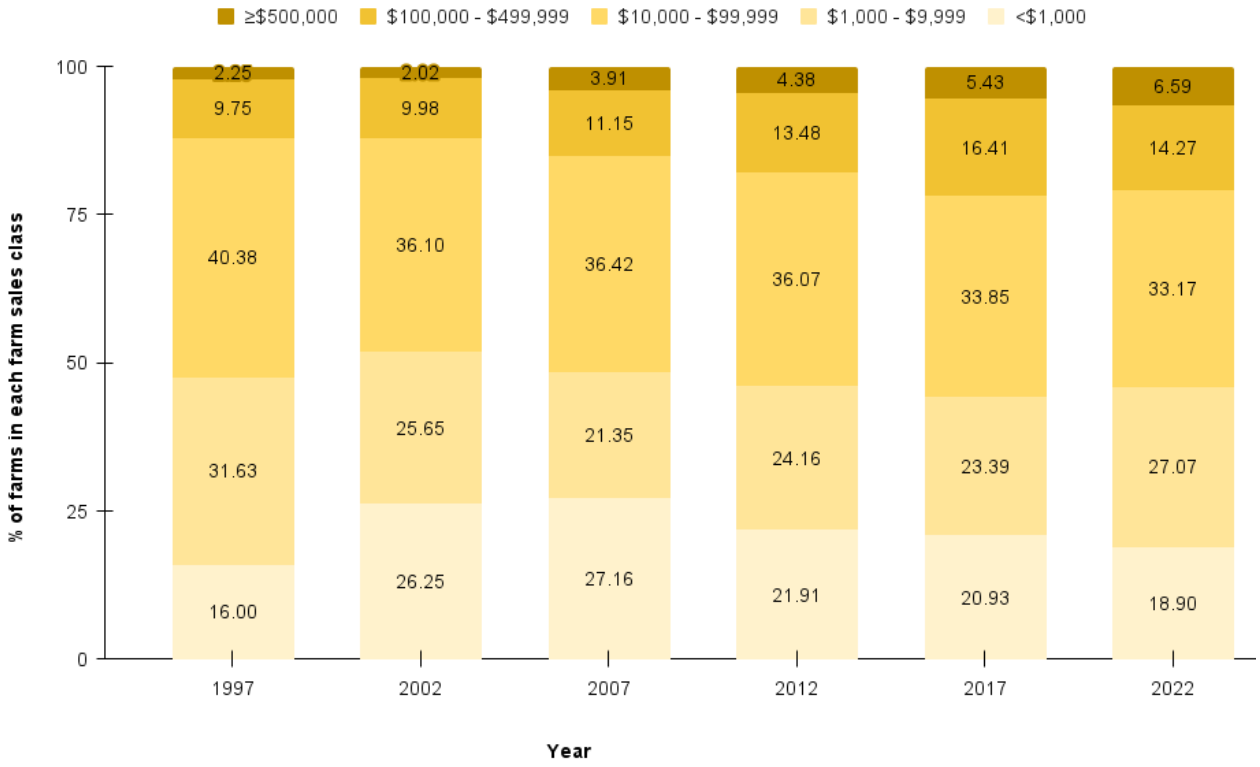
Gross Product Sales Concentration

While most PT residents experienced improved wellbeing, most PT farmers did not. From 1997 to 2022, the average inflation-adjusted sales per operation increased by $76,091.43. However, much of that increase was in the largest farms. The rate of farms in the ≥$100,000 sales class range captured 20.86% of total market sales in 2022, up from 12.0% in 1997 (Figure 2.2). In terms of inflation-adjusted annual farm market sales as a percentage of total operations with sales, in 2022, the top market sales class of ≥$500,000 captured 75.61%, compared to 62.07% in 1997 (

Figure 2.3). In other words, in 2022, just 54 of PT's 820 total producers (6.59%) captured more than three-quarters of all product sales.

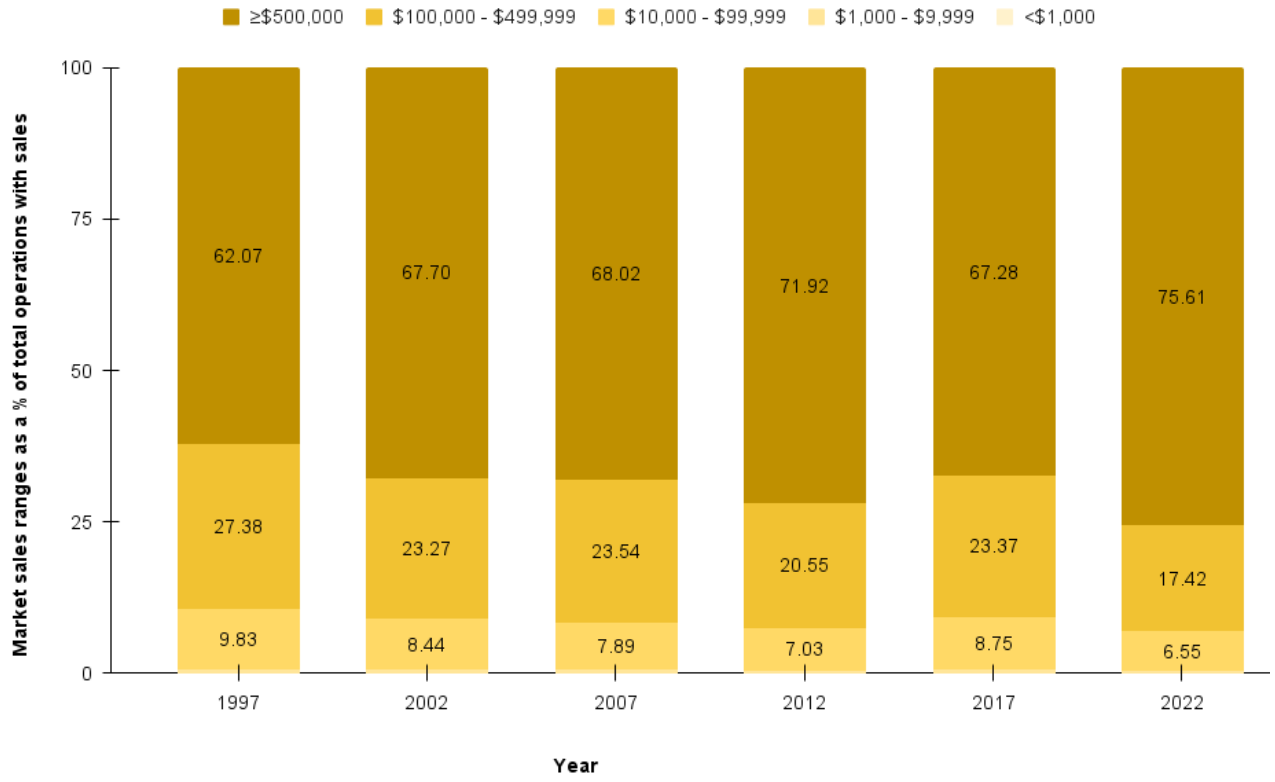
These trends were most likely driven by the larger socio-cultural conditions of both low per-unit returns and higher per-unit production costs. Low per-unit returns stemmed from overproduction and low prices, while higher per-unit production costs resulted from larger operators who received cheaper per-unit prices for many inputs (bulk orders), spread fixed equipment costs over larger acreages, and had higher labor efficiency (Cochrane, 1993; Duffy, 2009). These conditions may have pressured farmers to expand/intensify their operations (Crowley & Stainback, 2019; Farm Action, 2024).

Figure 2.2. Distribution of Pottawatomie County, Kansas, Farms by Sales Class, 1997–2022



Data sources: USDA NASS, 1999, 2004, 2009, 2014, 2019, 2024.

Figure 2.3. Distribution of Pottawatomie County, Kansas, Farm Sales Ranges by Operations with Sales (Inflation-Adjusted May 2024), 1997–2022



Data sources: USDA NASS, 1999, 2004, 2009, 2014, 2019, 2024.

Redistricting and County Commission Board Expansion

Kansas farmers have long been concerned about how non-farm development both threatens access to large enough tracts of contiguous farmland for efficient operations and increases the risks that those operations will cause conflicts with non-farming neighbors. Historically, state policies have ameliorated such concerns. Kansas was the first state to pass a 'right to farm' law in 1963, with the purpose "to provide agricultural activities conducted on farmland protection from nuisance lawsuits" (National Agricultural Law Center, 2022 p. 1; Kansas State Legislature, 2024).

At the county level, the PT Board of County Commissioners can limit activities on the land and the sale of property for non-agricultural uses. PT has historically used the 'quarter-

quarter rule' to preserve farmland from large residential developments by requiring new houses be sited in wooded areas or on less productive soils (though this rule could be revisited or amended). Articulated in the PT Office of Planning and Development's (2023) unified development plan, the quarter-quarter rule promotes "productive agricultural land" preservation and seeks to "lessen the conflict between urban development and agriculture" (p. 44).

While these longstanding policies have been advantageous for stakeholders with interests in farming, a 2022 resolution weakened their advantage. On December 12, 2022, PT's Board of County Commissioners (2022) passed Resolution No. 2022-70, which added two more county districts and commissioners to better reflect PT's changing population dynamics. The five-commission district map went into effect in November 2024 (Appendix Figure A.2). The 2024 redistricting and addition of two commission seats reduced the long-term representative power of farmers and farming stakeholders. It divided the county so that the six townships of Blue, St. George, Louisville, Wamego, Belvue, and St. Mary's—which collectively housed 80.1% of PT's total 2022 population—became represented by four district commissioners. The 17 remaining, northernmost townships—which comprised 75% of the county's land mass but only 19.9% of the 2022 population—became solely represented by District 5, which contains a much larger share of farmland than the other four districts combined.

By adding two commissioners and realigning districts with township population trends, PT gave the average resident both more representation and more accurate representation. Because people rely on political connections with their commissioner to mobilize resources to augment their community's political capital (C. B. Flora, 2004), two more connections likely increased resource mobilization. At the same time, however, adding two new commissioners reduced the voting power of the District 5 commissioner from 1/3 to 1/5, a 40% decrease.

Compared to pre-2024, redistricting gave greater representative power to people in exurban and suburban places than those living on the lion's share of PT farmland.

Because of that representative shift, the strategic plan language suggesting quarter-quarter rule revisions, and the fact that 75% of PT's land was already in farmland (PCEDC, 2022), the county commission became less politically compelled to support policies favoring farmland preservation over development.

Methods

Methods included participant interviews and a farmer survey, followed by a reflexive thematic analysis of those coded interviews.

Participant Interviews and Farmer Survey

Following institutional IRB procedures, I conducted semi-structured interviews with 22 PT participants from December 20, 2023, to May 19, 2024. My purpose was to understand how stakeholders with interests in farming and stakeholders with interests in development perceived and experienced the symbiotic relationships among them.

I used purposeful sampling (S. Campbell et al., 2020; Palinkas et al., 2013) and snowball sampling, whereby I asked participants to recommend others who might be willing to participate. Of the 22 interviewees, 14 were aware of my existence prior to initial contact. I sought potential participants who did not know who I was, but to little avail given timing issues or lack of interest in this project on their part. This made it difficult to gain perspectives outside of this networked sample and resulted in "inconvenience sampling" (Duneier, 2011, p. 9), which created the potential for bias, but also revealed social network patterns among participants (Noy, 2008).

My interviewees consisted of four nonfarmers and 18 farmers, 10 of whom also held leadership positions in agricultural and/or community organizations. Interviewees worked for a

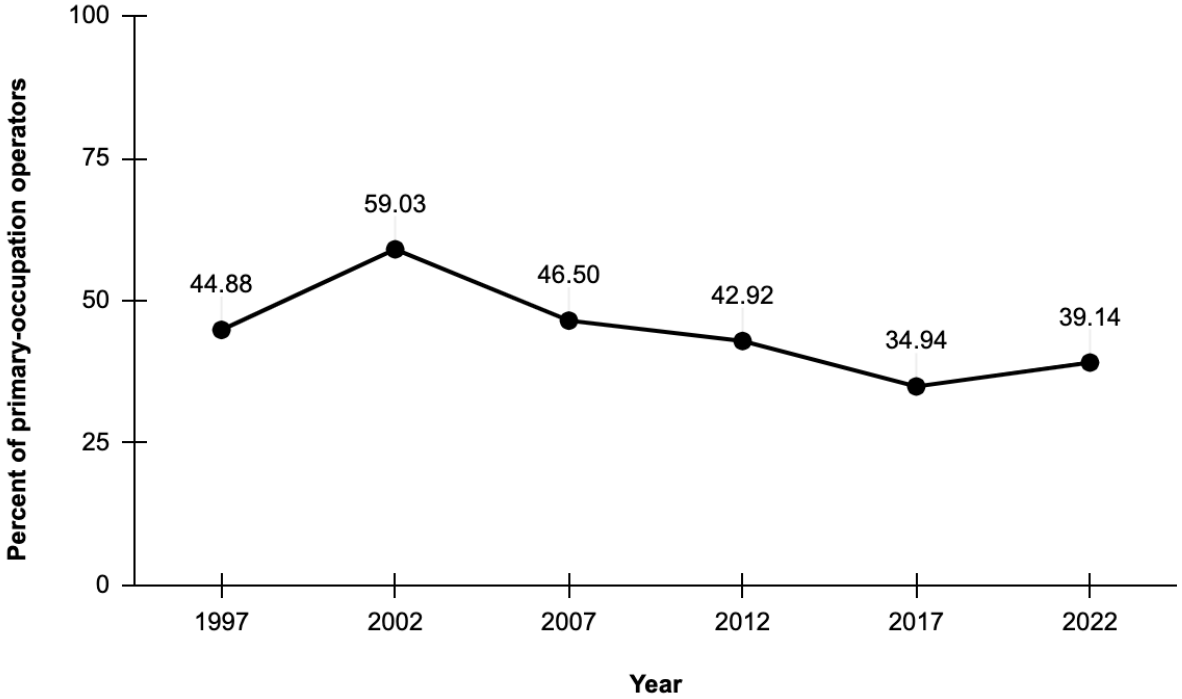
USDA conservation service office, county soil health agency, coop board, bank, feedlot, ag-tech company, agri-input company, and/or were members of the Farm Bureau, the National Farmers Union, churches, FFA, school boards, ad hoc community committees, and so forth.

A farmer's management practices can be influenced by the morals and mores of the groups to which they belong, including Facebook groups, in coffee shops, on church committees, or at sporting events. The SC interview guide, adapted from Arnott et al. (2021, p. 43), included the following questions. Which groups do you belong to? How often do you engage in them? With which groups are you most likely to discuss best farm management types and which groups do you learn from the most? With which groups do you most regularly share knowledge and resources? How do you perceive increased development in the county? How does it affect your operation and livelihood? How would you describe your relationships with other, similar farmers; do they tend to be more cooperative or competitive?

Of those 18 farmers, 16 responded to a short survey asking for basic information on their farm typology and characteristics. Among those, the average farm size was 1,182.75 acres (of which 435.4 were owned and 749.4 rented), which was 689.72 acres larger than PT's 2022 average farm size of 493.03 acres. Because I did not inquire about gross sales, I considered 'smaller' farms to be ≤493 acres and 'larger' farms to be >493 acres. On average, interviews lasted nearly two hours, and I talked 26% of the time versus 74% for interviewees, a 3:1 ratio. Participants were all non-Hispanic white and 72.3% male, with an average age of 55 years old and a range of 26 to 71.

Eight of those 16 farmers agreed that they would "be able to make it financially without farming," a secondary-occupation proxy. Countywide, the percent of primary-occupation farmers linearly declined (linear $r^2 = 0.462$) since 1997 (Figure 2.4), reaching 39.14% in 2022.

Figure 2.4. Percent of Pottawatomie County, Kansas, Primary-Occupation Operators, 1997–2022



Data sources: USDA NASS, 1999, 2004, 2009, 2014, 2019, 2024.

The average farm size of the eight interviewed primary-occupation farmers was 1,526 acres (29.02% larger than the interviewed sample average and 209.52% larger than the county average), illustrating the extent to which primary-occupation farmers were reliant on vast acreages to make a living. This was intuitive. Principal operators self-report whether farming is their primary occupation (USDA ERS, 2025, p. 2), and if so, they are typically more dependent upon farm income (derived from larger acreages) for their livelihood than secondary-occupation farmers (Daloğlu et al., 2014, p. 99).

Reflexive Thematic Analysis

I used My Voice Recorder to record, Otter.ai to transcribe, and Atlas.ti to store and code transcripts. To ensure respondents remained anonymous, I assigned pseudonyms. I thematically analyzed qualitative portions of the interviews by following Braun & Clarke's (2006) six steps of

reflexive thematic analysis: become familiar with the data, generate initial codes, search for emergent themes, review themes, define them, and name them.

Because coding was performed at the paragraph level, most paragraphs included more than one code. So, to get a better idea of how much aggregated time was spent discussing topics central to each capital, I meta-coded each paragraph (Table 2.3).

Table 2.3. Transcript Thematic Codes and Meta Codes Grouped by Community Capital

Capital	Codes		Meta-codes	
	n	*%*	*n*	*%*
Natural	430	22.63	116	18.95
Cultural	414	21.79	138	22.55
Social	291	15.32	68	11.11
Financial	245	12.89	118	19.28
Human	179	9.42	32	5.23
Built	174	9.16	60	9.80
Political	167	8.79	80	13.07

'Meta codes' provided a more holistic understanding of which capitals where most emphasized during the overall conversations. I gave a paragraph one meta code if more than 50% of the paragraph's codes belonged to the same capital, or if there were two or more codes that belonged to the same capital.

Findings

I analyzed interviewees' eco-social symbiotic experiences, followed by how those experiences shaped their social capital perceptions of the stakeholder groups.

Symbiotic Relationships Between Farming and Development

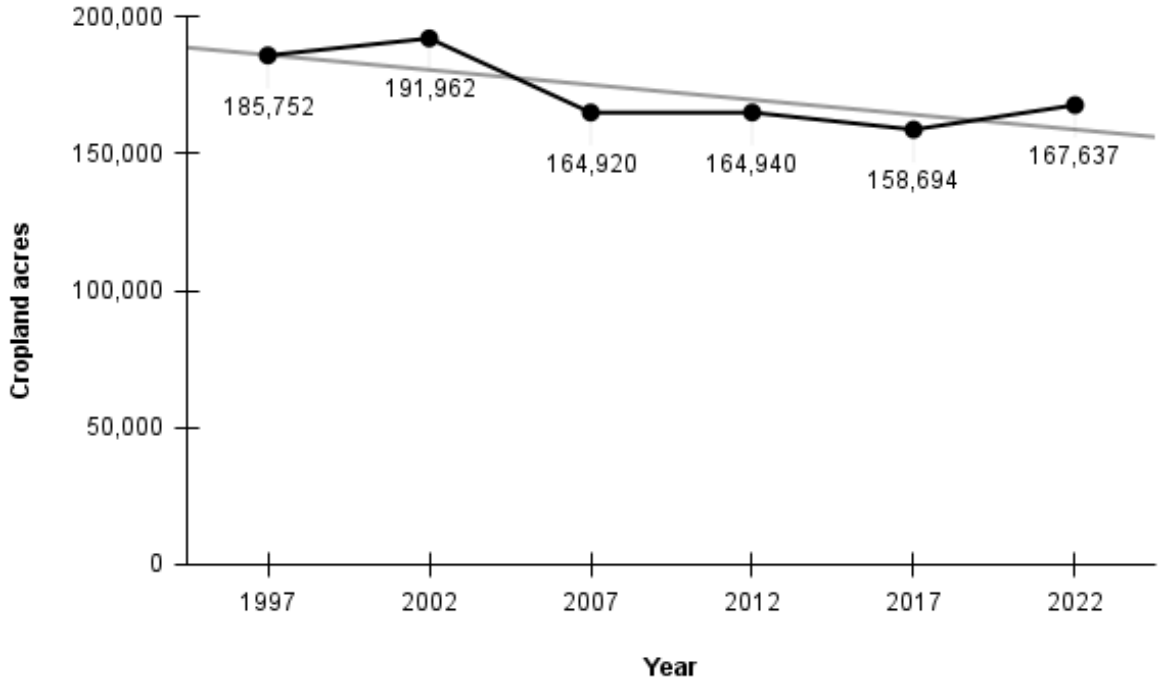
In its reports, the PCEDC has emphasized agriculture's myriad economic benefits PCEDC (2022, 2023), and couched development as a 'win-win' for all residents (see Giridharadas, 2019). That there were 150 more total producers in 2022 than in 2017 might serve as evidence for the mutualistic argument that the county has equally supported both stakeholder

groups. But consider, as farmer and community leader Camden did, the scale at which those emerging producers operated:

> *"The increase in new farmers includes a lot of the more 'urban type' of farmers who may have a farm service agency account, but they might have a two-acre property, and they're going to install a high tunnel and do cut flowers or vegetables for the farmer's market. If anything, I'd say that farming operations are consolidating, they're clumping."*

Under the USDA system, an operation with just over one-third of an acre of vegetables or five horses/ponies qualifies as a "point farm" worth at least $1,000 (O'Donoghue et al., 2009, p. 5). Even though the number of PT producers increased, the total cropland acres linearly declined since 1997 (Figure 2.5).

Figure 2.5. Total Cropland Acres in Pottawatomie County, Kansas, 1997–2022



Data sources: USDA NASS, 1999, 2004, 2009, 2014, 2019, 2024.

Primary-occupation farmers with larger-than-average operations stressed the necessity of consistently expanding their acreage to survive. Pete, a primary-occupation farmer with an operation much larger than the PT average, stated:

> *"There are no small farmers anymore, there's just no way for them to exist…You got to constantly expand. They've told us that at K-State for the last 20 years, 'If you don't double in size every five years, you're not going to be here much longer.'"*

Pete elaborated that farmers with larger operations have the necessary capital to compete with private land sales, mostly from wealthier nonfarming families wanting to live a rural lifestyle:

> *"People are moving out of the city, coming here and buying the land…we have more people around here, though they're not buying a huge amount of lots and then building a whole bunch of houses out here yet. But we're going to run out of land out here, and they're just gonna keep finding more land. Especially for the small-town farmer, it's hard to say 'no' with that amount of money on the line, especially now that all these small-time farmers are usually older farmers. If they have no one else in their who family wants a farm, why keep doing it? It's a lot of work, and when you're getting up there in age, you sometimes don't want to have to deal with farming."*

There are several reasons why a farmer with a smaller operation might sell parcels to a nonfarmer, including retirement; retiring farmers typically value family succession first, turning to leasing or selling as secondary options (Grubbström & Eriksson, 2018, p. 721). The annual payments for mortgages on farmland may well exceed the returns, especially when land prices are high and returns on farming are low. Having larger operations allows the owner's farm debt payments to be distributed over larger acreages in production, especially if they own much of the land without debt. In large part due to the widespread financialization of farmland (Gunnoe,

2014, p. 499), owners of larger operations are better suited to take on more land—e.g., Weber & Key (2014) found that farmers who incurred larger wealth gains from land appreciation bought more land than they would have otherwise compared to farmers with smaller gains.

Primary-occupation farmers were skeptical that commercial and residential development was the rising tide to lift all boats. Zach, a primary-occupation farmer whose operation was larger than the average county farm size in 2022, described a parasitic relationship:

> *"Agriculture can't compete with residential or commercial development, especially in the fastest growing county in the state. That's right in our back door. That's how it is, but probably not how it should be. Where the Scorpion project is going in, man, that was a prime 80-acre field. Maybe I wasn't on any kind of a list to rent or buy it in the future, but I could have been, so that affects me. Residential development can pay roughly three to four times the amount per acre that I can, so I'm basically doing whatever I can with politics to try to prevent more of it, and just holding on to what I have…The people who are doing the agriculture are not getting compensated enough for what they do, relative to the people who are reaping the benefits. And therefore, we're not competitive in the land market. And so, it's the demise of agriculture. If it was truly a free market, we would be adequately compensated for what we're doing. But the fact that agriculture is not competitive with other industries, that raises a red flag, doesn't it? At some point, it's going to, because people need to eat and if we don't have any land to raise food, then that at some point that will be an issue…I don't see it turning around."*

Nick, another primary-occupation farmer whose operation was larger than the county average, was concerned for the future of cropland farming given developmental pressures and the cultural transmission of values from those who come to own the land:

"Who cares what you were going to do with [the land], they'll pay more for it. I see that [sentiment] a lot out here, and it's getting closer to us. The money is the end all be all. But, if everybody built a house on five acres, what's left? That may be not in my lifetime, but I have grandkids, and it could be during their lifetimes. The land is getting passed on to people who don't have the same values, which is why we're having the housing development pressures. It's expensive to buy land around here because developers can obviously make it happen easier than I can. And it's tough because there's not enough responsibility or selflessness out there to question those younger people making the decisions. If you're in a subdivision deed and need five acres, why do you need to go spend thousands on a lawn mower so you can mow two hours once a week?"

A central issue most interviewed, primary-occupation farmers had was not with population growth per se, but with nonfarmers buying more acres of former contiguous farmland than primary-occupation farmers deemed necessary. Earl, a primary-occupation farmer, called for sustainable development to reduce pressure on the county's limited stretches of contiguous farmland:

"We'd be better served if the housing was more concentrated because you got to keep farms around, or eventually you're gonna get more competition between farmers. There's X amount of farm ground, and it's dwindling with the new houses and a little bit getting sold off here and there. It's not like the plumbing shop, where the town is growing and they're adding customers, so they're not necessarily stealing somebody else's customers. There's just a finite amount of land."

Farmers typically rely on stretches of contiguous farmland to yield enough to pay their operating notes. However, development can make farmland increasingly fragmented and unaffordable for

farmers. When farmland parcels are sold to residential developers, farmers can come to operate smaller, oddly shaped plots of land; especially for farmers who own large equipment, this way of farming can be inefficient and challenging. Farming parcels of land that are long distances apart (even if all those parcels are rectangular and good-sized) can lead to inefficiencies and increased costs (Aslam & Fazal, 2025).

Secondary-occupation farmers mostly expressed relationships that ranged from commensalism to mutualism. Michael, a community leader and secondary-occupation farmer of a handful of acres, said there was a need to balance farming and sustainable development:

> *"It's a balancing act. I mean, it's progress. It's new money. It's great for the community, but I don't know about agriculture…When farm ground comes available [to buy], it's mostly grassland north of St. Mary's where they're developing and building homes."*

Nathan, a secondary-occupation organic farmer and community leader, said he hoped that several younger families interested in smaller-scale, subsistence, and specialty food production (Donahue, 2023) could pool their assets to make farmland purchases to then equally divide among them. In other words, the 'get big or get out' dictum need not be the default for successive generation's "future imaginaries" (Bazzani, 2023). Nathan imagined a more mutual model:

> *"Four cooperating families could do a good job farming these 400 acres, [and] they would probably have an opportunity to buy more than that. There are a lot of older people whose kids left for professional careers, and they don't need to sell the farm for money. They don't want to see it sold or have the uniqueness of that place obliterated, like bulldozing buildings and trees just for it to become a large tract of corn or soybeans. There are younger people who can look to develop that alternative land ownership model*

to the farmers who spent their lives assuming that they needed [their farms] to be large scale, and I think that was a mistake. They should be smaller scale and replicated."

Pete, a primary-occupation farmer with a larger-than-average operation, recalled the weekly in-person social events that used to take place in Westmoreland and Blaine in the 1940s and '50s:

"Social structure was so different back then. Saturday nights were the big thing—all these people would come in. Some would live as far as five or six miles out, but they got their horse and wagon and came into Blaine on Saturday night with some chickens, eggs, cream, or whatever they had to trade. And those vendors would be open on Saturday night in Blaine, and we had stores like the general store, the lumberyard, and two banks. There were several hundred people involved."

Due to decades of policies, social mores, and industrial capitalist penetration into agricultural ways of being (linking SC), farmers have felt pressured to expand and/or intensify commodity production to survive (Lobao & Meyer, 2001; Lobao & Stofferahn, 2007; Magdoff et al., 2000), and to compete with the higher land bids that developers typically offer.

Compounding farming and development stakeholder tensions were PT's relatively low mill levy rates (tax rates applied to a property's assessed value to determine the amount of property tax owed), which attracted developers. In 2023, all Kansas counties had an average of $133,046 on each $1,000 valuation. In comparison, PT's average property levies of $96,885 were the second lowest, behind only Coffey County (Kansas Department of Revenue, 2021). Even so, in September 2024, PT lowered property taxes by 9.9% (Parker, 2024), meaning that PT residents saw a 2.856 mill levy decrease in the 2025 General Fund (Wolfe, 2024).

Some farmers were frustrated by the extent to which they subsidized exurban/suburban development. For instance, Sam, a primary-occupation farmer, wanted to make non-agricultural-use properties pay more in property taxes:

> *"I tried to talk to our county commissioners about Pottawatomie adopting a different tax mill levy for lands not used for agriculture."*

Sam's request was not unrealistic, given there was already a wide discrepancy between average urban (129.213) and rural (88.915) county-wide mill levy rates (Kansas Department of Revenue, 2021). Moreover, some PT townships had much lower-than-average rates than others; for example, certain 2021 tax codes for St. Mary's and Belvue Townships posted sub-80 rates.

Historically, farm, ranch, and forest landowners have paid far more for government services than they have received. American Farmland Trust's (AFT) 2002 meta-analysis of 83 'cost of community services' studies in 19 states found that those landowners paid more than they received in public services, with a median cost of community services, per dollar of revenue raised, of $0.36 per tax dollar versus $1.15 for residential (Freedgood et al., 2002, p. i). Moreover, AFT's (2005, p. 29) analysis of 18,261 acres of farm, forest, and open land found that their landowners created an average surplus of $8.03 per acre for town services.

Property tax assessments can be great unifiers or dividers. For PT residents, especially those residing in the more remote rural townships, lower property taxes resulted in fewer county resources and their equitable deployment. For instance, when I spoke with Sam, he was frustrated that not enough county snowplows were deployed to the more remote rural pockets. He had just spent much of the week using his own tractor, diesel fuel, and time *"plowing snow off county roads"* and towing snowdrift-stuck vehicles so that his neighbors could access essential services from Blue Township. Indeed, the degree of Social and Political Capital accrual

can depend on the degree of township rurality (McCall et al., 2021). If rural PT township leaders increased their mill levy rates for nonfarm properties, they could perhaps influence county commissioners to do the same, disincentivizing nonfarmer purchases of previously contiguous farmland. If this change ever occurs, primary-occupation farmers may come to view their relationships with nonfarm stakeholders as less parasitic.

In sum, interviewed, primary-occupation farmers primarily couched agriculture versus development in competitive (lose-lose) and parasitic terms (win-lose), whereas secondary occupation producers and community leaders perceived relationships ranging from commensalism to mutualism. As I explored in the next subsection, interviewed primary-occupation farmers' competitive and/or parasitic perceptions of, and relationships with, nonfarmers and developers also typified their relationships with other primary-occupation farmers in their social networks.

Competitive Primary-Occupation Farmer Social Networks

Primary-occupation PT farmers reported (in interviews) deriving their success from 'winning' land from other farmers. Raymond, a primary-occupation farmer of an operation much larger than the county average, used the phrase *"vulture culture"* to describe his perception of, and nature of engagement in, competitive conventional agriculture social networks:

> *"I've seen where a farmer dies, and the family get tons of phone calls the next day before the funeral. I've never done it before, but they'll beat on the door to ask to farm the ground—it's the vulture culture…I've never cut anybody's throat, but that's the culture of everybody around here. To be successful, to a certain degree you have to learn how to manipulate or cut someone else out, like a small producer. That's the problem with agriculture now, you do anything and everything to get ahead. Like say some [farmer]*

neighbor is going to retire; you have to make relations with that person before they retire, and even then, you still might only have a 50/50 chance to get their land. Even though you've helped that neighbor, a whole other third party might come in and get it. There are a lot of mind games. There is a lot more to farming than just 'go farm ground.'"

Of course, local agriculture is affected by the larger social context of political polarization and media factions (Archer et al., 2008), and aggressiveness may influence financial success and social status.

When families go through farm transitions, they usually sell or lease, and each option has its own considerations, advantages, and disadvantages (R. Moore, 2025). Family farm ownership engenders socio-ecological resilience (Darnhofer et al., 2016, p. 115), but in cases where there is not a clear family farm transition in place, competition heightens for owned or rented ground. A farmer operating more land would likely be able to offer or pay higher rent prices, at least in the short term, than would a farmer of a smaller operation. There were, of course, renter-lessee relationships in PT characterized by commensalism (0, +) or mutualism (+, +). However, the primary-occupation farmers of larger operations couched their relationships toward other primary-occupation farmers as competitive, meaning that there was negative harm for both social groups. However, there were times when their espoused relationships with other farmers were more parasitic (+, –) than competitive (–, –); i.e., they perceived owning or renting more land as benefitting them while doing financial and social harm to other farmers who also wanted the land but lost out.

Competitive, parasitic, and cooperative aspects to farming have always existed, but how did they change in rate and extent over time? The consensus among interviewees was that social

symbiotic relationships surrounding land transition have emerged as increasingly competitive since the 1980s farm crisis (Meyer & Lobao, 2003). Development was a reason for increased competition, but certainly not the only reason. Earl farmed before the farm crisis, and experienced farmer competition grow fiercer since, especially when it came to renting farmland. He told a story of his time in seed sales to exemplify the competitive tensions that have persisted among those in his social networks:

> *"I don't think farming is cooperative anywhere [in the county]. Here's an example. When I was selling seed, the district rep came around and we had a couple of dinners together. All my customers came in, we fed them and went through different plots. The rep down on the east side of Wamego had several big customers, but he took each one of his clients out separately, because none of them could get along because they had all poached ground from each other. It was so competitive, and people just did not like each other."*

Vanessa, a secondary-occupation organic farmer with an operation size near the county average, did not want to be around the aggressive self-interest that she viewed as permeating the social engagements of conventional farmers. So, she pursued networks with other organic farmers:

> *"Conventional farmers are far too interested in, 'what's in it for me?' It's a narrow, short-term interest…I think a lot of it is peer pressure—'what are your neighbors doing?' …We've done it differently than the big industrial approach to agriculture, the 'I'm going to buy out my neighbor and lease ground out from under you' mentality. I was going to do it differently, so I had to find people. Not in the county, because there's just a few organic farmers in the northern part, but I fled to find those people who were going to farm the way I wanted to farm."*

Vanessa argued that farmers in alternative agriculture networks (such as organic or regenerative) were keener to share knowledge and help neighbors due to their transformed worldview, a finding revealed elsewhere (Ohlson, 2014; Page & Witt, 2022; Snorek et al., 2024).

Adam, a primary-occupation farmer who rented an amount of farmland smaller than the county average, believed farming did not used to be so competitive, and wished neighboring farmers could return their more mutualistic roots:

> *"I felt like our area was a community 30 years ago. We went away from that type of culture, and it has become more selfish. It is sad to say, but I think everybody's in it for themselves. I don't like that. I feel like we can get kind of back to something like that culture, where it feels almost like a second family where if you ever need any help, don't be afraid to call. I saw that a lot growing up. If someone called you for help, you would say, 'yeah, I'll be right there." And I want to get back to that."*

Cameron, a conservationist and secondary-occupation farmer of just a few acres, also argued that farmers should not view their successes as competitively-derived:

> *"Success is not a pie. Your success does not have to take away from mine or be deleterious toward me."*

While Adam and Cameron espoused commensalism and emphasized the importance of cooperative farmer-to-farmer relationships, most primary-occupation farmers perceived success as a limited 'pie.' They stated or implied that they defined 'success' by their ability to acquire more affordable land or maximize yield per acre, a common way that conventional agriculture has measured success (Stone, 2022). For a few interviewees, success was not a 'pie' because they expanded their boundary of consideration beyond yield to encompass the larger goals of operation solvency (e.g. net income maximization) and community coherence.

Discussion and Conclusion

I analyzed how PT farmers, farm experts, and community leaders perceived and experienced eco-social symbiotic relationships between and among stakeholders with interests in farming and stakeholders with interests in development. This study was the first using eco-social symbiosis in tandem with social capital. By uniting Flora et al.'s (2016) CCF conceptualization of SC with the eco-social symbiosis spectrum concept, I showed how within-county forces helped to create the social conditions for rising tensions between these stakeholder groups. Due to larger, systemic socio-economic factors driving concentrated farm sales ('linking' SC), primary-occupation farmers felt pressured to expand or intensify production. Moreover, the board of county commissioners' 2024 decision to redistrict and add two commission seats shifted more representative power from farmers to nonfarmers.

Performing a thematic analysis of 22 participant interviews allowed me to reveal the ways in which county development influenced how interviewed, primary-occupation farmers of larger operations perceived their relationships with development stakeholders as parasitic, and with other primary-occupation farmers as competitive, in turn undermining their bonding and bridging SC. Interviewed, primary-occupation farmers felt the pressure to intensify and/or expand production because they could not compete with the prices offered for land by commercial or residential developers and in-migrating millionaires *"who [could] buy 80 acres and build a house"* (Nick). The rate of farmers whose primary occupation is farming may shrink as a result of pressures from population growth and development (that are unlikely to abate) and may also increase the scale of surviving farms owned by primary-occupation farmers. Conversely, interviewed, secondary-occupation farmers and community leaders espoused commensalism and mutualism with developers and other farmers.

For struggling commodity farmers wanting to transition to more alternative principles and practices requiring fewer acres, there are several 'how-to' guides (Butterfield et al., 2019; Masters, 2019; Perkins, 2019). PT has lacked sufficient infrastructure for processing, storing, and selling locally grown, specialty produce outside of the growing season. Recognizing this issue, the board of county commissioners adopted a strategic plan in 2019 (Kendig Keast Collaborative, 2019, p. 87) that included language calling for greater investment in aggregation spaces, cold refrigeration, local purchasing initiatives, and specialty markets (Ray & Schaffer, 2008, p. 150).

Together, these efforts may help improve social capital stocks among stakeholders in agriculture and development and enhance the flourishing of all people who call Pottawatomie County home.

“Land Assault”

Prairies are the heartlands of Mother Earth
though hers is broken at the hands of frustrated men
who undress native soil without permission

Millions of acres of eroded, dirtied soil silently scream
& management disguises its destruction with “production,”
claims she never said “no.”

The prairie we call plain as we measure beauty by diamonds,
compressed coal that wants to be left alone,
& the ugly we don’t measure
is ourselves.

- Jacob Miller (2018a)

Chapter 3 - Cover Crops, Chemicals, and Emissions in Pottawatomie County, Kansas

Abstract

Cover crops have numerous benefits, including enhanced erosion control, forage biomass, nitrogen fixation, nutrient recycling, weed suppression, water management, temperature moderation, and carbon sequestration. Still, the adoption of cover crops by farmers is significantly influenced by their individual goals and preferences, their specific agroecological contexts, and larger agro-industrial structures and systems. Farmers in Pottawatomie County, Kansas, planted cover crops on 8.2% of the county's cropland in 2022 (nearly twice the national average). This study sought to understand what these farmers were looking for in cover crops by specifically choosing to interview them. Utilizing information gleaned from interviews with 22 farmers and/or cover crop experts, I was able to thematically analyze the resulting data. Coding revealed that many interviewees were on the "chemical herbicide treadmill" for cover crop suppression and/or termination. I used this information as a theoretical framework to inform descriptive analyses of farm characteristics, crop types, farmland use, and emissions. After comparing trends and themes, I found that interviewees looked for cover crops to be affordable if not profitable, suitable for use as a supplement forage biomass/nutrition for cattle and ideally subsidized by cost-share programs (~US$50/acre). Weather and labor availability and labor cost were also key influences. When grazing or crimping cover crops was not an option for their suppression or termination, interviewees preferred using herbicides over minimum tillage. This preference was reflected in the 1997–2022 county-level trends of increased herbicide application rates and expenses, notable changes in the primary cropland type from hay(lage) to corn and soybeans, and accelerated leaching emissions. Finally, I discussed implications for adopting soil

health principles that trended more organic than regenerative, and offered resources for cover crop education, outreach, and cost share.

Keywords

Chemical Herbicide Treadmill; Climate Change; Conservation Agriculture; Cover Crop Suppression and Termination; Herbicides; Pottawatomie County, Kansas; Soil Health Principles

Highlights

- Farmers valued cover crops for affordable forage and soil retention and improvement.
- Cover crop adoption depended on the timing of weather and labor availability/affordability.
- Farmers said they would plant more cover crops if they received cost-share subsidies (~$50 per acre).
- When grazing or mechanical suppression was not possible, nearly all interviewees relied on herbicide termination, reinforced by the chemical herbicide treadmill.
- Herbicide rates on PT cropland acres more than doubled from 1997-2017, chemical expenses per operations more than tripled from 1997-2022, and all four emission types increased from 2005-2019 (%Δ range from 53 - 371). These trends corresponded with a shift in the predominant cropland types, from hay(lage) to corn and soybeans.
- Farmers balanced stewardship values with “feed the world” narratives (based in the Care/harm moral foundation) to justify their chemical herbicide dependence for cover crop suppression/termination.

Introduction

Communities in the U.S. must adapt to the triple planetary crisis of climate change, pollution, and biodiversity loss (Hellweg et al., 2023). Adaptation includes favoring policies that better align with UN sustainable development goals (Guterres, 2021; I. Ibrahim & Ahmed, 2022) and IPCC (2021) land degradation targets. In the U.S., the Biden Administration's Partnerships for Climate-Smart Commodities allocated $3.1 billion to hundreds of agriculture organizations, corporations, universities, and nonprofits for 'climate-smart' projects (Amos & Hauptle, 2023; Graddy, 2023; USDA NRCS, 2023). The intention of this funding was to "pass most of the money on to tens of thousands of farmers, ranchers, and forest owners" (Popkin, 2023, p. 1). Continuous government funding for these projects, however, is unreliable, and adoption of climate-smart projects is ultimately up to farmers and communities themselves and the demands of their places (Lloyd & Chalabi, 2021; van der Ploeg, 1994, 2022). To better understand how these practices are implemented on the ground, it was crucial to investigate how farmers in one community utilized, perceived, and valued one specific climate-smart agricultural practice: cover crops (CCs).

Although CCs are "no silver bullet" (EDF, 2022, p. 28; Lamichhane & Alletto, 2022), there are several reasons to plant CCs before, after, or in companion with corn and soybeans (USDA NRCS, 2019b, 2019a). These include enhanced erosion control, soil organic matter, forage biomass, nitrogen fixation, nutrient recycling, weed suppression, water management, temperature moderation, and carbon sequestration (Green Cover, 2024; Kranz, n.d., p. 2; USDA NIFA SARE, 2024). Among other options, farmers can seed CCs with shorter season genetics into commodity crop systems, or no-till a cash crop into a living, green cover (Correira et al., 2023; PFI, 2023a). In the past 15 years, CC implementation in the U.S. has surged (Plastina et

al., 2024). This trend has been true in my lifelong community of Pottawatomie County, Kansas (PT), which features highly-erodible, native Flint Hills prairie.

From 2012 to 2022, the number of PT cropland acres planted to a CC—excluding Conservation Reserve Program (CRP) acres—surged from 3,894 to 13,660 acres, and, among farms with CCs, their average CC acreage nearly doubled, from 105 in 2017 to 201 in 2022 (USDA NASS, 2019, p. 713, 2024b, p. 684).[13] In 2017, 4.3% of total PT cropland acres (excluding CRP) were planted to CCs; by 2022, 8.2% were, which exceeded the contiguous U.S. CC average of 4.7% in 2022 (Bowman & Morales, 2024). Therefore, in this study I explored the following three-pronged question: Why did such a rapid increase in CC adoption occur in PT, what were the primary individual and structural factors driving enhanced adoption, and what were PT farmers looking for in CCs?

The answers and findings made novel additions to the robust CC management and adoption literature for larger-than-average operations ($\bar{x}$ = 1,183 acres) and offered implications on how the chemical herbicide treadmill influenced PT farmers' uses of and beliefs in CC suppression/termination.

Review of Extant Literature

Since antiquity, farmers in ancient China, Greece, and Rome have used CCs, otherwise known as "green manure" (Magdoff & Van Es, 2021, p. 137). A proven ecological management practice (USDA NRCS, n.d.-a), CCs have several beneficial agri-ecological functions for the ecosphere's four spheres (Van Eerd et al., 2023, p. 1).

[13] The NASS Agriculture Census's wording on the CC question means a CC could be planted after a crop is harvested or be the only use of land during the census year (Zulauf et al., 2024).

CCs can enhance soil cover, plant and animal biodiversity, and the presence of living roots in the soil, which together total more than half of the generally agreed-upon soil health principles (G. Brown, 2018; Groundswell Agriculture, 2019; USDA NRCS, n.d.-d). CCs have been shown to decrease a soil's susceptibility to compaction, temperature, and erosion (Adetunji et al., 2020; Huang et al., 2025), while simultaneously increasing soil aggregate stability, nitrogen (*N*) concentration, and soil water content (Blanco-Canqui et al., 2011, 2012).

Despite the multiple benefits of CCs, U.S. acreage adoption rates have remained in the low single digits (Zhou et al., 2022), indicating that CCs can present more challenges than benefits for most farmers. CCs can be complex to manage and require new knowledge and specialized equipment (Acharya et al., 2019; Koehler-Cole et al., 2023; Kreitzman et al., 2022). It can take years for CC benefits to accrue, but farmers incur extra costs and reduced yields immediately (Deines et al., 2023), one reason why farmers have called for greater CC economic incentives and more diverse crop and livestock markets (Bergtold et al., 2017; Roesch-McNally et al., 2018).

Understanding the holistic impact of CCs requires examining farmers' considerations and perceptions of CCs while also considering their personal and agronomic goals, as well as commodity and CC types (Basche et al., 2014, p. 476; Mwangi et al., 2015, p. 2; Van Eerd et al., 2023, p. 3). Therefore, the purposes of this research were to (1) analyze PT farmers' treatment, management, and implementation of CCs, and (2) consider agroecological, climatological, and socio-cultural influences on PT farmers' CC adoption.

Methods

Methods proceeded in three steps. First, I thematically analyzed participant interview transcripts and a 23-item survey of their CC beliefs (Appendix Table A.2). Second, while coding

certain themes, the 'chemical herbicide treadmill' emerged as a guiding theoretical framework. Finally, I reported descriptive variable trends—measuring farm characteristics, crop types, farmland use, and emissions—to contextualize the thematic analysis.

Thematic analysis

Following institutional IRB procedures, I conducted semi-structured interviews with 22 participants from December 20, 2023, to May 19, 2024 using purposeful (S. Campbell et al., 2020; Palinkas et al., 2013) and snowball (Noy 2008) sampling techniques. I primarily interviewed farmers, but also CC experts in extension, federal conservation, agronomy, input sales, and crop insurance. At the end of interviews, I asked for recommendations of other potential interviewees. Five of the participating interviewees were individuals I had previously known, which introduced minimal purposeful sampling bias and constituted a limitation.

There were 18 farmers and four non-farmers, with ten of the 18 farmers holding leadership positions in agricultural and/or community organizations. We conversed in vehicle cabs, barns, pastures, and during chores. On average, interviews lasted nearly two hours. Participants were 100% non-Hispanic white and 72.3% male, with an average age of 55 years old (R = 26-71). With an average of 1,183 operated acres (Table 3.1), the sample more than doubled PT's 2022 average farm size of 493 acres (USDA NASS, 2024b, p. 245). To ensure anonymity, I assigned pseudonyms to respondents.

Table 3.1. Descriptives of Interviewed Farmers

Item	*n* responses	Mean
Total acres operated	16	1,183 acres
Substantial off-farm income[a]	17	53%
Use cover crops?	16	81%
Integrate livestock?	16	94%

[a]Defined as "being able to make it financially without farming."

As detailed in Chapter 1's methods section, I followed the six steps of reflexive thematic analysis (Braun & Clarke, 2006; Byrne, 2022; Knott et al., 2022, p. 5; Naeem et al., 2023; Vanover et al., 2021), During steps four and five of thematic analysis, I struggled to explain why many participants chose herbicide applications for CC suppression or termination by default, with no unprompted explanation of why that was their go-to method. CC and herbicide rates increased over 25 years (1997-2022), even though CCs were supposed to reduce the extent to which farmers applied herbicides to manage weeds (Giuliano et al., 2021). To make sense of the simultaneous increase in CCs and herbicides, one theoretical explanation emerged as most salient: the "chemical herbicide treadmill."

Theoretical framework: Chemical herbicide treadmill (CHT)

CHT is a combinatory concept deriving from several sources (e.g. Aronov, 2020; Haggblade et al., 2017; Howard, 2016, p. 151; Merrill, 1976, p. 303; Mortensen et al., 2024; Rodale, 1954, p. 18). Although chemical herbicide adoption can reduce labor and tillage costs, their widespread and repeated use exerts strong selection pressure on weed populations, and resistance evolves and spreads (Bharadia, 2025). To 'fix' this problem, farmers add new herbicides, using mixtures, higher rates, and/or switching to crops tolerant to multiple herbicides, which can once again accelerate selection for multi-resistant weeds and increase costs (Peterson et al., 2025).

Although chemical herbicides can reduce labor and tillage costs, their widespread and repeated use exerts strong selection pressure on weed populations, and resistance evolves and spreads (Bharadia, 2025). To "fix" this problem, farmers add new herbicides, adjust formulations, utilize higher rates, and/or switch to crops that are tolerant to multiple herbicides,

which can once again accelerate selection for multi-resistant weeds and increase costs and continue this cycle or "treadmill" (Peterson et al., 2025).

Powerful agro-industrial actors sell farmers chemicals to be used with crops genetically geared to their use, forcing farmers onto the CHT. By continuously selling these new-and-improved 'fixes' to farmers, consolidated and concentrated agro-industries continuously profit (Carolan, 2022, p. 25). Public dollars indirectly subsidize farmers for herbicide expenses, and land-grant extension agents then offer farmers long tables of pre- and post-herbicide blends of optimal CC species suppression/termination (Grint et al., 2022; Hill & Sprague, 2024; Palhano et al., 2018), with the purpose of minimizing CC competition with cash crops and maximizing yield per acre, the culturally-touted metric of a 'good' productivist farmer (Burton, 2004). These forces further spin the CHT.

CHT is a byproduct of the agricultural treadmill of production (ToP) (Cochrane, 1993, 2003; Curran, 2017; Levins & Cochrane, 1996; P. Lynch, 2017; Sanderson & Hughes, 2019), where technological advances, production scales, and government subsidies encourage farmers to continually expand production and capital investment to keep up or leave, which in turn depresses commodity prices and creates additional scaling pressures. As an example uniting CHT and ToP, farmers' widespread adoption of herbicide-tolerant crops reduces labor, enables larger fields and simplified rotations, exacerbates farm consolidation, and reinforces production incentives. Meanwhile, the intensive and repetitive use of herbicides selected for resistant weeds has forced farmers into additional herbicide options and new genetically modified traits tolerant to other herbicides. This exemplifies the mechanistic similarities between the ToP (scale, subsidies) and CHT (herbicide overuse, weed resistance).

Descriptive analysis

After performing thematic analysis and establishing a theoretical framework, I compared interviewee data to county-level descriptive data measuring farm characteristics, crop types, farmland use, and emissions (Bingham, 2023, p. 2). I then analyzed these data in a comparative, integrated, and systematic approach (Meissner et al., 2018, p. 9). County-level descriptive analyses also served as important validity and reliability checks on interviewee data (Guest et al., 2012, p. 4).

I sourced most variables from USDA NASS (2004, 2009, 2014, 2019, 2024) and Conservation Technology Information Center (CTIC), Regrow Ag, Inc., et al. (2023). The latter developed a remote sensing algorithm using earth-observing satellite data to document the adoption of soil health practices and greenhouse gas emissions at high spatial-temporal resolutions (Hagen et al., 2020, p. 2), which are available through the Operation Tillage Information System (OpTIS) 2.0 database (TNC et al., 2023, p. 3). Regrow Ag, Inc. then utilized the Denitrification–Decomposition (DNDC) 11.0 model to estimate greenhouse gas emissions for nitrous oxide (N_2O), nitrate (NO_3^-), and soil organic carbon (SOC) (Gilhespy et al., 2014). I reported OpTIS and DNDC descriptive statistics to compare 2005-2019 trends in residue cover and leaching of soil organic *C* and *N*-based gasses to 2002-2022 trends in harvested cropland types.

Findings and Discussion

The primary findings were grouped in three sections: (1) interviewees' CC beliefs, practices, and peer information networks; (2) county-level changes in leading crop types (less perennials, more corn and soybeans) and emissions over time; and (3) interviewees' preferences

for “spray over spade” to control CCs; that is, automatically deferring to herbicide applications rather than minimum tillage to suppress and/or terminate CCs.

Beliefs, practices, and peer information networks

At first glance, using the chemical herbicide treadmill as a theoretical framework may not seem appropriate to analyze farmers’ CC beliefs and practices. However, the chemical herbicide treadmill’s socio-cultural hegemony shapes farmers’ beliefs and practices regarding CCs. The treadmill fuels lock-ins and path dependence, fails to support the internalization of supposed ‘externalities,’ and creates arms-race dynamics that demand stronger chemicals, making it difficult to adopt alternatives (such as front-mount roller crimping, which requires neither spraying nor spading certain CCs, like rye) (Green, 2018; Green & Owen, 2011).

Interviewees believed in the union of no-till and CCs. In 2022, 49.5% of PT farmland was no-tilled. An extension agent and farmer named Tammy remarked, *“With cover crops, you don’t have to have all the different tillage equipment.”* Tom said “*no-till and cover crops go together,”* commenting on their ability to improve moisture retention and regenerate “poorer ground”:

> *“I did not see any yield drag at all except one field on one farm. Instead, the yields increased, especially on poorer ground. You’re going to see more of an increase in yield with no-till and cover crops with your poor ground. Your poor ground is going to be a little wetter ground, you’re going to have problems getting into it in the spring…Have the patience to wait to have that ground dried out, and your cover crop will help get that moisture down deeper, just like money in the bank…The soil is not going to have as much compaction, so when your seeds sprout, the roots of the new seed are not fighting all that*

hard against wet, tight, and compacted ground…Walk into that field, and it's good ground. Good corn has a lot of trash [corn stover or crop residue]."

Although Tom did not experience overall yield drag from CC, that can be the case. For instance, the first large-scale, field-level analysis of observed yield impacts from cover cropping implemented across the U.S. Corn Belt found there was an average corn yield loss of 5.5% (Deines et al., 2023). For soybeans, there was an additional 3.5% yield loss on fields where CCs were used for three or more years, compared to fields that did not adopt CCs (Deines et al., 2023).

To address Tom's other points, integrating CCs into no-till acreage can improve the soil's physical properties and decrease its compaction and temperature (Blanco-Canqui et al., 2011; Blanco-Canqui et al., 2012), Western corn belt producers perceived diverse cropping rotations as an adaptive strategy to cope with marginal lands (Wang et al., 2021), and among U.S. soybean farmers, CC adoption positively correlated with crop diversification and no-till adoption (Lee & McCann, 2019). Interviewed farmers believed that CCs enhanced crucial agri-ecological services. Based on a 23-item survey of their CC beliefs, they most strongly agreed that CCs decrease natural resource degradation and soil erosion (Table A2.3). For instance, Tom regularly planted CCs after harvest to stymie soil erosion:

One year I got the crops off way too late to plant any covers. So, I thought, "Well, I've been doing this for six years, I can skip a year." And I skipped that year, but it was amazing how many ditches I had out there. I mean, it was something you could just visually see, you didn't need to bring somebody in to point it out. And so, [ever since] I've been continuous cover cropping no matter what. I'm right behind the combine with the drill.

Despite CC's benefits, there can be drawbacks. For instance, Camden, a federal conservationist and farmer, cautioned farmers not to be complacent with initial CC success:

> *"Cover crops make weeds manageable, but they are not a cure all. There's no one thing that works every year [because] every year is different. That is probably the biggest thing I would tell you—if you think you got it figured out, you better not pat yourself on the back too hard because next year's going to be different."*

CCs can be sunk costs if a farmer chooses expensive mixes. Camden remarked:

> *"You got to have these very specific mixes, and they get expensive, especially if people don't have the capability to graze them because they don't have fence, water, etc. Even if the government pays me $45 an acre, it still may not pencil out because I got to buy this crazy expensive seed just to terminate it."*

Tammy also addressed concerns about CC seed costs, stating that cost share programs can sometimes require multispecies CC seed blends, which are more expensive to plant:

> *"Sometimes those cost share program rules say that you must use species from each different class, you must have brassicas, grasses, and legumes. Very commonly, one or two species out of a mix is going to dominate."*

In 2019, Myers et al. identified some specific situations that can accelerate farmers' CC profitability. Their study contextualized responses from interviewed farmers who wanted CCs to be affordable, if not profitable. By utilizing CCs to increase their soil organic matter ratio to help improve future yields (Jacobs et al., 2022b), the opportunity to potentially sell CCs on a secondary market can be considered.

Increases in CC adoption have previously shown a high correlation with funding from federal and state conservation programs (Zhou et al., 2022), and farmers are eager to receive

federal risk protections and incentives (Sawadgo et al., 2021; Wallander et al., 2021). For example, in the Southern Great Plains, producers expressed moderate willingness to accept CCs if they were paid US$26.38/acre (T. D. Johnson et al., 2024). In our study, a farmer interviewee named Hank confirmed that he would plant more CCs if the government subsidized seed costs to the tune of US$50/acre:

> *"The problem with cover crops is they may not always be the way. Right now, the seed is expensive. I mean, it costs you quite a bit per acre to put cover crops on…I'd rather do it for 50 bucks. But if the cost of the seed was regulated or somehow moderated or supplied by the government that would kind of make a difference too. Think back when the government did the soil belt programs, they supplied clover seed."*

While much smaller than USDA Environmental Quality Incentive Program (EQUIP) CC payments of US$40–50 per acre (Myers & Wilson, 2023, p. 6), the 2022 USDA Risk Management Agency's (RMA's) Pandemic Cover Crop Program offered a US$5/acre premium discount to producers who planted qualifying CCs and were enrolled in eligible crop insurance policies.[14] Curtis, a farmer and crop insurance agent, remarked,

> *"They're good for me, they're throwing me an extra five bucks an acre, and that makes a little bit of a difference. It might not pay for a chemical application throughout the spring or pay for seed costs, but it will make a little bit of a dent…The option to graze them has become popular, because until just two years ago, [RMA] wouldn't allow you to graze or hay your cover crops…Opening that up…really helped because farmers don't have to let acres sit idle for that long, and they can bring additional value back into their operations."*

[14] H.R.8527 (2023) would have extended this program by providing a US$5/acre crop insurance discount (Casten, 2023), but it died in subcommittee.

In Curtis' last point, he was referring to USDA RMA's (2021) decision that producers with crop insurance could hay, graze, or chop CCs for silage, haylage, or baleage at any time and still receive 100% of the prevented planting payment. Curtis referred to USDA RMA's (2021) decision that producers with crop insurance could hay, graze or chop CCs for silage, haylage/baleage at any time and still receive 100% of the prevented planting payment. Previously, farmers could only hay, graze, or chop CCs after November 1; otherwise, their prevented planting payment was reduced by 65%. Crop insurance also benefits from the USDA RMA decision. Won et al. (2023), for instance, found that counties with higher CC adoption rates had lower levels of crop insurance losses caused by prevented planting.

When livestock graze CCs, they recycle manure back into the agroecosystem (Groff, 2015; USDA NIFA SARE, 2024). CC systems integrating livestock can be more profitable than livestock systems without CCs because the value of CC forage is greater than its costs (Bowman et al., 2024). Martin used wheat as a CC for soybeans:

> "*We'll use wheat as a buffer between soy rotations. We will plant corn this year on everything down there, then turn around after corn harvest is done and plant wheat to help with erosion and to keep that ground covered until we plant soybeans in the spring. We will do one of three things—either spray the wheat, harvest it and take it to market, or cut and bale it up for cattle feed."*

In Tom's case,

> *"As a normal practice, I'll plant covers right after silage and I'll get a foot to eighteen inches of grazing off it. It's top nutrition, high protein. The cows will just get fatter than fat off it and do really well…Because I run livestock, this here was chopped for corn*

silage and put in the silo, then I went in and planted turnip, radishes, and triticale…As soon as it warms up, they will take off. That's what I like to see."

Edwin would plant late-summer cover mixes into wheat stubble, and then sell the silage to his neighbor to feed cattle:

"I've got a window of time in late summer after I harvest wheat to plant cover crops. I drill them into the wheat stubble. I've got a neighbor who we sell our cows to, and they want to buy chuck silage and put it in the silo for feed for their calves in the winter. We've worked with them where we can take that planter corn and bean – we have a rotation – and we can take that silage off, usually in early August, and that allows me to go in there and drill cover crops and turnips all in the same blend."

There's more to CCs than simply harvesting or grazing them. CCs require practice, patience, adaptation, long-term planning, and the ability to learn new management practices. To assist with the adoption of CCs, there are several resources available that consider species type and plant characteristics that best align with each farmer's goals (CAFF & The Freshwater Trust, 2023; Hamilton et al., 2017; USDA NRCS, n.d.-b). Integrating CCs means learning new management skills. Luckily, there are several CC education and outreach resources in PT and the surrounding region: Pottawatomie County Conservation District (KACD, n.d.) (in Westmoreland); Kansas State University Research and Extension's (n.d.) Northeast Regional Office and the University's Department of Agronomy (n.d.) (in Manhattan); the Kansas Soil Health Alliance (n.d.) (in Esbon); Kansas Farmers Union (n.d.) (in McPherson); Kansas' USDA NRCS (n.d.) office (in Salina); Rodale Institute Regional Resource Center at Kansas Wesleyan University (in Salina); and the Kansas Alliance for Wetlands and Streams (n.d.) (in Newton).

Finally, Kientzy et al. (2023, p. 2) provided a summary of CC seeding machinery, equipment costs, coverage rates, seeding quality, seed size, and consistency.

Interviewees also emphasized that growing a successful CC *"is more of a timing thing"* (farmer Earl). "Timing" meant different things to different farmers. It meant receiving timely moisture after seeding CCs to ensure successful germination (farmer Michael), planting CCs before a freeze (farmer Zach), or terminating CCs before they *"go to seed"* (farmer Tammy). Farmer Sam lamented that lack of time and affordable labor prevented him from consistently planting CCs:

> *"I don't always get cover crops planted everywhere. I'd like to, but I don't always have time. The last several years I planted cover crops, and they didn't come up until the spring because it was too dry, so that didn't really help much. In fact, [planting] covers was more problematic than helpful. And so, this year, it was just too dry, and so I just didn't plant them…I don't really see anything wrong with that."*

Nick commented on the trade-offs of not tilling (but increasing his herbicide application rates for CC suppression/termination), and the time-intensive nature of CC management. He said,

> *"We use less fuel than we used to because we're not out there ripping the guts out of a tractor tilling. But we're also doing our own spraying, and so that kind of offsets that benefit…Since I've gotten more into the cover crops, I have one guy who now works full-time for us on them."*

Farmer peer information networks also influenced interviewee decision-making. Geraldine noted,

"Cover crops are big talk at the coffee shop because people want to try it. They want to know their neighbor is doing them and when they can see the results, then they're going to try to plant them."

Farmers who use CCs are more likely to bond with other farmers who use CCs (PFI, 2023b), primarily for knowledge exchange. As Curtis explained,

"The guys that have done covers in the past are the first ones to tell you what has worked, what blend that they've used, or stuff that may not have worked as good for their operation."

Virtual mediums (online forums and Facebook groups), in-person events (e.g., No-Till on the Plains conferences), and everyday interactions with neighbors and community members spur knowledge exchange and bonding (Riley & Robertson, 2022). Trust and reciprocity norms emerge from regular and repeated interactions within a bounded community (Bridger & Alter, 2006). Camden, a federal conservationist and farmer, noted that the *"farmer see, farmer do"* mentality has even helped sway CC-skeptical farmers:

"I've heard conversations at many of the talks I've been to, like 'just see what crazy Jim is doing, he's putting cover crops down!' They might talk about each another behind their backs a little bit but [then say], 'he's been doing it for five years now, so he must be doing it for a reason.'"

Less perennials, more corn and soybeans, and accelerated emissions

To better understand why CCs increased, it is necessary to examine an overview of county-level changes in leading crop types. From 2002 to 2012, PT farmers harvested more acres of hay(lage) than corn and soybeans. By 2017, the combined harvested acreage of soybeans and

corn for grain or silage overtook hay(lage) acreage, and by 2022, soybean acres were the most prevalent crop (Figure 3.1).

Camden questioned the economic rationale of farmers who converted hilly hay fields to cropland:

> *"You get guys who will try and farm the top [ground], and it makes me shake my head. What are you gonna get? You got to plow it up and lose that grass. Prairie soils are highly erodible, so you have to put structural conservation on the ground – terraces, waterways – and then by the time you do that, now you have marginal farmland. How you gonna make that pencil out?"*

From 2005 through 2019, the PT cover crop rate increased, as well as crop residue rates of 51-100%. Meanwhile, conventional tillage and reduced tillage, low-residue cover crop rates decreased (Appendix Table A.3). Over that same timeframe, all leaching emissions increased (**Error! Reference source not found.**, Figure 3.2).

Figure 3.1. Pottawatomie County, Kansas Harvested Cropland Acres by Select Crop Types, 2002–2022

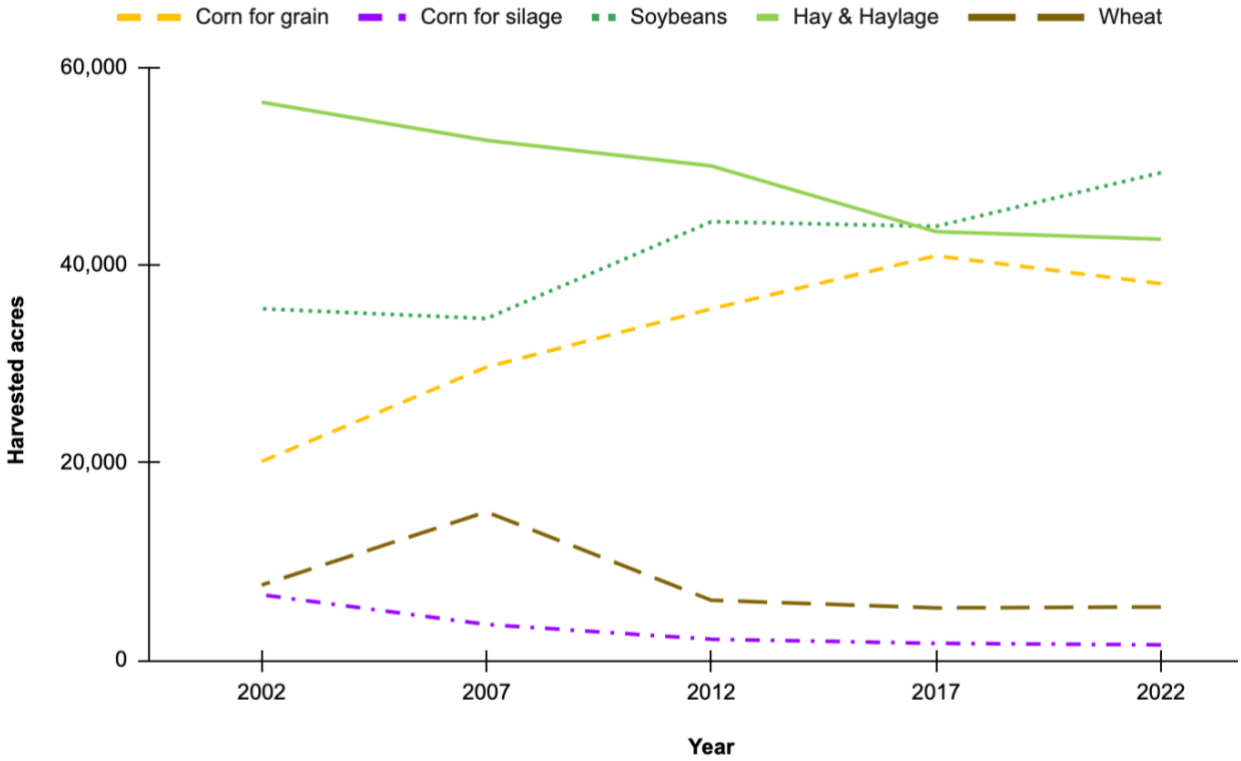


Figure by Jacob Miller-Klugesherz, © 2026.

Data sources: USDA NASS 2004, 2009, 2014, 2019, 2024.

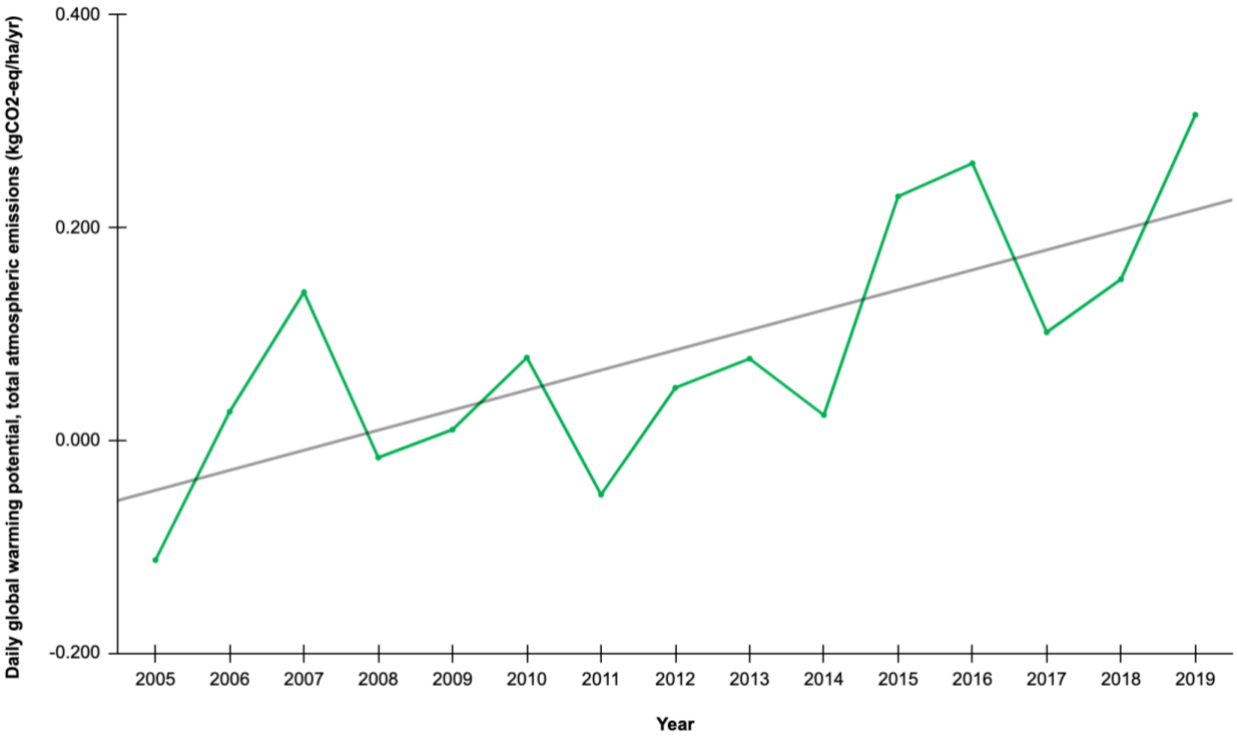
Table 3.2. Denitrification Decomposition Emission Trends for Farmland Acres in Pottawatomie County, Kansas

Annual leaching emissions	% Δ (2005 to 2019)	Linear r^2	Min. (yr.) – Max. (yr.)	CSB 2019 Rank %
Nitrous oxide (kgN_2O/ha-yr)	53.19	0.432	0.778 (‘08) – 1.649 (‘18)	73.73
Nitrate ($kgNO_3^-$/ha-yr)	93.41	0.524	22.69 (‘06) – 60.32 (‘19)	64.1
Daily soil organic carbon global warming potential (kgC/ha/yr)	103.3	0.383	-0.306 (‘16) – 0.01 (‘19)	70.01
Daily global warming potential, total atmospheric emissions ($kgCO_2$-eq/ha/yr)	370.8	0.523	-0.113 (‘05) – 0.306 (‘19)	75.52

Data source: The Nature Conservancy et al., 2023.

Figure 3.2. Annual Average Daily Global Warming Potential of Total Atmospheric Emissions on Pottawatomie County, Kansas (PT) Cropland Acres by Year, 2005-2019

Negative values equal net sequestration and positive values represent net emissions.



Data source: Hagen et al., 2020, p. 16; Figure by Jacob Miller-Klugesherz © 2026.

In sum, CC rates increased in the county, but so did all emission types. This was especially surprising for nitrate emissions because Nouri et al.'s (2022) global meta-analysis found that, across different soil types and agronomic systems, cover crops reduced nitrate leaching by 69% compared with fallow. There was a sizeable discrepancy – in directionality and magnitude – between the emissions data I expected and those I observed.

One possible explanation for this discrepancy was that the acreage ratio of perennials, alfalfa, and woodlands all decreased, while corn and soybean acreage and productive intensification increased over the same time. The percentage of acres planted to herbaceous perennials was >11% from 2005-2007, but in 2009, it dropped to 4.41% and remained <5% through 2019 (Hagen et al., 2020). Acres of harvested alfalfa declined since 1997 (10,163 acres),

reaching its lowest point in 2022 at 6,077 acres (USDA NASS, 2019, 2024). This could have collectively skewed C-N ratios below the ideal 24:1 thresholds (e.g. alfalfa fields exhibit a 25:1 C-N ratio) (Gullickson, 2015). Moreover, although CCs can supplement inorganic fertilizers by fixing more N_2 (Blanco-Canqui et al., 2012, p. 13), in certain conditions—especially in drier fields fertilized with inorganic N—decomposing, leguminous CC residues can consume soil O_2 and lead to N_2O emissions via respiration-induced anoxia (Lussich et al., 2024, p. 10).

Organic farmer Vanessa explained why increased CC attention can distract from understanding the broader impacts of farmland use patterns:

> *"I've seen some pretty bad examples of no-till. How is there still a lot of sediment in the ditches and in the reservoirs if we're doing such a good job with [no-till]? So now they implement more cover crops and chemicals in corn and soybean rotations. But that's not enough diversity. We are not going to solve the problems of water quality and soil health until we recognize and solve the problem of size and scale. I see the bulldozing going on, and they're constantly pushing the borders of the fields. They're filling in the little low places and farming the riparian and brushy areas. They're taking all that out so to do monocultured corn and soybeans. And then they say, 'Oh, I'm environmental because I've thrown in some rye cover crop or a mix. And you know, I graze our cattle out there, so those are good things.' But for the big picture, we're not going to solve the bigger problems this way."*

Vanessa's perspective was holistic. Similarly, Nathan recognized the importance of public dollar investment in CC payments, but experienced a situation when a government program incentivized farmers to convert native prairie to CC-planted cropland:

"[I was on a] project where farmers tore out a whole bunch of native prairie to put it in cropland. They had a proposal that would pay them to implement cover crops on this land they had taken out of native grass. I was adamantly opposed and said, 'we are just rewarding bad behavior. We should not be supporting it.' But man, there were people on that committee who said, 'but it will do good going forward.' It passed and well shit, it's still paying them for something that they should not have done."

There was another potential explanation for increased emissions: excessive herbicide application can result in NO_2 and NO_3^- leaching, which occurs when an herbicide is dissolved in water, moves down through the soil profile, and is carried away from crop and weed germination zones (Giuliano et al., 2021; Nogueira et al., 2022). From 1997-2017, the percent of total PT cropland acres applied with herbicides more than doubled (USDA NASS, 2004, p. 563; 2014, p. 610; 2024, p. 670), and from 1997 through 2022, chemical expenses per operation (in June 2024 inflation-adjusted US$) more than tripled (USDA NASS, 2004, p. 268; 2014, p. 293; 2024, p. 309) (Table 3.3).

Table 3.3. Herbicides and Chemical Expenses, 1997-2022

Variable	% Δ, 1997 to 2022	Linear r^2	Min (yr) – Max (yr)
Percent of agricultural land acres applied with herbicides	45.11	0.671	41.41 ('97) – 85.85 ('17)
Inflation-adjusted (June 2024) chemical expenses per operations reporting them	216.55	0.831	$6,761.71 ('97) – $21,404.08 ('22)

Data sources: USDA NASS, 1999, 2004, 2009, 2014, 2019, 2024.

'Spray or spade'? The rigid dualism dictating cover crop suppression/termination

Choosing the correct CC suppression or termination method depends on farmers' goals, equipment availability, cost, and management preferences. These options include mowing, disking, roller crimping, grazing, and herbicides (Adetunji et al., 2020, p. 7; M. Anderson, 2023;

Hill & Sprague, 2024). Ideally, cover crops' weed suppression should reduce the herbicide costs farmers pay for weed suppression. Tammy explained:

> *"Weed suppression is becoming more of a cover crop benefit that producers are focused on. They like the idea that they could use less expensive herbicide options, because the days of glyphosate working perfectly and never having to apply anything else are long gone…They can help farmers use less costly herbicides, and potentially they might be able to use Roundup only for their burn-down."*

The evidence that CCs can reduce herbicide costs is mixed. CTIC et al. (2025) have conducted nationwide surveys of CC users. In their 2023 survey, 55% of respondents saw no change in herbicide costs in corn following CCs, while 42% noted that they saved money on corn herbicides after CCs (p. 74).

Eight PT interviewees (36.36%) said that every year they must make the choice between minimum tillage or herbicides for cover suppression/termination. For their operational contexts, crimping or grazing were not options. They perceived "spray versus spade" to be a necessary choice for ensuring a harvestable and marketable cash crop. Earl argued,

> *"Either you spray, or you use a spade. I don't know how you could do it otherwise… Cover crops can eliminate one trip across spraying for weeds, and that helps. And a lot of the chemical stuff has gotten high enough that this year, I think you could run over ground a couple times with a disk and a field cultivator for way less than the burndown cost…I hired my chemical application done because I don't really want to be around the stuff. And they [coop] have better spray equipment with better filters on the cabs. If I were to go organic, that would make a pretty big change."*

Curtis echoed Earl's rigid belief about the necessity of spray or spade:

"From an on-farm perspective, there are two ways to control weeds: with iron, whether that be a disc, moldboard, plow…or with a chemical application, [especially] when the weeds become so bad…If you go through with a cultivator, you're only killing what's in-between the rows. I think that's why some guys have gone back to a more of a minimum till instead of a no-till, because of the mismanagement of the chemical that they had to begin with."

Some farmers were not concerned about the negative impacts of chemical herbicides, partly due to the implied trust that considers salespersons as the experts. As Pete explained,

"I don't see any other way to do it…My grandfather came here from Germany in the late 1920s, and they farmed with a hoe. Back then you could round up a few kids to help weed. Now you can't do that or find anybody who would even consider doing that kind of work…I go to farm meetings all the time, and with those farmers I talk to, all of us have used Roundup since it was initially invented. It's a very useful herbicide.

Hank, a noncertified organic farmer, said neighboring farmers used herbicides to terminate both annual CCs and emerging weeds around the planted-green cash crop:

"A lot of the no-tillers now are going in and are no-till planting the cash crop into that cover crop and then trying to come in later and spray it to kill the cover crop. So, they're kind of doing two things at once: they're killing the cover crop plus killing the new weeds coming in around the cash crop."

However, herbicides used to control weeds in a cash crop stand can affect CC planting schedules—termed residual "carryover" (Corteva, 2022; Maia et al., 2024; Paris et al., 2024). Tammy explained the carryover:

"One of the other challenges to cover crop adoption is going to be the herbicides used on the cash crop. Some are going to kill some of the cash crops because of their perennial natures and the time between planting and harvest. When trying to get that cover crop established, not all of them are going to survive. And so sometimes the choices that you make in the cash crop will dictate what you can do with covers, or if you can grow anything after. A lot of our most effective weed control herbicides have some residuals, and there hasn't been testing done on every single cover crop known to man, and so you just try to find something close or look at the longest one. A lot of times, the longest [residuals] may be 15 months, but you don't have 15 months between the application and the need to plant a cover crop. So, there are some substantial limitations in terms of herbicide technologies and some testing that probably should be done on particular cover crop species and whether they can be established after using those herbicides."

Unless they did custom spraying themselves, most interviewed farmers distanced themselves from spraying and depersonalized its effects. They acknowledged certain risks but downplayed them to emphasize the necessity of spraying. For instance, Michael said,

"These airplanes, you gotta be careful…Herbicides will kill people's gardens, flowers, and trees… There aren't very many neighbors who don't get along, but that'd sure be a way to piss off your neighbor and have them not talk to you—scorch their gardeners."

"Kill." "Piss off." "Scorch." Such terms of death can reflect farmers' attitudes toward themselves, others, and their operations (G. Brown, 2020, p. 94). Herbicides can be lethal for humans, as Hank attested:

"I quit using chemicals…I can't make myself spray anymore. Dad came down with Alzheimer's when he was 60, and he just loved to spray. He'd come in soaking wet with

chemicals. I think maybe that's what ended up doing him in. It got so bad he put a raincoat on me when I sprayed with a tractor, because it gets sprayed up. That was agent orange, you know?"

Five PT interviewees displayed cognitive dissonance about using more herbicides for weed and CC suppression/termination. However, they all ultimately justified their intensified use of herbicides as being necessary to "feed the world," which is a powerful cultural and social "script," or a "commonly used line of argument that is widely invoked in response to a particular issue or situation" (Vanclay & Enticott, 2011, p. 256). Marvin followed this script thusly:

"There's always a balance. You either take the risk of death by cancer or death by starvation. The main goal that farmers are trying to tackle is just feeding the world. It's why you see the need for improved technologies. Bigger populations require more people to be fed. It's an interesting social dilemma."

Barbara admitted that her farming practices were heavily dependent upon herbicides and that they have negative impacts on human health (Ahuja et al., 2024). However, Barabara justified her use of them:

"We are afraid of people starving, that we won't be able to produce enough to feed the world. We've already got people in the world starving."

Tammy believed there was no viable way to "feed the world" with organic production:

"The Certified Organic Program is perfectly acceptable if honesty is shared about what that actually means, which sometimes it's not…But the reality is that if every producer adopted only those practices and went through that [organic certification], we would have trouble feeding the world for sure."

Stewardship and business represent competing moral imperatives (Bell, 2004, 2018). To reduce this tension, the farmers portrayed themselves as a "hero feeding the world," a third social role with more positive moral overtones (Comito et al., 2013, p. 283). The "feed the world" justification for herbicide (over)use has been refuted (Stone, 2022). Scaled organic production can feed the world just as viably as conventional production (Badgley et al., 2007). As Lappé (2010) argued, creating a food system that encourages "low-input local production, with organic practices where viable, will not only help address the climate crisis but also help redress one of the most painful facts of the modern world: hunger amid plenty" (p. 172). Nevertheless, these interviewed farmers followed the "feed the world" script to justify their chemical herbicide suppression/termination of CCs.

From an agroecological perspective, the ideal management type would be 'regenerative organic' (Rodale Institute, n.d.)[15], verified via the Regenerative Organic Alliance's (n.d.)(Regenerative Organic Alliance, n.d.) Regenerative Organic Certified™ program. This certification indicates that both no spray and no spade is achievable, although PT interviewees perceived it as impractical. Given that many of these PT farmers will not stop using herbicides any time soon, a practical way that farmers can reduce usage rates is to consult and consider the best on-farm management practices (Prokopy et al., 2008, 2019). One option to consider is the 4R method, which involves applying the right source at the right rate, time, and place (Rogers, 2019; The Nature Conservancy, n.d.). Jones (2009, p. 5) argued that if one had to pick between herbicides and minimum tillage, the latter would be best, because in most situations, herbicides cause greater loss of soil aggregation and structure than tillage. To minimize erosion and

[15] The "original regenerative principles" (pluralism, protection, purity, permanence, peace, potential, and progress) did not specifically omit herbicides or tillage (Rodale Institute, 2019), though their exclusion was implied.

leaching, Jones continued, one should consider planting CCs immediately following a tillage event to incorporate some kind of living root back into the turned soil.

Conclusion

This study analyzed the CC beliefs and practices of Pottawatomie County (KS) farmers and CC experts on large corn and soybean operations ($\bar{x}$ = 1,183 acres), as well as structural factors influencing their CC perceptions, decision-making, and adoption. Interviewees foremost looked for CCs to be affordable, if not profitable, and subsidized by public dollars via cost-shares. PT farmers planted CCs to supplement forage biomass for cattle, and grazed cattle on CC residues, mostly corn stover. They learned about CCs from their neighbors and emphasized the importance of timing related to weather and available labor. They treated CCs as another tool in the conservation toolbox, not a silver bullet. One explanation for the increased adoption of CCs was that farmers converted more cropland acres from perennial crops to corn and soybeans from 1997 to 2022.

During that same 25year timespan, other concerning trends increased: acres applied with herbicides, total chemical expenses, and leaching emissions. These trends were associated, related, and likely correlative, although I did not empirically demonstrate correlation in this study. When CC suppression/termination by crimping or grazing was not an option for farmers, they deferred to herbicides (spray) instead of minimum tillage (spade). While generalizations are limited to the study context, this finding raises implications for the tradeoff between herbicides versus minimum tillage under certain agricultural conditions and contexts (Dentzman, 2018).

Moving forward, PT farmers and ag-adjacent persons could consider soil health principles that trend more organic than regenerative (Figure 1.2). Starting from the five principles used by Jay Fuhrer (Groundswell Agriculture, 2019) and Gabe Brown (2018), replace

the “maintain living roots year-round” principle with the “no synthetic chemicals” principle. The “maintaining living roots year-round” principle can be considered implicit to the “keep the soil covered” principle, and omitting the former allows for shallow, minimum tillage practices when and where appropriate. Front-mount roller crimping does not use herbicides or disrupt soil aggregate formation through tillage (Gailans & Bakehouse, 2022; USDA SARE & Clark, 2007, p. 115), and could therefore be considered as a suitable suppression/termination tool (Alonso-Ayuso et al., 2020). Of course, “regenerative” and/or “organic” labels are most useful when contextualized with ongoing, on-ground farm management practices, farmer experiences, and certification requirements (Staton et al., 2024).

Adopting healthier agricultural practices is at once difficult and necessary, yet ultimately dependent upon farmers’ preferences, beliefs, and contexts. CCs are not a one-size-fits-all solution. When implemented and managed correctly, however, CCs can help root and spread the soil health revolution (Montgomery, 2018). They are a small but essential part of helping communities adapt to the triple planetary crises of climate change, pollution, and biodiversity loss.

“Without Her, No Prospect”

Nature’s beauty will outlive our bounty
stripped from Her spine.
For while some preserve and conserve Her wealth and splendor,
for ecology’s economy,
most see beauty in Her eroded field and razed forest.
Justified as a prospective means to a never-ending end.

Hypocritical. Me, penning this on a *United* flight.
In reality we, *Sapiens*, are all prospectors.
Boeing 737s our covered wagons.
Panning the Earth in search of gold, 39,000 miles above but still within
Her reach,
we remain *Divided*.

Everywhere below are fellow grubby money-grubbers,
rushing the river rocks, fields, and oil basins,
hollering “thar’s gold in them hills!” while
pick-axing their way to “freedom,” “innovation,” and “progress.”

Panners pander to the country’s planners, so we all capitalize on having
no carbon cap.
Novel prospects line up—new development, land, energy sources—
because we see the wrong shade of green.
For us, every rushed day is golden 1849. For Nature, every dusty day is 1933.
The worst part? Prospecting feels “natural.” It feels deserved. It feels meaningful.

We plan to dig up more, get more, own more, feel more.
But left with less and left poor, shallow feelings of more
match the ground’s mound, overturned.

Over-churned inside, rootlessness, sickness, and meaninglessness,
we keep on prospecting, even as
Nature, ever alive, begins to awaken.
Her stretch alerts us that our debts mar our prospects, that we and She are changing,
that Her spine will straighten, and we crooked species will lose our bounty.

The plane lands smoothly and I am shaken. All I want to see is Her.
Her enduring land, rebelling trees, dancing sky, and singing streams.
I just want a glimpse of Her beauty and to forget about the change.
I want to smile and laugh and feel good again.
So, I look.
Nature’s reflection blinds me with a golden sheen I cannot unsee.

- Jacob Miller (2020)

Chapter 4 - Good for the Soil, but Good for the Farmer? Addiction and Recovery in Transitions to Regenerative Agriculture

Abstract

While the ecological benefits of regenerative agriculture (RA) are becoming clearer, its effects on farmers themselves are less well-understood. This paper's aim was to understand how farmers experienced transitions from industrial agriculture to regenerative agricultural practices. Drawing on the 'good farmer' concept of identity, I provided a qualitative, narrative analysis of 51 farmers in United States' Central Great Plains region, who, at various points in time, began transitioning to RA. Transitioning farmers set themselves apart from those practicing industrial agriculture, including their past selves, who constituted an 'other' against which they contrasted their emerging identities as 'regenerative' farmers. These farmers used the discourse of addiction to describe industrial agriculture, seeing RA as a form of recovery from the chemical-intensive and subsidy-fueled treadmill of production that characterizes industrial agriculture. RA was experienced as a process of recovery that entailed shifts in farmers' identities as 'good' farmers.

Keywords

Farmer Wellbeing; Good Farmer; Industrial Agriculture; Narrative Analysis; Regenerative Agriculture; Structural Addiction

Highlights

- Narrative analysis of Kansas farmers transitioning from industrial to regenerative practices.
- Regenerative agriculture is good for farms, but less-understood is whether it is good for farmers.

- Transitioning farmers used the discourse of addiction to describe industrial agriculture.
- Regeneration is experienced as a recovery process from the subsidy-fueled production treadmill.
- Shifts in farmers' identities as ‘good’ farmers away from ‘others’ (industrial farmers).

Introduction

The demise of civilizations can be attributed to the degradation of soils (Lowdermilk, 1950; Montgomery, 2012). Evidence suggests that history may be repeating. The world's soils have lost a total of 133 billion tons of carbon since humans first started farming the land approximately 12,000 years ago (Sanderman et al., 2017). Soil erosion from agricultural fields is estimated to be 10 to 20 times (under no tillage) to more than 100 times (under conventional tillage) higher than the soil formation rate (IPCC, 2020, p. 7). If current rates of soil loss continue, only one-quarter of all arable and productive land per person in 1960 will be available in 2050 (Food and Agriculture Organization of the United Nations, 2011).

The problems of industrial agriculture are not limited to soil. In 2019, the agriculture sector contributed 5.79 gigatons of greenhouse gas emissions (CO_2e), which, including land-use change and forestry, represented 11.65% of total sector emissions (World Resources Institute, 2022). Industrial pollution via nitrogen runoff is the leading source of water pollution in rivers and streams, the third-largest source for lakes, and the second-largest source for wetlands (Lindwall, 2021, p. 7). Pesticides are routinely detected in 88% of streams and rivers (Covert et al., 2020), and more than 90% of USA residents have pesticides in their bodies (Chiu et al., 2018). Industrial agriculture has accounted for 60% declines in wildlife populations since 1970, and at least one million species are threatened with extinction (WWF, 2018, p. 7).

"Regenerative agriculture" (RA), has emerged as a leading response to the problems of industrial agricultural practices (O'Donoghue et al., 2022). RA is a "place-based management philosophy whose adherents think about their land, their businesses, and their communities as dynamic ecosystems, contrary to today's dominant industrial agricultural model" (Sharma et al., 2022, p. 8). RA is neither a new concept nor practice; RA mimics and employs indigenous

principles that have been practiced for centuries (Carlisle, 2016, 2022; Dahlberg, 1994). RA practices are heterogenous (Newton et al., 2020; Rehberger et al., 2023), and although no one accepted definition of 'regenerative' exists, U.S. mainstream RA discourses typically recognize five principles (G. Brown, 2018; Fuhrer, 2016; I. Ibrahim & Ahmed, 2022, p. 5; Khangura et al., 2023, p. 2): (1) limit soil disturbance; (2) keep armor (cover) on the soil surface; (3) build diversity; (4) keep living roots in the soil; and (5) integrate animals.

RA's benefits for ecosystems are becoming clearer, as evidence demonstrates that the more complex, diverse landscapes that RA promotes host more biodiversity than simpler ones (Estrada-Carmona et al., 2022; Karp, 2022; Kremen & Merenlender, 2018). RA has proven to repair soil health and biodiversity, increase the amount of soil organic carbon in existing soils and build new soil (Rehberger et al., 2023; Rhodes, 2017), sequester carbon (Burgess et al., 2019, p. 3), improve water infiltration rates (Strickler, 2021, p. 173), and improve resiliency to droughts (Basche & DeLonge, 2019).

While the ecological benefits are becoming clearer, the benefits of regenerative agriculture for farmers themselves are less well-understood. The process of shifting from chemical-intensive, industrial practices to more labor-intensive regenerative practices can require considerable spans of time – often measured in years – before measurable soil quality improvements become evident, even as farmers and ranchers incur the immediate costs of transition (Jacobs et al., 2022b). How did farmers experience the transition from industrial-conventional to regenerative agriculture? How did the shift to more regenerative practices shape the wellbeing of farmers? Does regenerative agriculture restore and renew the farmer as well as the ecosystem? I investigated these questions through in-depth interviews among farmers and ranchers in USA's Central Great Plains region that vary in the breadth, intensity, and length of

time with which they have employed regenerative practices. I tried to understand how farmers experience the transition to RA, and the findings complement other 'good farmer' research on farmers' experiences transitioning away from productivism (Burton & Wilson, 2006; Cusworth, 2020; Haggerty et al., 2009; Marsden, 2013). The primary contribution showed how farmers' conceptions of themselves as 'good farmers' were imbricated with transitions to regenerative agriculture, exploring how farmers at different stages of the transition navigated and negotiated shifting identities and practices.

Background: Good Farming, and Transitioning to Regeneration as Recovery

Farming is an identity derived from a way of life, such that to farm the soil is to "farm the self" (Bell, 2004, p. 122). Thus, inherent in farming are moralized concepts of what it means to be a 'good' farmer (Riley, 2016a; Stock, 2007; Sutherland, 2013), which is usually conceived in terms of demonstrating a "high level of competence in the performance of professional farming activities" (Burton et al., 2021, p. 129). The 'good farmer' concept is dynamic, geographically dependent, has evolved over time (Riley, 2016a), and was categorized by Burton et al. (2021, p. 68) into three broad periods.

Pre-industrial European farming (14^{th}-17^{th} c.) was rooted deep in religious sentiments valuing fair treatment of wives, family members, servants, and "untidy farming" that worked with nature (Burton et al. 2021, p. 41-45). In a subsequent era, tidy farming became the norm (18^{th}-19^{th} c.) due to the invention of the drill and corresponding "drill husbandry" (45-48, 57-59), a rapidly growing world population, and the industrial scaling up of agriculture to maximize food production (p. 130-131). Maximizing yields became a central moral imperative of 'good farmer,' and the productivist norm was supported later with further technical innovations such as fossil fuel-powered tractors, anhydrous ammonia, seed and biotechnologies commoditization,

(Goodman et al., 1987; Kloppenburg Jr., 2005; Otero, 2008; Quinn & Carlisle, 2019). During the 1970s and 80s (3rd period), however, 'alternative' farmers, activists, and organizations questioned and opposed the "feed the world" moral imperative because they recognized the cumulative effects of industrial productivism on ecosystems, the climate, and rural communities (Burton et al. 2021, p. 131). Alternative farmers (re)turned to prioritizing practices and principles of stewardship, conservation, environmental protection, multifunctionality, and community wellbeing (p. 131). RA practices codified during this third period are *re*named and *re*claimed ways of farming practiced in pre-industrial times (Duncan et al., 2020).

Alternative farmers today enact several, fragmented moral imperatives (Burton et al. 2021, p. 132), including conservationist, civic-minded, and naturalist (McGuire et al., 2015), but productivism remains the leading moral conception of what it means to be a good farmer in the U.S., as evidenced by mainstream agricultural discourses and practices. Productivism is the predominant form of discourse promoted by mainstream agricultural organizations like the U.S. Farm Bureau, and productivist messaging appears throughout the landscape, including Kansas, where signs along Interstate 70 – a principle highway linking the East and West coasts of the country – claim: "1 Kansas farmer feeds 155 people *AND YOU*!" Despite a wider scope of farmers consulting RA more recently, regenerative practices remain marginal in comparison to industrial agriculture, even if cover crop adoption – a key practice of RA – estimates of 20 million acres by 2020 and 40 million acres by 2029 materialize (Hamilton et al., 2017). Today, continuous no-till has been adopted across only 21% of all cultivated U.S. cropland acres (Creech, 2017), and as a share of harvested cropland (excluding alfalfa), cover crop adoption increased only from 3.4% in 2012 (10.3 million acres) to 5.1% in 2017 (15.4 million acres) (Wallander et al., 2021).

Although productivism remains the central moral imperative in U.S. agriculture, most farmers who rely on farming as a primary source of income struggle to make ends meet. While farmers earned 40 cents from every dollar of sales in 1910, net income from producing crops and livestock has fallen to Depression-era levels—farmers now earn only one penny from each dollar of farm sales (Meter, 2021, p. 33). Most value in the agri-food system is now captured by global input suppliers, processors, distributors, retailers, and financial institutions (Carolan, 2022, p. 30).

Government subsidies, direct payments, price supports, and crop insurance policies incentivize farms to prioritize production, especially for larger, industrial farmers. Farmers in the industrial model thus confront a political economy in which they are price-takers for the products of their labor. They are dependent on larger, consolidated, and much more powerful actors who both control access to the markets and set the terms of the market for farm outputs (Bruckner, 2016; Hendrickson et al., 2020; MacDonald, 2020). Moreover, price-taking farmers are forced down one of two paths: get bigger, or get out and go small. Built on the moral imperative established by Earl Butz's infamous "get big or get out" slogan (Philpott, 2008), a bifurcated farm structure with a hollow middle often makes farmers choose to either continually intensify industrial production or focus on small-scale specialty production reliant on direct-to-consumer markets (Lyson et al., 2008).

A farmer's level of protection from the federal government is almost entirely based on their farm's actual production history over the past five years (USDA RMA, 2023). Cover crops – a central component of many RA strategies – can weaken the strength of government protection. Cover crops can help build soil organic matter, which can improve fertility and yields in the long-run, but in the short-run they can seem like a sunk cost that threatens yields, and thus

the farmer's bottom line (CTIC et al., 2020). Cover crop intensification can result in lower commodity yields, which leads to higher farmer insurance rates; together, they diminish a farmer's level of federal protection.

As the case of cover crops shows, farmers transitioning to RA face significant risks, and these risks are economic and socio-cultural in form. They are bound up with *a way of farming* that has become known as 'conventional' or industrial agriculture—an input-dependent, chemical-intensive, mono-cultural set of practices that have re-shaped agriculture into an industrial form on a global scale (Buttell, 2001; Friedmann, 1993; Lobao & Meyer, 2001). The industrial model is characterized by a productivist culture that above all else valorizes rationality, efficiency, and expansion of outputs (Burton, 2004; Setten, 2004). By maximizing production, however, the 'good' farmer has been caught up in the agricultural production treadmill, in which they must continually expand production output to maintain living standards (Curran, 2017; Levins & Cochrane, 1996). The production treadmill is supported by government subsidies and price supports, which encourage farmers to incur increasingly large debt loads to further capitalize and mechanize their operations and expand production (Sanderson & Hughes, 2019).

Productivist culture supports the production treadmill, providing normative motivation and value affirmation for farmers practicing the industrial model of agriculture. Stepping off the treadmill thus involves not only economic risks, but risks to one's very identity. The risks of transition are also more-than-economic, extending to the symbolic and cultural aspects of agri-*culture*, and thus, to one's sense of self, purpose, meaning, and being. Agriculture is cultured. Farmers draw upon constellations of norms, values, beliefs, and symbols in communities of practice (Bell, 2004), and in the process, farming practices are imbued with meaning as farmers co-produce landscapes and themselves (Vanclay & Enticott, 2011).

Although implementation of regenerative practices is ultimately a decision for each individual farmer, farmers are members of communities from which they find meaning and take meaning-making actions. Research on the 'good farmer' examines how various community capitals (Bourdieu, 1986) relate to farmer participation in agri-environmental scheme (AES) (Burton & Paragahawewa, 2011; Cusworth, 2020; Forney et al., 2018; Riley, 2016a; Riley et al., 2018). However, because rural communities face dwindling populations and labor shortages (Johnson & Lichter, 2020; Sutherland & Burton, 2011), it can be more difficult to build the community capacity to encourage AES participation. Some argue that this is one reason why regenerative agriculture is not as concerned with broader structural changes as agroecological policies, practices, and discourses (Bless et al., 2023; Brescia, 2017; Shiva, 2022), which can hinder transformational systems change (Gosnell et al., 2019b). Foregoing the security of government supports can make the risks of transitioning off the production treadmill excessive for many farmers, especially since doing so exacerbates income uncertainty and financial volatility year-to-year (Dudley, 2000).

The pressures and strains of the industrial model are accumulating for farmers. When the surrounding farm structure strips farmers of most of their autonomy, makes it almost impossible to make a net profit from production, and leaves farmers' livelihoods to the whims of governmental programs, policies, and politics, it is not surprising that farmers face rapidly declining mental and physical health (Beard et al., 2014; Bondy & Cole, 2019; Mylek & Schirmer, 2015; Peel et al., 2016; Vayro et al., 2020, p. 165) in an array of contexts (Austin et al., 2020; Carter & Marony, 2021; Ellis & Albrecht, 2017; Huth et al., 2018; Letourneau & Davidson, 2022). In the USA, where the industrial model has perhaps been taken the furthest, farmers are more than twice as likely to die from suicide compared to the rest of the population

(Norrod, 2021). Industrial agriculture is a major driver pushing ecosystems beyond planetary boundaries (B. M. Campbell et al., 2017), and it appears not only ecologically unsustainable, but socially unsustainable as a means of maintaining communities and renewing farmers.

In this context, growing numbers of farmers are looking to alternative forms of agriculture, including regenerative practices, as a means of restoring soil health and renewing ecosystems in working landscapes. I explored how farmers navigate transitions from the productivist ideal of the good farmer toward emergent practices, cultures, and identities in the context of the agricultural production treadmill.

Methods

Semi-structured, in-person interviews were conducted with 51 farmers between June-August 2021 and January-February 2022. All but two resided within central Kansas, in the USA's Great Plains region. Using purposive sampling (Bernard, 2017), I initially interviewed 24 farmers who were enrolled in a regenerative agriculture pilot program, supported by a large, multinational food corporation. To further extend and diversify the group of interviewees, I asked farmers in the initial group to identify others who were interested in, or were trying to, employ RA practices on their operations in the region. I identified 27 other farmers using this snowball sampling (Noy, 2008).

As discussed earlier, RA features a plurality of meanings, definitions, place-based origins, genealogies, and discourses (Burgess et al., 2019, p. 8). Although 'regenerative' practices attempt to go beyond sustainability, the term has become a catch-all concept for anti-industrial practices (Bless et al., 2023; Gibbons, 2020). (Bless et al., 2023, p. 10) identified five agricultural narratives—organic, conservation, sustainable intensification, agroecology, and regenerative—and their geographical origins, founding actors, social-ecological triggers,

challenge to industrial agriculture, and status. Relatedly, Gordon et al. (2023) consulted nine discourses that contribute to RA's storyline: Restoration for Profit; Big Picture Holism; Regenerative Organic; Regrarian Permaculture; Regenerative Cultures; Deep Holism; First Nations; Agroecology and Food Sovereignty; and Subtle Energies. Varying RA discourses result in its four "tensions" of genealogy and holism, equity and power, definition, and departure (p. 1835). To the third, in systematically reviewing scholar and practitioner definitions of RA, (Newton et al., 2020, p. 7) found five types of RA definitions that have been used: no definition offered; outcome-based, process-based, combined process- and outcome-based definitions; or definitions with multiple processes and/or outcomes.

I recognized the importance of privileging a plurality of narratives to allow for diversity (Page & Witt, 2022), placed-based context (Bless et al., 2023; Loring, 2021; Pascucci, 2020, p. 323) and acknowledge the substantive differences among the practices and narratives that are increasingly assumed under the label 'regenerative'. However, because RA's definitional ambiguity better allows corporations to shape discourses to their own ends, which can lead to cooptation and greenwashing (Giller et al., 2021, p. 16), my study used a process-based definition focusing on "the inclusion or exclusion of one or more agricultural principles and/or practices…that define what types of agriculture may be considered regenerative (Newton et al. 2020, p. 6). My RA definition—*a socially (re)produced ecological and biological system for growing food and restoring degraded soil and landscapes* (adapted from Brown 2018, p. 11)—assessed farmers' practices based on RA's five principles.

This process-based definition was a continuum, from industrial (0) to regenerative (5), with industrial agriculture being the most ecologically extractive and regenerative agriculture the least extractive (Anderson & Rivera-Ferre, 2021). I employed this process-based definition with

five principles because it is producer-driven, treats farming styles as a continuum (Page & Witt, 2022), and the principles are most "common and are perhaps the norm" in the field at this time (Newton et al. 2020, p. 8). For these reasons, process-based definitions hold potential implications for policymaking around RA, especially for certification programs (e.g. Savory Institute, 2023) and carbon sequestration payments (Lal, 2019, 2020). However, because this process-based definition mainly relies on farmers to prove that they are indeed making measurable progress in the process of transitioning (Fenster et al., 2021), producers and their consultants acknowledged that this definition faces an epistemic barrier given that the efficacy of practices underlying the ascribed principles was determined based on what was visible, and not what was invisible or left unsaid (Carolan, 2006).

While visiting the first 24 farmers' operations and interviewing them, I developed a framework to understand why each was categorized in the manner they were. Consulting this framework, I categorized the remaining 27 based on what I saw during my tours of farmers' operations and what the farmers told me. Principles in the process of being added or removed were not counted; only those visibly demonstrated were categorized.

Throughout the fieldwork, I sought to be conscious of how my positionality shaped interactions with interviewees. As a white male with a rural, farming background, it was not difficult for me to pass as an 'insider' among the interviewees. Farmers likely felt more comfortable opening to me because I looked like a farmer, dressed like a farmer, used the language of farming, and had knowledge about the work and lifestyle. I asked questions about wellbeing adapted from questionnaires developed to survey farmers about their physical and mental health (e.g. "what makes you get out of bed in the morning?") (Cummins et al., 2003; Dodge et al., 2012; Peel et al., 2016), as well as questions about how their identity is shaped by

their neighbors, community, and close farmer friends and neighbors. It is also worth noting that, when prompted, I also inquired into how producers understood the relationship between their religiosity and their farming practices, as there is research demonstrating the importance of religiosity for ordering morality in and toward nature (Farrell, 2015).

I conducted comparative narrative analysis to "discern the underlying patterns and practices" that shape farmers' experiences (Morrison, 2005, p. 249). Narrative approaches engage people in meaning-making dialogues that help move beyond a strict problem to more general social phenomena (Fraser, 2004). They reveal relationships between "deep, macrolevel structures and surface, microlevel structures" (Franzosi, 1998, p. 525), revelations that are essential for social psychological studies like these. Narrative analysis is "less interested in historical master narratives than in the space of everyday practices" (Keunen, 2005, p. 548), making it most suitable for my purposes, as everyday narratives help researchers explore the rules of identity formation (p. 548). The foundational budling blocks of narratives are stories, which are "a basic human strategy for coming to terms with time, process, and change" (Herman et al., 2005, p. ix). Because they can contain multiple truths (Josselson & Lieblich, 1999), they should be compared across story-tellers (Abell, 1987). And, because interviewees chose "chronological, cyclical, or kairotic" timeframes when telling their stories (Czarniawska, 2004, p. 52), I sought to capture the experiences of farmers with varying principles practiced at different points in time. I structured questions that prompted answers in the past continuous ("*I was trying* to plant rye but…") and past perfect ("*I had tried* to plant rye but…") tenses. Thus, my thematic analysis compared farmers to other farmers *and* farmers to their past selves and practices.

Extending narrative analysis in agri-food systems research (Bellon & Bell, 2021; Beus & Dunlap, 1990), my analysis process consulted Riessman's (1993, p. 10) levels of representation of experiences: attending, telling, transcribing, analyzing, and reading. I sought to be "careful observers" of subtle factors, attending to the physical setting in which the interviews took place (Merriam, 1998, p. 97). Interviews were conducted *in situ,* at living room tables, over dinner, in the cabs of combines, tractors, on irrigation equipment, while helping with chores, and so forth. I treated interviews as activate sites of narrative production and distribution, where researchers extend and clarify narratives previously produced (Czarniawska, 2004). Interviews were transcribed using Otter.ai, and farmers were assigned pseudonyms to provide anonymity.

Figure 4.1. Farmers Grouped by Number of RA Principles Practiced at the Time of the Interview

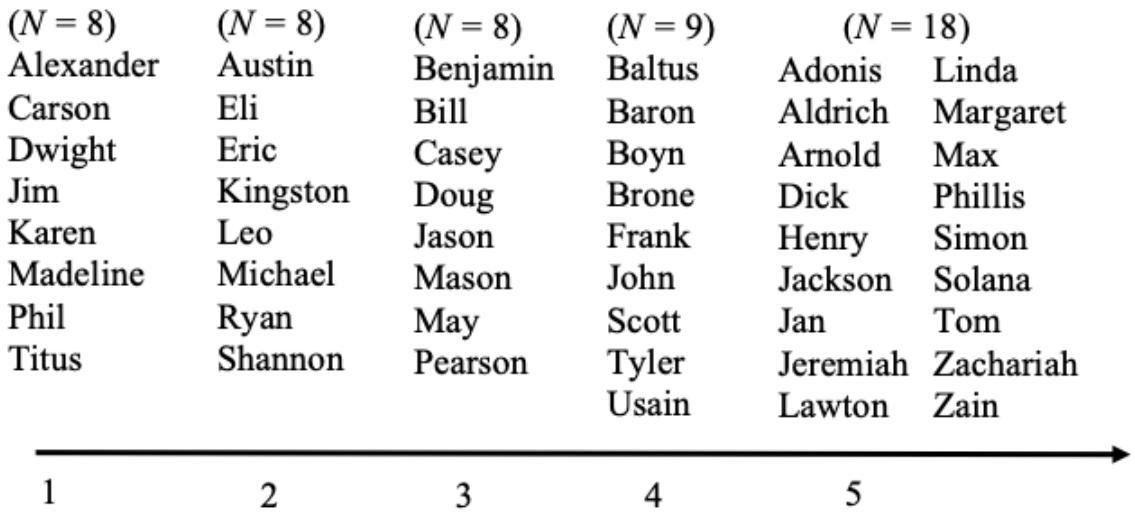


Figure 1 places the farmers I spoke with on a continuum from beginning the RA transition (practicing 1 principle) to complete transition (practicing all five RA principles). All the farmers I spoke with had employed at least one, and as Figure 1 shows, they were nearly evenly distributed across all stages of the RA continuum. These farmers were broadly representative of farmers in the region, as 80% were male and all self-identified as white, non-Hispanic. Their farms were larger than average for the state of Kansas (USDA NASS, 2019),

ranging from two to 22,000 acres, with an average farm size of 1,888 acres. Sixty-nine percent of these farmers' operations included both crops and livestock (cattle, swine, sheep), 90% were partial or full owners of the land they farmed, about one-half used irrigation and one-half were dryland operators. The farmers were approximately ten years into their transition to RA, on average, with a range of zero (had just started their transition) to 38 years.

Findings

The good farmer acknowledges industrial farming addictions

I found that transitions to RA involve re-constructions of identities through the moralizing processes (Burton et al., 2021, p. 89), where thoughts and actions are judged according to principles regarding right and wrong, good and bad, or desirable and undesirable. Among the interviewees, those who had undertaken steps to implement regenerative principles consistently framed their experiences as being in opposition to the 'others' practicing more industrial agriculture; thus, moralizing tended to fall along the continuum bookended by productivist-industrial and alternative-regenerative discursive and cultural categories identified in other contexts (Comito et al., 2013; Kunze, 2017; McGuire et al., 2013; Salamon, 1994; Silvasti, 2003; Stock, 2007; Vanclay & Enticott, 2011; Welsh & Rivers, 2011).

Because dichotomous analyses can oversimplify and homogenize complex, dynamic meaning-making processes which are the focus here, (Bruce, 2019; Chouinard et al., 2008; Fairweather & Hunt, 2011; Höglind et al., 2021), I treat these continuums simply as heuristics for understanding transitions to RA, while recognizing that symbolic, meaning-making processes are dynamic, negotiated, and situated (Burton et al., 2021, p. 26; Lähdesmäki & Vesala, 2022, p. 428; L.-A. Sutherland, 2013, p. 439; L.-A. Sutherland & Darnhofer, 2012, p. 238; van der Ploeg, 1994, p. 18).

Farmers in transition would most frequently contrast their experiences with industrial farmers in terms of addiction and recovery. For example, Lawton (5 p, 4 y)[16] said transitioning to RA is "…*like weaning somebody off of drugs…you're weaning your soil off of [needing] all those input costs."* Akin to the process of bouncing back after quitting chemical dependence in the human body, Max (5 p, 5 y) likened the process of exiting the industrial-chemical treadmill as "*having to recover.*" Others made the connection between the body's chemical dependence on a drug and industrial agriculture's dependence on synthetic chemicals more explicit. Zain (5 p, 19 y), for example, linked alcohol addiction with the practice of industrial agriculture, saying of the industrial farmers he knew: "*Alcohol needs addressed. I see way too much alcohol*." Adonis (5 p, 7 y) stated it most succinctly: "*I'm addicted to fertilizer and chemicals.*" Boyn, who employed four of the RA principles and started the transition to RA 16 years ago, emphasized that, like dependence on synthetic drugs in the human body, the soil requires time to recover from synthetic chemicals: "*Going from the ground that's completely dependent on synthetics to trying to have Mother Nature do the work? It's hard. It takes a while.*"

Although various factors motivate farmers to begin transitioning to RA, and every story is idiosyncratic in its own way (Canales et al., 2015; Carlisle, 2016; O'Connor, 2020; Vitale et al., 2011), the farmers I spoke with tended to initiate recovery after reaching some kind of a breaking point, financially, socially, mentally, or emotionally (Bryant & Garnham, 2013; Chapman et al., 2022, p. 287; Gosnell, 2021a, p. 3). For example, Boyn (4 p, 16 y) began his recovery because he "…*went through a dark period…I never want to go back to that place.*"

Changing farming practices based in different principles is also an implicit and simultaneous shift in one's identity, as a farmer effectively leaves one social group for another

[16] Throughout, I identify the number of regenerative principles farmers are using ("p") and the duration of time in years they have been practicing regenerative agriculture ("y").

(Burton, 2004). That can include not just friends, but also family. Arnold (5 p, 20 y) described his father-in-law's decision to take farmland away from him because of his transition to RA:

> *"My father-in-law…worked the soil eight times: he plowed it, disked it, and field cultivated it over and over…to look perfect. I'd have 15 percent better yields every year with my minimum tillage…and my input costs were significantly less. But all he could hear in his head was the coffee shop crowd bragging about how clean his fields were. I helped my father-in-law the last 20 years of his career. One day I found out that he rented the farm to another guy. Why? Because I was a 'crazy cover crop, minimum tillage guy.'"*

Arnold effectively described a transition to a new definition of the 'good farmer.' The transition can be experienced as a form of identity loss requiring new self-perceptions, statuses, meanings and symbols from new principles and practices. Michael (2 p, 3 y) elucidated the intricate connections between addiction, recovery, and the feeling of social loss from rejecting an identity derived from farming that is in some cases familial:

> *If you interact with someone who's addicted to a substance of some form, you can go cold turkey but it's not fun for anyone. …It involves change, which is tough for everyone. In many ways, we're acknowledging that we haven't done it right. And for some of these [multi-generational] farms, you're admitting that your ancestors didn't do it right either."*

Many farmers were motivated to achieve alternative definitions of 'good farmers' because of the financial strains associated with IA (Sutherland & Darnhofer, 2012). For example, John (4 p, 12 y) explained:

> *"Every farmer I talk to comes from a different angle, whether it's financial, spiritual, emotional, a divorce…Every shape and form of farmers that have went through hell and back have come to this [regenerative movement] because it creates a better life for farmers emotionally and mentally."*

Financially-motivated transitions to the RA definition of a 'good farmer' tended to take one of two forms: luxury or necessity (Burton et al., 2021, p. 74). Transitions were financially easier for more-advantaged farmers because they could better afford the up-front risks associated with sacrificing yields for cover crops and tended to own more land with which to experiment slowly incorporating RA principles. Baltus (4 p, 12 y) – 12,000-acre landowner – exemplified this type of transition, remarking, *"I've quit worrying about the cost of the right thing."* However, many of the farmers I spoke with undertook the transition to RA out of necessity: they could not afford the increasingly high costs associated with industrial agriculture. Jackson (5 p, 10 y) dedicated time helping surrounding farmers who needed to transition out of necessity:

> *"Several farmers in my area almost lost their farms…because they couldn't get a line of credit because they're so highly leveraged, so they felt like they had to use cover crops to change."*

John (4 p, 12 y), using the language of addiction, described the necessity of regenerative practices:

> *"I didn't really have any bad addictions [because] I didn't have the money to buy tillage equipment, so I was fortunate to not have that bad habit to get rid of."*

Zain (5 p, 19 y) personified this experience, again using the language of addiction and recovery:

> *"[My transition] really started because I was broke and I couldn't hide that being a public speaker…I had to stand up in front of the crowd and say, 'I'm broke.' I am a recovering conventional farmer."*

Zain expressed the identity tensions at the heart of the transition to RA. He felt morally obligated to transition because he could no longer lie to himself or maintain a "public face" that masked his experiences in industrial agriculture (Comito et al., 2013, p. 283).

Related to financial motivations, another major motivation for transitioning to RA was concern about dependence on chemical inputs and their impact on ecological and human health. The culture of productivism on the industrial production treadmill motivates many farmers to use glyphosate (Roundup®) (Dentzman, 2018), but the financial, physical, and environmental costs raise questions about whether the costs exceed the benefits (Lähdesmäki & Vesala, 2022, p. 425; Nouvian et al., 2023). Frank's (4 p, 5 y) experience illustrated the role of chemical dependency as a motivation for transitioning to RA:

> *"You can walk outside in the morning and smell chemicals...When your eyes are watering and you see the smell that stuff for ten minutes, I can't help but think that it's doing something to you. That's what we're trying to get away from."*

Chemicals had tainted the drinking water so badly in Aldrich's (5 p, 20 y) part of the region that he described seeing *"'no clean water' signs. Nitrate levels were above ten parts per million. You can't even draw a well to drink your own water."* Doug (3 p, 9 y) was motivated to transition to RA after a…

> *"...severe allergic reaction to [neonicotinoids]. So, we voted not to go that route. I would have a metallic taste in my mouth for a month after, and this isn't even handling the stuff,*

this is simply the smell of it. And I go, 'You know what? I want to live another 20 or 30 years, I don't want to go down this road!'"

Regardless of the motivations for transitioning to RA, these transitions involved shifting conceptions of the 'good farmer' from a purely productivist ideal, who utilizes chemical inputs and industrial methods, to a more post-productivist ideal grounded in values that acknowledge industrial agriculture as a form of addiction and recognize recovery from addiction as a worthy form of farming.

Going farther is better for the soil…and can be harder on the farmer

After the transition to RA is initiated, the work of shifting practices and principles ensues. On average, the sampled farmers took 1-2 years to adopt and implement up to two of the five RA principles, but it required another six years, on average, before the adoption of three or more RA principles.

Going farther into RA seems to involve additional challenges, key among them financial, as the risks of implementing RA principles accrue nearly immediately but the rewards emerge over a longer time horizon (Deines et al., 2023). For example, biodiversity, soil health renewal, and returns on cover crops—the most popular options of which were rye, sedan millet, winter peas, vetch, and triticale—become more fully realized after three years. Tyler (4 p, 3 y) struggled to plant the right cover crops when he began transitioning:

"We have had 27 acres in a crabgrass and triticale rotation for grazing purposes…for probably three years now. I just didn't get a real good growth on the cover crop mix. I'm learning that crabgrass has some allelopathic properties, even if it has been sprayed and killed, [and] that's limiting some of [triticale's benefits], potentially."

Indeed, crabgrass has been found to interfere with triticale growth (Pereira et al., 2011), which Tyler learned from experience during the critical first three years of deciding to transition to RA. Adonis (5 p, 7 y), too, refers to this three-year period when he describes the need for neighboring farmers to work together to help with the transition, saying if neighboring farmers *"got together and collectively said 'okay, for three years don't strip, don't spray'…yields are gonna go down, but we can keep our profitability."* The transition takes time, and the early years can be the most trying for farmers transitioning to RA: Solana (5 p, 15 y) remarked, *"[when] chemistry has killed the biology…to redevelop it takes time."* Jackson (5 p, 10 y) said that patience is crucial, drawing an explicit comparison between the soil and his own mental orientation in the recovery process:

> *"My soil wasn't where I was mentally…[Its health] wasn't exactly where I wanted to be, even though I knew I could get there. It just takes time. You can't change your soil in one year, in three years…it's a slow building process."*

I found that farmers tended to find themselves stuck in the middle of the transition because of the challenges for maintaining their living standards during the transition. Although 87% of the farmers agreed that they were "generally profitable," most also indicated that they were "just making a profit," and nearly one-half reported "substantial off-farm income" was necessary to support the household. Bill (3 p, 3 y) illustrated a typical sentiment of the time and financial wellbeing needed to transition to RA practices:

> *"I can't afford three years of zero income. There's no way the banker is gonna let me do that. The economics of it is [that] I have to be profitable making money farming now."*

It was in the middle-of-the-transition stage where tensions about the relationship between the ecological benefits and social (human) benefits of RA were sharpest. Max (5 p, 5 y) articulates this tension:

"We're wrapping up a lot of money in cover seeds that you got to be prepared to eat. Is it great for the soil? Yes. But to dive off into it 100 percent in the beginning is a huge pitfall. [Cover crops] are inflating faster than their value unless you consider the long-term. I buy that the long-term benefits to the soil are unmatched. But if you can't keep a guy profitable through the short term and he had to sell the farm in the end, what difference does it make?"

Max expanded on the issue that farmland owners may not profit from or see the benefit in regenerative practices:

"Landlords will dump you and your neighbor will come outbid you tomorrow. You can find a regenerative landowner that doesn't care if he breaks even for a couple of years…there are guys out there. But good luck finding them here."

Bill (3 p, 3 y) too said, "*If I go broke, somebody else will come farm on my ground, and they will farm it however they see fit. Who knows what they'll do?"* As of 2017, 54% of the total operated acres in Kansas were rented, the third highest among all states (Bawa & Callahan, 2021, p. 2). Competition for farmland is keen in the USA, and the pressures of productivism were rife in the stories I heard about the financial risks of transitioning to RA. Even if the farmer is willing to accept the socio-cultural risks of transitioning to RA, the agricultural treadmill looms large, especially in the first three years of the transition, posing material challenges to a one's burgeoning identity as a post-productivist, regenerative farmer.

Good farmers learn to see again

Those that make it through the three-year time point seemed steeled by the process of transition. Their convictions about the ecological benefits and human benefits (Natural and Human Capitals) of RA were deeper, and even more noticeably, these farmers more clearly saw

their interrelationships. Indeed, they seemed to think more relationally, seeing much less of a distinction between the health of the ecosystem and the health – financial, emotional, social – of themselves. For instance, Adonis (5 p, 7 y) described how and why Marestail (horseweed), which is widely considered an undesirable annual forb, disappeared when he replaced chemical herbicide use with rotational grazing. Adonis drew a direct link between soil health ceasing chemical 'addiction,' the improvement of ecosystem health, and the financial health of his farm:

> *"I met with my accountant. He's intrigued that I'm doing something different than the other 100 percent of his customers, …he asks, 'how did you have such a good year?' Well, I'm not addicted to this system."*

Solana (5 p, 15 y), too, explained the correspondence between soil health and the farmer's (financial) health and wellbeing as "feeding your biology":

> *"Money that I put into seed is never wasted, because you're either feeding your biology directly when they eat the seed, or you are growing in live roots, and that's what's going to improve the soil faster than anything else."*

Aldrich (20 y, 5 p) also emphasized the correspondence between regenerative practices and financial wellbeing:

> *"You start building your systems back with regenerative practices and you become profitable…I've been in debt, and I've got myself out of it."*

Having seen more of the principles at work on their farm for a longer period, farmers' identities past year three had shifted even more toward an ecological orientation to farming. (Bell, 2018, p. 72, original emphasis) called this orientation a "*natural conscience*, a basis for moral thinking we believe to be free of society and all its politics and constant play of interest and ambitions." The natural conscience is conceptualized as existing "beyond" the social and

political – even though it cannot be – and as being a surer "basis for the moral for precisely that reason" (p. 73). The natural conscience emerges from the dynamism between a "natural other" and a "natural me" (p. 72): the natural other is generalized and idealized as "separate and pure, real and true" and "natural me" as our non-corrupted, non-political self (p. 73). The natural "me imagines the generalized other's response to us, which simultaneously shapes what our sense of me is to begin with" (p. 73). I heard this consistently in the narratives of farmers who had passed year three and farmers who were practicing more of the RA principles.

As price-takers on the agricultural production treadmill, farmers using industrial practices are dependent on chemical inputs manufactured off-farm to maintain operations. The turn to a 'natural conscience' form of farming entails a shift in the form of dependence the farmers experience, from dependence on large, multinational seed and chemical firms – external actors – to ecosystem dynamics on farm – internal 'actors.' Aldrich's use of the word *'systems'* was not trivial but instead indicated an important part of the identity shift in the RA transition: this shift was experienced as a widening of the boundaries of the farmer's scope of orientation to include the natural, ecological processes within which the farm and farmer exist.

Part of the process of re-working one's "natural me" to see oneself as part of the broader ecological context is also the ability to re-evaluate one's relationship with the subsidy-fueled agricultural treadmill. Farmers often positioned RA as a means of countering what they felt was a troubling dependence on direct payments and crop insurance. For example, Ryan (2 p, 3 y) described his identity as a farmer bluntly, saying industrial agriculture had turned him into a *"government contractor."* Phil (1 p, 0 y) plainly stated the dependence he felt: *"if it wasn't for government payments, we wouldn't (have) made anything."* Baltus (4 p, 12 y) made clear the connection between subsidies and industrial practices: *"government subsidies [are] propping up*

bad practices." Again, however, RA was often viewed as a means of transitioning away from dependence on subsidies. Lawton (5 p, 4 y) described:

> *"If you are determined to stick it out for a couple years, you start to see that 'I don't need the government to tell me what I can and can't grow. I can do this because…[I'm] making money. And that's not in the form of subsidy checks.'"*

Along with the effort to become more *independent* of government subsidies was an effort to acknowledge a *different kind of dependence*, one that holds the possibility of renewing the farming operation, and one's identity as a 'good' farmer. Transitions to RA entail principles that encourage an orientation to farming that works *with* ecological processes, not against them. This orientation seemed to be associated with more of an openness in disposition, with more room for questions, more interest in observation, and more comfort with uncertainty than the norms of those in industrial agriculture. Simon (5 p, 3 y) illustrated this disposition:

> *"I find it exciting to be continually learning new techniques and information all the time. There's so much once you start learning how to work with biology versus just reaching for the chemical solution. I find that endlessly fascinating, challenging, and intellectually stimulating. It changes the relationship you have with your land and the way you see things… I'm always trying to learn things."*

This openness in disposition is a key part of the identity shift entailed in RA transitions. I found it was routinely expressed alongside another key part of shifting identities: the tendency for farmers to see themselves and their work as much more intimately interconnected with complex and adaptive living systems.

Transitioning farmers seemed to produce their identity by comparing themselves to industrial farmers, *and* to a 'natural' ecosystem that was perceived as beyond the human and

social context. Farmers whose identities were more strongly grounded in RA tended to try to express their experiences with the ecological context in more holistic terms, as interconnected systems, often personified as "Mother Nature"—a natural 'other', or reference point, that complemented their othering of industrial farmers, and which served to develop the "natural me" of their changing identities. Farmers transitioning to RA acknowledged their dependence on ecosystems, like many farmers, and even those employing industrial practices. Leo (2 p, 4 y), for example, described this sense:

> *"(We farmers) are totally reliant on Mother Nature, so you damn sure better take care of what She sends you, and She's gonna send you a six-inch rain in an hour. Better figure out how to handle it [and] take advantage of it."*

However, for farmers transitioning to RA, there was a sense of dependence that went further toward acknowledgment of embeddedness, of being fundamentally dependent upon – and a part of – their ecological contexts. These sentiments were often explained using language from *The Holy Bible*, which remains a central component of the dominant culture in the region, with many making special reference to the concept of 'dominion' in the Book of Genesis. Mason (3 p, 9 y), for example, described this sentiment:

> *"I don't think in terms of dominion, and I don't see nature and soil as things to be conquered, per se…I see us as part of creation as opposed to being separate from it, and not necessarily above it."*

In addition, Henry (5 p, 8 y) expressed his "natural me," both in response to the industrial 'other,' his family's ways of farming, and the natural other (*"nature"*) in terms of the concept of 'dominion':

"I very much view myself as a part of nature, and I want to be…I want to live my life in contrast to the tradition I was raised in where you have dominion over nature, and you fight nature."

Pearson (3 p, 3 y), an industrial farmer for over 30 years, re-prioritized the good farming symbols he produced as he began transitioning to RA near his impending retirement (Riley, 2016a). He acknowledged RA as an ongoing process, one that requires a different view of nature as a partner to work with rather than against: *"there's all these steps to get to where you want to be…you better be working with nature instead of against nature."*

As the reference point for how to farm, and even how to live, nature was frequently invoked to evaluate 'good' farming, and regenerative agriculture was seen as way to farm in nature's image, or at a minimum, to farm in ways that mimic pre-European settlement in the region. Solana (5 p, 15 y) made the connection to pre-European settlement clear when she argued for the need to reintroduce livestock into farming, one of the principles of RA: *"(Farmers) need to go back to nature; if you can't have a buffalo on the prairie, then you need to have cattle on the prairie."* Zain (5 p, 19 y), for example, described his industrially-farmed operation explicitly as "dead": *"When we moved [to our farm we had] a dead system.*" Contrasted against the industrial approach to farming was Adonis (5 p, 7 y), who again referred to the 'problem' of Marestail when describing an emerging systems perspective of his farm and practices:

"Mother Nature drops in Marestail. Why is that? She's trying to patch…the symptoms of something we're doing. She's curing it on her own. How do we farm synergistically with Her?"

Seeing *"dead"* systems as an outcome of industrial practices coincided with the view that industrial agriculture is also easier, or less complicated, to practice than regenerative practices,

which require closer observation of, and adaptation to, ecological processes. Pearson (3 p, 3 y) is fully committed to regenerative agriculture, but has had difficulty learning new practices and finds it hard to shift away from his decades of experience with industrial farming precisely because RA is more 'complex':

> *"In the old days…[farming] was pretty simple…. Just 'farm the shit out of it.' Well, now we've added cover crops, [which is] another operation, [and if] we want to run a crimper, that's another operation…regenerative agriculture is much more complex."*

The complexity of the practices, and the challenges of implementing RA principles for one's identity, mean that the transitions can be difficult, incomplete, and ongoing. Titus' (1 p, 5 y) disposition, for example, illustrates that at times, the willingness to implement RA practices coexists with the well-engrained habits of industrial farming. Titus espouses the Mother Nature script more typical of farmers practicing regenerative agriculture, along with a view of humans as part of nature, which also tended to characterize RA farmers: "*[The soil] was here a long time before we were. If you use what Mother Nature has allowed you to have, usually things work out well."* However, Titus also expresses the continual tension he feels to continue industrial practices, again employing the addiction analogy used by many RA farmers with whom I spoke:

> *"If we can ever get his soil health, micronutrients, pH, and everything perfect, I think that stuff works really well. But we've got a lot of drugs. And as of right now, I have really no interest in going 100% because I like to have options."*

Still, among those that went deeper into RA, employing more of the principles, over a longer time horizon, conceptions of the 'good farmer' shifted more clearly to an ecologically-oriented, whole-systems perspective that was the basis of a different identity as a farmer. Jeremiah (5 p, 38 y), who had implemented regenerative principles for the longest duration

among those I spoke with, describes regenerative agriculture as an altogether different worldview, one that requires a more "holistic" appreciation for farming in the context of living systems:

> "*I use a holistic approach to agriculture. You're not looking at…bushels for one crop, [but rather] looking at how all these things fit together in a healthy way. The other approach has been to the detriment…[of the farmer and to] the organisms in the soil… [Without seeing] at agriculture as a functioning, whole system…we have totally diminished people, the soil, and our environment. Farming in a holistic manner can regenerate both the Earth and its inhabitants."*

The shift to RA thus entails a process through which farmers come to see their practices, and themselves, as more intimately connected to the broader communities, or ecologies, of which they are a part. Farmers transitioning to RA are moving away from the productivist culture which valorizes the role of farmers as producers of food to co-producing members of ecological communities. Usain (4 p, 10 y) describes how moving away from his tillage habit allows him to co-create habitats for non-human species: *"I saw deer, pheasants, quail…if I would've tilled it, it'd just been a wide-open, vast area. But instead, I created this habitat."* Pearson (3 p, 3 y) could not wait until the fall when he could seed "*clovers…so we can have a buffet of flowers blooming all the time for the bees."*

The shifting definitions and boundaries of community in the transition to RA can also include a reinvigoration in the experience of being a member in a community of practice. Zain (5 p, 19 y) describes this sense of community with fellow farmers transitioning to RA, contrasting it with his previous experiences in industrial agriculture:

"In the regen(erative agriculture) circles, [if] you got a problem, they're all jumping on it with an idea of how to fix it. It's an open community and they love to talk and share ideas and try to help anybody. So maybe we are kind of getting a little bit of our community sense back and some of our integrity back."

Many of the farmers far along in the transition regularly attend and lead conferences, field days, and regeneration events to increase awareness, education, and adoption of RA. They try to change the rules of the game – industrial U.S. farm structure – and its self-reinforcing rationale, especially in the U.S. Midwest since the good farmer is geographically dependent (Riley, 2016a).

There is a sense among farmers transitioning to RA that they are seeing again, for the first time, themselves, their work, and the ecosystems which encompasses them. It is a sense of renewed place attachment and a re-grounding of their identity in their place (Leck et al., 2014; McGuire et al., 2015; Stedman, 2002, 2003). Many of the farmers I spoke with contrasted their revitalized orientations to their life and work with others on the conventional-industrial treadmill and their previous lives practicing industrial agriculture. Boyn (4 p, 16 y), for example, expresses sympathy and regret for his neighbor, who continually employs industrial practices:

"[He] just has to kill and control for tidiness. He carries everything with him, everything is so stressful. He doesn't get enjoyment out of what he does."

John (4 p, 12 y) describes this transition, drawing explicit comparisons between his orientation prior to transitioning to RA and comparing himself to his peers practicing industrial agriculture:

"Your whole mindset changes. There's life here and success, [not] the failure that comes with 'I can't put food on my family without getting more debt.' You will treat your family differently. If you interact with [industrial] people every day, you know that they don't have much of a spring in their step. And then you see the next guy who has incorporated

these [RA] things. [You see it in] their eyes, they look excited. They have a spring in their step, and they're excited about life because there's hope. All of that translates into how we interact with others…I think our disasters are, in some ways, our best opportunities."

These experiences provide "tractions"—newfound joy, purpose, integrity, interest, enthusiasm, hope, and life—for further pursing the RA transformation (Gosnell et al., 2019, p. 7). Jackson (5 p, 10 y) draws sharp contrasts between the addictions of industrial agriculture and his emerging identity derived from RA:

"Before I changed my farm and started caring about my soil and thinking about the soil as an ecosystem, it was a very depressing life. Every day I'd wake up deciding what I was going to kill next, whether that was a pest or a weed. It was a life revolved around death. But when I completely changed the outlook of my life—when I started trying to grow things and bring life to my farm—it gave me a positive attitude…It's less draining to work around life instead of death every day."

Jackson expresses how changing definitions of a 'good day' (Sutherland, 2021) using RA principles ultimately rejuvenated not just the soil or the ecosystem but himself, drawing a direct contrast between industrial and RA practices, and a clear connection between the health of ecosystems and his own health and wellbeing. An emphasis on working with nature—as a part of living, complex, and adaptive systems—is an integral part of the shifting identities of farmers transitioning to RA. The association of 'life' with RA practices and 'death' with industrial practices was often more implicit than was the case with Jackson, but it was a continual undertone of the narrative contrast between industrial agriculture as addiction and regenerative agriculture as recovery.

Discussion and Conclusion

Regenerative agriculture is gaining traction amid the accumulating costs of industrial farming for the environment, rural communities, and for farmers themselves. Consulting a process-based RA definition (Newton et al. 2020), I explored how farmers experience the transition to RA in Kansas. Through in-depth interviews, I uncovered emergent, changing meanings of the 'good farmer' as farmers incorporate RA principles and practices.

Farmers transitioning to RA set themselves apart from those practicing industrial forms of agriculture. Many adopted a moralized stance where a primary reason for their actions to maintain or rebuild good soil, healthy food, strong families, and communities was that they did *not* want to do the opposite: that is, degrade soil, and undermine health by continuing industrial farming practices, a finding that aligns with Stock's (2007) study of reflexive and alternative Midwest organic food producers. RA farmers were more inclined to share how their practices harmed them, and they used the discourse of addiction to describe industrial agriculture, seeing

RA as a form of recovery from addiction to the chemical-intensive and subsidy-fueled treadmill of production that characterizes industrial agriculture. The farmers I spoke with were becoming more comfortable embracing regenerative practices increasingly promoted in the cultures of farmers and non-farmers alike (Food Insight, 2019, p. 54; Whole Foods Market, 2020). As farmers become more comfortable in their post-productivist identities, new meanings of farming and the 'good farmer' emerge to support the new behaviors (Burton 2004, p. 211). Through discursive actions in various "para- or non-agricultural fields" (Sutherland & Darnhofer, 2012, p. 238)—such as agri-business conference rooms, regenerative conferences, auctions, coffee shops, bleachers, etc.—these farmers were working to change the "rules of the game" (Riley & Robertson, 2022, p. 438) by providing symbolic valorization for re-worked

definitions of 'good' farming to replace industrialization as the cultural convention with regeneration as the norm.

The labels and symbols underlying the heuristic continuums I employed—'conventional,' 'alternative,' 'industrial,' 'regenerative'—are neither "fixed or generalizable descriptions of real-world farmer types or styles of farming" (Lähdesmäki & Vesala, 2022, p. 428). They are not impermeable dichotomies that determine farming practices (Höglind et al., 2021). Moreover, "changes in farming symbols are neither rapid nor clear cut" (Sutherland & Darnhofer 2012, p. 238). For example, Titus (1 p, 5 y) espoused an environmental ethic while plowing a field not only because he wants "*options,*" but because he rents the ground from a fully absentee, Oregon-based owner who insists that Titus plow and disk the soil because that is how her father farmed. Titus continued conventional practices because of his rental agreement with the absentee landowner, but he also expressed that he eventually wanted to change the agreement to become more regenerative because he saw other farmers having success with no-till and cover crops. Of the 22 farmers displaying 1-3 regenerative practices, nine (Eli, Titus, Leo, Austin, Michael, Ryan, Casey, Pearson, and Mason) were open to adopting more regenerative practices in the future to forward an environmental ethic, but only if the practices could prove financially feasible *and* if something about their situation were to change, like arrangements in ownership/family, age, health, environment, etc. In this sense, the findings corroborate that "conventional farming is highly varied and can include cohorts of environmentally oriented producers" (Sutherland, 2013, p. 439). Labels like 'transitioning' or 'conventional' hold heuristic value, but they alone cannot characterize the complexities of farming, farm life, and the attitudes, values, and behaviors of each individual farmer.

'Learning to see again' typically involved the transitioning farmer making comparisons with other farmers in their networks, understanding why/how their practices worked (or did not), and then trying out some for themselves to see if they worked for their own farm. In this sense, farmers were more reflexive about the act of farming and open to change than farmers who employed fewer principles. These farmers would be within Höglind et al.'s (2021:7) "high chemical input and conservation or ecological farming with mixed grassland management" profile but would better fit within Lähdesmäki & Vesala's (2022, p. 421) "open-minded and rational conventional farmer" type. Like the farmers in Lähdesmäki & Vesala's (2022), nine farmers in the study were clearly open to learning more information about regenerative practices but would only consider their long-term adoption if they achieved farmer-first aims on *their* timeframes and in *their* operation.

These nine farmers displayed a range of 'good farmer' valuations, though they were mostly constructed with production-based symbols, just like Sutherland's (2013, p. 435) "pragmatic organic farmers," or conventional English farmers who saw the financial stability of organic farmers and were thus persuaded to change some of their practices. On the other hand, the early-stage transitioning farmers treated organic and regenerative agriculture as related, yet ultimately distinct paradigms, or models, and organic and regenerative are distinct in practice in this region: farmers can be certified organic without integrating livestock, maximizing diversity, or eliminating tillage (Charles, 2021; Gruver & Wander, 2009). It was also apparent that these nine farmers tended to be older and were less inclined to value RA practices because they were either or both more committed to conventional practices or did not have as much desire, time, or practical knowledge to change management practices (e.g. Pearson), which supports Höglind et al.'s (2021) finding that age was a greater predicter of Swedish farmers' overall farming profile

than the conventional category (along with farm income and geographic region). The pragmatic, open-minded, rational, yet conventional farmers could clearly see the well-worn paths to be a good, profitable, and environmentally-conscious organic farmer (Page & Witt, 2022, p. 13), but regenerative transitions tended to remain more uncertain or unclear when viewed through conventionally-prescriptive productivist lenses.

Farmers' valuations of 'good farming' entail multiple agency-structure tensions and contradictions. On the one hand, farmers are active agents who (re)produce fluid, flexible, and evaluative farming symbols (Burton et al. 2021, p. 26; Lähdesmäki & Vesala, 2022, p. 428). On the other hand, larger structural political-economic actors shape products that are visibly appealing, and persuasive in their messaging, to farmers who sport productivist lenses. For instance, although it was Michael's (2 p, 3 y) goal to someday quit his day job, he remained a salesman of conventional chemicals. He did this to be able to someday afford more RA practices for his own farm, because RA production alone was not sufficient to pay his family's bills. For example, he recalled that the multinational BASF corporation sent him a pamphlet to advertise a new biofungicide, which means *"to kill with biology, not chemistry,"* but the product still kills the living insects and plants in agri-ecological systems, a function directly antithetical to the 'maximize diversity' RA principle. Biofungicides had some appeal especially for farmers earlier in the transition who were still seeing through productivist lenses perhaps because they offer a way to claim 'good' farming that is environmentally conscious, but in a way that still values the symbols and materials of more productivist-type paradigms.

Along these lines, it is crucial to recognize that large, multinational agri-food firms make and market products to keep up with evolving cultural conceptualizations of good farming, yet these products still subordinate holistic, alternative models of 'good farming' (Carolan, 2022, p.

25-45; van der Ploeg, 2022, p. 164). As these powerful actors—General Mills, Cargill, Bayer-Monsanto, BASF—increasingly fund and support programs and policies that encourage RA, process-based definitions will need to be balanced with outcome-based definitions, quantitative measurements, and third-party verifications to mitigate the extent to which these actors coopt the RA movement for their own financial benefit (Fenster et al., 2021, 2021; LaCanne & Lundgren, 2018b; Lundgren, 2021; Savory Institute, 2023). By promoting verifiable, outcome-based definitions in policy negotiations, RA advocates can help reduce the likelihood that RA succumbs to principle drift or experience gaps in enforcement, issues that occurred as 'organic' agriculture scaled and became more widely adopted (Beste, 2019; Gibbons, 2020).

Despite decades of alternative agriculture discourses, only 7.5% of farms in the 2017 census planted cover crops, accounting for 3.9% of U.S. cropland (USDA SARE et al., 2023, p. 9). Cover crops alone can maximize soil cover, biodiversity, and the presence of living roots in the soil, which together total more than half of the generally agreed-upon soil health principles (USDA NRCS, n.d.d). There are several established and emerging federal government programs and policies to help scale RA by offering more protection for farmers wanting to grow cover crops. In addition to already-established USDA NRCS Conservation Stewardship (CSP) and Environmental Quality Incentives Programs (EQIP), the COVER Act (2018) would offer a $5 per acre discount for crop insurance premiums for producers who utilize cover crop systems, develop a soil health pilot program to investigate soil health practices, and provide technical assistance and outreach to producers on cover crop implementation (Mulugeta, 2023). It has yet to be reintroduced. These types of programs especially appeal to pragmatic, open-minded, and rational conventional farmers (L.-A. Sutherland, 2013). The Growing Climate Solutions Act (2021), which passed the U.S. Senate but stalled in the House, would establish a voluntary

greenhouse gas technical assistance provider and third-party verifier certification program to help reduce entry barriers into voluntary environmental credit markets for farmers, ranchers, and private forest landowners. Moreover, the Biden administration committed $22 billion to "regenerative or climate-smart" practices (Qiu, 2022, p. 1). These and other policy initiatives may offer greater protection, but they do not radically change the overall farm structure, productivist culture, or the production treadmill it promotes.

Nevertheless, new meanings of the 'good farmer' developed along with recognition of the addictive features of industrial agriculture, which include most prominently dependence on chemical inputs government subsidies. Addiction is a conceptual analogy, or metaphor (Lakoff & Johnson, 2003), connoting both the power of the agricultural production treadmill *and* farmers' acknowledgement of their relative powerlessness. Metaphors collapse the distance between spaces of meaning (Frye, 1990, p. 7), more clearly uniting for its users their lived, embodied, and material realities with their respective cultural and symbolic representations. Recovering farmers saw a more direct relationship between the health of their soils and their own health, which extends the idea that by regenerating their soils (material-symbolic), farmers can regenerate their souls (symbolic-material) (Gosnell, 2021a, 2021b; VanWinkle & Friedman, 2017).

'Good,' recovering farmers felt they could improve the baseline wellbeing of their agri-ecosystem, community, and themselves. The events that trigger the transition to RA were as idiosyncratic as the farmers themselves, but common among their narratives was a recognition of the addictive features of industrial practices, which were seen as harmful to the ecosystem, their farm, and their sense of wellbeing.

In this sense, regenerative agriculture was experienced as a process of recovery. As Burton & Wilson (2006, p. 110) also found, the process of recovery was not linear nor sequential, proceeding in an orderly set of stages from fully-industrial to completely-regenerative. Recovery did not always begin with acknowledgement of addiction, nor was there a singular, formal acknowledgement of addiction, followed by recovery. Instead, I heard about recovery as a cycle, with incremental steps forward toward new practices and new senses of self, and steps back toward the conventional practices and established identities. Just as Burton et al. (2021, p. 117) found, these transitions are an ongoing (re)negotiation – a struggle – within the farmer and between well-engrained habits inscribed by industrial farming and emerging patterns of thought and action prescribed by RA principles and practices. For this reason, there was no singular form of transition to RA. My analysis identified the general contours of what it is like to attempt the transition to RA but there were only processes (plural) of transition, or multifunctional *transitions* to RA (223).

Although there reasons for transitioning were varied, and their experiences in RA varied widely, good farmers still exhibited broadly consistent narratives and themes (Lähdesmäki & Vesala, 2022, p. 431). Most clearly, transitions were consistently expressed as the experience of seeing again. Farmers described the transition to RA as a nearly complete change in perspective, or worldview altogether. Using the language of addiction, recovery meant not only acknowledging addiction but seeing the ecological and social context of farming more clearly. Employing RA principles meant that it was necessary to think more holistically about farming (Gosnell et al., 2020). It meant seeing the farm *in context*, as a system, or assemblage (Forney et al., 2018): an interconnected set of relationships between soil, water, animals, and ultimately people, in communities. This lens, reoriented away from economistic productivism toward

regenerative stewardship, can expand the scope of ethical responsibility beyond human relationships to ecological ones (Stock, 2007, p. 96).

This type of change can be very challenging to one's sense of self precisely because it involves such comprehensive shifts in one's sense of identity. The ability to see differently entailed a certain acceptance of uncertainty, an openness to change that could be challenging for those accustomed to the conventions of the industrial production treadmill. Although detrimental, conventions are comfortable, established, and routinised patterns that stabilized one's identity. Eschewing conventions may require cultivating "unknowledge," or identifying these conventions and their underlying social relations as mistaken, untrue, unimportant, and ignorable (Bell, 2004, p. 138). Recovering farmers expressed that transitioning was the right thing to do, for their communities, soils, and for themselves. By developing a natural conscience "unpolluted by humanity's attempts to manipulate the truth," recovering farmers discovered "a realm of self that, finally, they can trust" (p. 158).

Farmers seemed to encounter the most unsettling parts of their transitions to RA within three years into the process, a finding that has been identified in other contexts (CTIC, USDA SARE, et al., 2023; Gosnell, 2021a; LaCanne & Lundgren, 2018a; Lujan Soto et al., 2021). There is a real need to investigate transitions to RA in different contexts to better understand the barriers to these transitions. Future research focusing on understanding transitions to RA should be attuned to the possibility of 'year three threshold', a point in the transition which is associated with higher rates of attrition among farmers transitioning. This threshold may not uniformly occur in year three in all contexts, but future research exploring transitions should be aware that risks of transitions could be unevenly distributed in time.

My study focused on farmers in Kansas. I do not pretend that my study yielded a thorough, comprehensive understanding of transitions to regenerative agriculture. These transitions are shaped in important ways by the contexts and cultures of farming. Because of their context-dependent and individually-specific variations, and the time spans over which these processes play out, studies employing longer-term, longitudinal research designs would be exceptionally helpful for more rigorous, nuanced understandings of these transitions. These types of studies would also be helpful for developing policies to help mitigate farmer attrition during transitions, and thus, facilitating culture change in agriculture.

“Kansas Sunset”

I toss my screen on the ground and see the Kansas sunset.
Not just look but really *see.*
With my eyes I say “hi.”
Her clouds wave back,
pale moon faintly nods,
heavenly bodies dance.
Celestial scenery seemingly ordinary for this sixth generation Kansan
made extraordinary tonight by a lingering look.

The constellations become countryside,
little and Big Dipper become little and big Bluestem.
Her burnt orange sears the landscape, uniting them in a fiery blaze.
Golden sun glistening, golden wheat sizzling.

Her clouds take familiar shape as buffalo herding across the horizon.
Wind winding their course as
they synchronize like home on the range,
the song our hearts know the tune of.

A song as sweet as those sung by her earthly sisters.
Western meadowlark melodies harmonize home,
the stratosphere sediments its notes in flint rock &
prairie plains contain no whistling planes.
There’s no reason to escape the music of this place.

Just as the sunrise always returns the sunset’s greeting,
I repay the sunset her wave.
This body altered by her shadow, the pulling of moons, sparkling choreography.
This sky aged into another day, neither her nor I the same.

Her scenery seems more serene.
Even visionary, you might say.
The past stars illuminate a present path,
allowing me clearer sight into my Kansas future where
I see the one. Our passion, love, pain, struggle, children, grandchildren, acceptance, home,
and through all of it, you. You eternal sunset.

As you set on this day, you foreshadow my exit when I’m old and gray.
You reveal my last moment. My last embrace, smile, twinkle, breath, & light.
I can’t help but shiver, at once warm & cold.
But you provide me solar solace and reassure that during my final, fading sky,
I will be made at peace by your affectionate wave goodbye.

- Jacob Miller (2019a)

Chapter 5 - Conclusion

Two burning research questions prompted me to answer them. To do so, I initially reviewed the Community Capitals Framework, literature veins of agricultural sociology, cover crops, regenerative agriculture, then employed reflexive thematic analyses and narrative analysis with 73 interviewees who lived and worked in four Kansas counties (primarily in Pottawatomie and Reno). In Table 5.1 are the central answers to my two research questions.

Answers to the Research Questions

Table 5.1. Brief Answers to the Research Questions

RQ	Question	Answers
1	*What was the nature of the socio-structural interrelationships between the health of soils and the health of souls – of farmers and communities – in four Kansas counties?*	- The nature of their interrelationships were material and symbolic and ranged from literal and direct to metaphorical and indirect. - Soil health encompassed all five regenerative soil health principles, but especially for cover cropping within corn-soybean systems. Soul health involved physical, mental, spiritual, familial, and communal factors. - Farm-level contexts and influences formed the most literal and direct relationships to various aspects of soil and soul health. Farmers recognized tradeoffs (e.g. 'spray v. spade'), as well as certain things lost and gained when transitioning from industrial to regenerative agriculture.
2	*How did those Kansas farmers experience transitions to regenerative agriculture principles and practices?*	- Transitioning farmers used the discourses of addiction to describe industrial agriculture, and they experienced regeneration as a recovery process from the subsidy-fueled production treadmill. - There were shifts in farmers' identities as 'good' farmers away from 'others' (industrial farmers). - Transitions were difficult, but oftentimes more than necessary.

In Figure 5.1, I diagrammed interviewees' experiences with and interrelationships among six units of analysis, referred to as 'actors' or 'agents' to confer the agential nature of the bounded concepts, actions, processes, factors, subjects, and/or variables, and to gesture to agricultural sociologists' Actor Network Theory endeavors (Busch & Juska, 1997; Middendorf, 2002).

Figure 5.1. Diagram of Interviewee Perceptions of and Experiences with the Interrelationships Among Six Material-Symbolic Agents

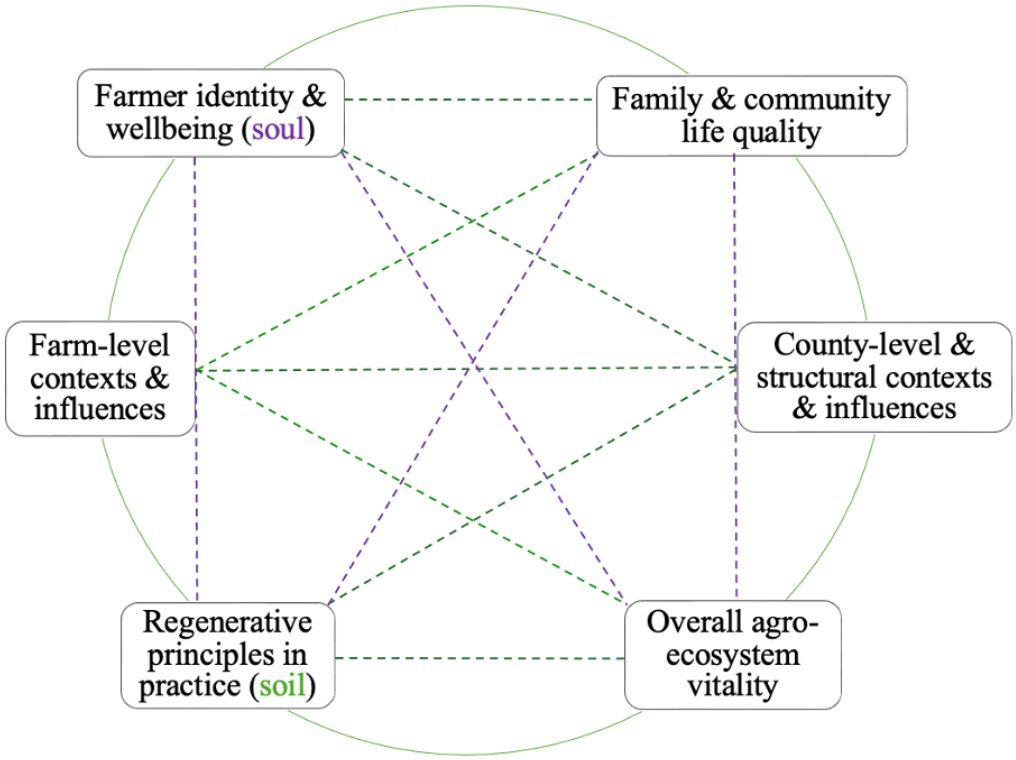


Figure by Jacob Miller-Klugesherz © 2026.

Table 5.2. Meanings of Lines and Colors for Figure 5.1

Symbol, color	Meaning
Green, curved, solid lines connecting the six bounded units of analyses (called 'agents')	These six, agential units of analysis represented concepts, actions, processes, factors, subjects, and/or variables. I indicated their cyclical interrelationships without temporal directionality (no arrows). I purposefully positioned the agents to indicate the tightest and most influential effects as experienced by the 73 interviewees.
Green, straight, dashed lines	A majority of interviewed farmers perceived the interrelationships between the units of analysis to be more ***literal*** and/or ***direct***.
Purple, straight, dashed lines	A majority of interviewed farmers perceived the interrelationships between the units of analysis to be more ***metaphorical*** and/or ***indirect***.

Interviewees experienced and perceived interrelationships among the six agents that spanned the material and symbolic realms. From the empirical findings, it was clear that interviewees spent most of their time working in the material world. However, they were eager to discuss spirituality, identity, and wellbeing with me. I have not encountered a convincing

empirical case for a material soul. Still, for many interviewees, and for myself, that did not mean the soul did not – and does not – *feel* real. Quite the contrary. Sometimes the least empirical feels the most real. In attempts to access healing of the soul through farming differently, interviewees expressed their experiences with tears of lamentation, grief, and mourning, but also joy, beauty, and renewal. There were a handful of times when interviewees were telling a story and had to stop to feel; to harken *Hamilton,* "there are moments that the words don't reach" (Miranda, 2015), when embodied experiences became indescribable.

The agents that interviewees experienced most literally and directly were farm level contexts and influences, and county-level/structural contexts/influences. They expressed these as having direct influences on overall agroecosystem vitality, regenerative principles in practice, and family and community life quality. Farmer identity and wellbeing and familial and communal life quality (soul) emerged as the most metaphorical and/or indirect agents, especially with 'soil' and overall agroecosystem vitality. As one potential explanation, the literal and direct gap between farmer identity and wellbeing and RA principles in practice seemed the widest, likely due to historical, cultural, and evolutionary contexts, and the Political-Financial Capital realities of industrial inertia. An implication of this explanation is that an experiential rift between the human and non-human world persists, likely because interviewees often dealt with more immediate Financial and Natural Capital challenges. This is intuitive; in farming, that which is in front of you requires more time and attention than that which is to come, or that which feels more ephemeral. Day-to-day is usually the way.

All seven community capitals were at play throughout the interviews. The rank of their frequency was, from most to least, Natural, Cultural, Financial, Social, Human, Built, and then

Political.[17] Because agricultural politics and policies have long been inseparable from farming, it surprised me that the Political Capital discussions were not more frequent.

Limitations of the Contents and Scope

There were limitations to this dissertation's contents and scope. All 73 interviews took place in four Kansas counties, limiting the generalizability of findings to those counties. For Chapter 2, I could have interviewed more non-farmer, agricultural experts, nonoperating landowners, and/or community leaders to expand the sample. Chapter 3 highlighted associations between farmland use changes and emissions but did not correlate the data. This could have resulted in stronger argumentation but would have also required a stronger emphasis on quantitative rather than qualitative methods. Chapter 4 was cross-sectional and did not capture a full spectrum of transitions from industrial to regenerative agriculture. While it is important to take these limitations seriously, they should not discount the contributions of this dissertation; a dissertation cannot be everything to everyone.

Regenerative Recovery is Difficult, but Usually Necessary and Worthwhile

Some scholars have argued that a fourth agricultural/agrarian revolution (4.0) is underway (Akinkuotu, 2023). There is some disagreement about what it entails, though most would agree it includes efficient, ecological-industrial intensification through precision agriculture, generative artificial intelligence, and autonomous equipment, like weeding robots (Koetsier, 2021; Lavars, 2021; Shang et al., 2023). However, if the U.S. is to work toward climate change mitigation and adaptation, as it should, then the leaders of agricultural revolution 4.0 must not only recognize how agriculture is impacted by the triple crises of climate change,

[17] Not based on codes and meta-codes, or frequency, but the influential extent the empirical data had on shaping the answers to my research questions.

biodiversity loss, and land degradation, but be critical and realistic about how these innovations and efficiencies are engrained in IA dictates and continue to exacerbate the triple crises.

For farmers, a crisis was the catalyst to change. To transition to more regenerative practices. Crises can catalyze us all not to just catastrophize, but change. Even as the world exceeds planetary boundaries, we – especially in the U.S. – should not give up mitigation and (certainly) adaptation efforts (Reisinger et al., 2025). We must continue to try to mitigate climate change in the ways we can while transitioning our socio-cultural and agricultural mores to better adapt to whatever agri-ecological systems arise from the ashes of a forced, post-modern, post-industrial society. To move beyond an illusory modernity to something beyond (de Oliveira, 2021, 2025).

I hope that this dissertation is but a small part of the body of work critiquing what is and helping to imagine what comes after. It has one common goal: heal soil, heal soul. Heal I, heal U, heal us.

“Heal Soil, Heal Soul”

Soil and soul, I and U.
Breathe

My threenager and I spade the Earth. Prod clod.
I wax poetic about digging with my dad.
He found a stick.
He knows I’m there with him,
sensing all the new senses.
Feeling life everywhere.
Seeing mycelium mingle, seeds sprout.
In every single speck billions of microbes,
stories and stats, world and word
…And he’s turned the nozzle full blast on the clover.
We make mud.

Play, engage away!
What will he think of how I treated the same soil
that he will one day bury me in?
Extinguish eternal worry, extol whimsy,
practice nanarchy, exude humility, stay present.
Ever present.

Embrace a social, perennial vision.
Make home from sacred loam,
look up and ahead while always rooted down.
Rest in the grace of the place,
in the peace of the people, land, and community
The eternal trinity,
where I and U become We.

Take a deep YWHW breath
and then get back to the sacred work.

- Jacob Miller-Klugesherz (2026)

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Appendices

Appendices included the following: (A) supplemental materials; pre-interview questionnaires and descriptive statistics for (B) Chapters 2 and 3 and (C) Chapter 4; and interview guides for (D) Chapters 2 and 3, and (E) Chapter 4. To retain the anonymity of participants, I omitted debrief statements, IRB materials, and internal codebooks.

Appendix A - Supplemental Tables and Figures

From participating interviewed PT farmers, I collected responses to survey items on the personal wellbeing index (PWI), created by The Australian Centre on Quality of Life (2013). Interviewees' self-reported overall life satisfaction scores indicated they were most satisfied with their religion/spirituality ($\bar{x}$ = 9.0, n = 12) and personal relationships ($\bar{x}$ = 8.69, n = 13), but they were least satisfied with their future security ($\bar{x}$ = 7.64, n = 11) and health ($\bar{x}$ = 7.69, n = 13) (Appendix Table A.1, Appendix Figure A.1). Appendix Table A.1

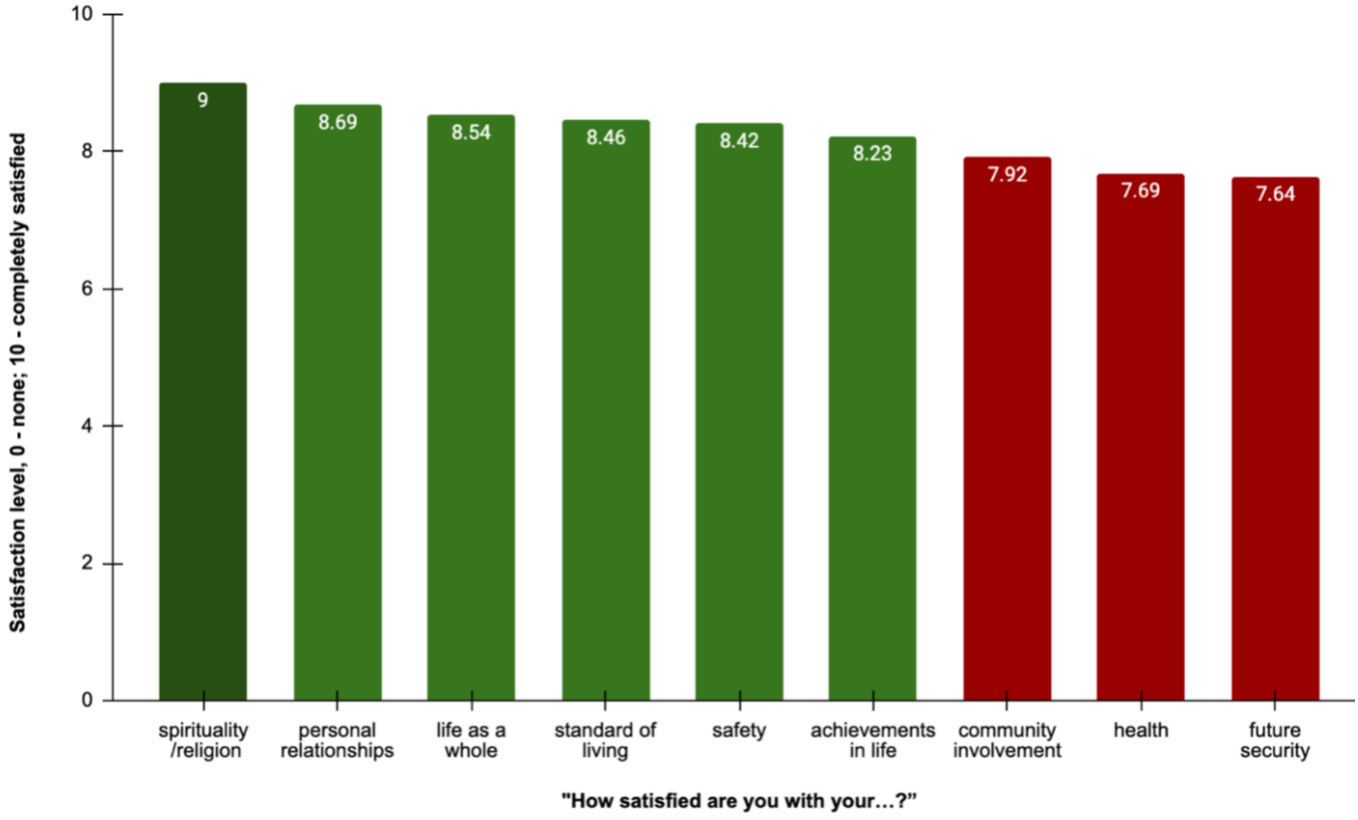
Appendix Table A.1. Personal Wellbeing Index (PWI) Survey Results of PT Interviewed Farmers, using Items from The Australian Centre on Quality of Life Survey (2013)

"How satisfied are you with your…?"

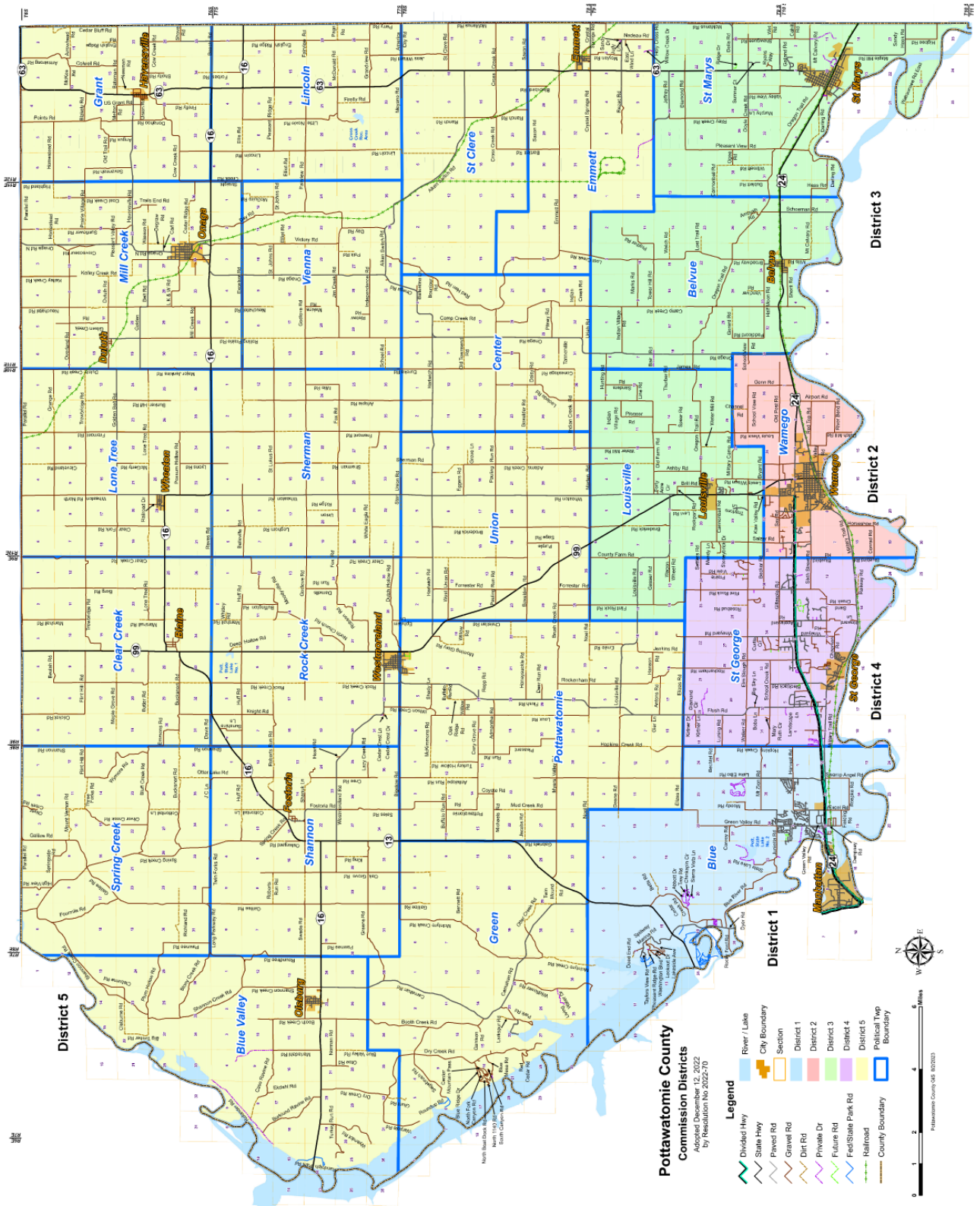
life as a whole	standard of living	health	achievements in life	personal relationships	safety	community involvement	future security	spirituality /religion
8.54	8.46	7.69	8.23	8.69	8.42	7.92	7.64	9.00
n = 13	n = 13	n = 13	n = 13	n = 13	n = 13	n = 13	n = 11	n = 12

Notes: 0 means no satisfaction at all, whereas 10 means you feel completely satisfied.

Appendix Figure A.1. Personal Wellbeing Survey Results of PT Interviewed Farmers



Appendix Figure A.2. Pottawatomie County's 23 Townships and Five Districts



Source: Board of County Commissioners, 2024, p. 56.

Blue Township leaders and residents (me included) have long discussed forming their own city but have yet to do so. They should accelerate their timeline, because within the decade, the City of Manhattan, Kansas (2025) will attempt to annex Blue Township, largely because its residents have received several city services but do not pay city taxes. The city of Manhattan established an East Manhattan gateway plan area that proposed their annexation of 13 square miles from Tuttle Creek Boulevard to Hopkins Creek Road (Appendix Figure A.3). If the gateway becomes annexed, it would be a boon to the Manhattan economy and increase property values on new/existing housing/rental stocks. However, it could also threaten farmers currently operating within the plan area. The PT commission rezoned 70 acres just east of the gateway – from agricultural to intermediate-density residential – to pave the way for more subdivision development (Peoples, 2025). So, pressures will continue to mount on Blue Township leaders to incorporate.

Appendix Figure A.3. East Manhattan, Kansas, Gateway Plan Area

Source: City of Manhattan, Kansas, 2025.

Appendix Table A.2. Interviewed PT Farmer Beliefs about Cover Crops

I asked interviewed farmers to provide their level of agreement with 23 statements related to CC benefits and influences on their decision-making.

#	Statement	*n*	$\bar{x}$
1	I believe that cover crops decrease the degradation of natural resources (soil organic matter, fertility, water retention, etc.).	14	4.50
2	Cover crops reduce the risk of commodity crop failure.	14	3.14
3*	Cover crops don't reduce dependence on pesticides and herbicides.	13	3.00
4	In general, planting cover crops is better than conventional (monoculture) methods.	13	3.92
5	Cover crops will reduce long-term dependency on external fertilizer inputs.	13	3.23
6	Conservation agriculture allows for optimized and sustainable yields.	13	4.00
7	Cover crops are a win-win for farmers and their agroecosystems.	14	3.93
8*	Cover crops do not help in adequately distributing nutrients in the soil profile.	14	2.36
9	I recommend other farmers in my area adopt cover cropping.	13	3.69
10*	Cover cropping is not applicable to my fields.	13	2.23
11	I believe cover cropping improves production efficiency.	14	3.93
12	Cover cropping requires new management skills.	13	4.31
13	Cover crops balance the soil ecosystem by carefully managing residue and waste.	13	4.15
14	To de-risk cover crop adoption, appropriate technical packages and training programs are needed.	13	3.69
15	Diversity in cover crops can reduce the occurrence of pests and diseases.	13	3.62
16*	Cover crops are ineffective for weed control.	13	2.23
17	Cover crops reduce climate risk.	13	3.54
18	Cover crops reduce soil erosion.	14	4.25
19	I am more likely to plant cover crops if government payments for them are *comparable to* payments for commodity crops.	13	3.62
20	I am more likely to plant cover crops if government payments for them are *more than* payments for commodity crops.	13	3.85
21	Current political and economic structures incentivize farmers to adopt cover crops.	13	3.00
22	I would be willing to try to incorporate groundcover into my cropping systems sometime before 2026.	11	3.91
23	Groundcover seems advantageous to cover crops that need terminated.	12	3.50

Note: Items source from Maria et al.'s (2023, p. 120) reliable "conservation agriculture" scale; *strongly agree* (5), *agree* (4), *undecided* (3), *disagree* (2), *strongly disagree* (1).
*Reverse coded to ensure respondents paid attention to the directionality of all questions.

Appendix Table A.3. Pottawatomie County, Kansas, Residue Cover Ranges, 2005-2019

Percent of total acres[1] with…	% residue cover range[2]	% Δ, '05-'19	Linear r^2	Min (yr) – Max (yr),	CSB '19 Rank %
…conventional tillage, very low residue cover level.	0–15	-27.95	0.217	8.93 ('13) – 26.65 ('05)	58.46
…reduced tillage, low residue cover.	16–30	-8.17	0.083	32.75 ('16) – 53.74 ('07)	66.57
reduced tillage, moderate residue cover (all previous year's crops *except corn*).*	31–50	-10.64	0.217	20.81 ('16) – 49.02 ('13)	37.96
reduced tillage, moderate residue cover (*only corn* was the previous year's crop).*	31–50	-28.16	0.019	28.39 ('13) – 59.39 ('05)	65.20
significantly reduced tillage, high residue cover.	51–100	0.91	0.011	15.89 ('06) – 26.73 ('10)	51.31
significantly reduced tillage to no tillage, high residue cover.	51–100	11.10	0.072	3.56 ('15) – 19.54 ('08)	27.37
cover crops.		20.99	0.156	0.49 ('10) – 9.00 ('17)	72.90
winter commodity crops.		-80.44	0.654	2.04 ('17) – 18.12 ('05)	70.56
perennial crops, such as hay(lage) or pasture.		-72.63	0.531	2.73 ('11) – 15.37 ('05)	82.81

Data source: I used Hagen et al.'s (2020) OpTIS 2.0 data—that was collected via remote sensing and validated with field-level verification data—to determine that the percent of PT acres with CCs peaked at 9% in 2017, which was well above the national or regional average at that time.[18] There was a positive percent change of commodity row crop acres containing CCs from 2005 to 2019 (% Δ = 20.99), although there was a sustained dip below 5% from 2008 to 2016.

[1]Total acres were calculated by summing "acres with CCs" and "acres without CCs," and included all previous year crop types (except for asterisked variables).

[2]Residue cover ranges >30% were considered "conservation tillage," whereas ranges ≤30% were considered "conventional tillage."

[18] There are differences in how USDA NASS and OpTIS measure and calculate of the percent of farmland with cover crops. The former relies on survey responses to the Ag Census, and the latter measures the ratio using remote sensing and ground-truthing. The latter is collected every year, and the former every five years. Therefore, although the ratios are not the same every year, the general direction and degree of the linear trends mirror one another.

Appendix Table A.4. Key findings from Analysis of Pottawatomie County, Kansas Qualitative Interviewee Data and Descriptive, County-Level Data, Grouped by Community Capitals

Capital	Key findings
Natural	PT is among the CSB leaders in percentage of acres devoted to perennial prairies, pastures, and high-end cattle production. However, since 2002, PT farmers have intensified corn-soybean production at the expense of perennial cropland, and an increase in cover cropping corresponded with an overall rise in herbicide rates (x2), chemical expenses (x3), and total emissions (x4) over their respective time frames ranging 1997-2022. PT farmers have increasingly used herbicides over minimum tillage for weed control and cover crop termination.
Cultural	Faith was central to their value formation, agronomic decision-making, and willingness to adopt conservation practices. For PT farmer tenure, there was a steady decline in individual/family operations but a rise in family-held corporations, likely due to the tax benefits of S-corps.
Human	Interviewees captured the bittersweet nature of farming, that even though it can be taxing for their mental and physical health, they love it as an occupation and way of life. On average, the county's producers were aging and navigating transitions. Meanwhile, PT's population, income, and wellbeing metrics have all increased, though most of the growth occurred in PT's four southern subdivisions bordering the Kansas river, where 77% of PT's population is concentrated.
Social	Interviewees acknowledged tensions between PT's prospering community development and agricultural production. Producers whose primary occupation was farming couched the relationship more as one of parasitic symbiosis, whereas producers whose primary occupation was not farming ('part-time,' 'hobby' farmers) and community leaders perceived the relationship to range from commensalism to mutualism. Conventional farmers perceived greater distrust among their networks, whereas those in conservation, regenerative, and organic networks were keener to share knowledge and help neighbors.
Political	The production treadmill for farmers whose primary occupation is farming has sped up since 2017 due to conventional farming norms, developmental pressures, inflating land values, and increased crop insurance payments. Farmers showed moderate support for increasing federal direct cover crop payments but differed in the availability and amount they favored.
Financial	Interviewees noted the proclivity of farmers who primarily farm based on immediate costs. Real net farm income has increased for PT producers due to greater market sales and livestock and crop insurance payments (average per farm increased ~$7,000 in real dollars from 2017 to 2022). However, its rate has not kept pace overall county development metrics, especially the rise in PT's median household incomes. Land sales for row crop farmland have increased, but not to the degree that all land sales have risen.
Built	Interviewees preferred buying used over new equipment and liked, but did not use, some of the newest precision agriculture advancements. PT building unit values, irrigation infrastructure, and internet access ranked among the CSB's 1st quartile. Housing and rental stocks grew in value but varied based on the subdivision location. There are generally adequate independent grocery retailers, but additional opportunity to add groceries in Blue Township and Olsburg.

Appendix Table A.5. Reno County Farm-Level Descriptive Statistics, 2022

Variable[1]	Reno County	Kansas
Operator age	57.3	58.2
Average farm size (owned and rented)	505	804
Average net cash farm income	58,803	73,058
Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed, as a % of total land in farms acres	14.02%	5.32%

[1]Data sourced from USDA NASS, 2024.

Appendix Table A.6. Conceptual Comparisons between Alcoholics Anonymous' (AA) 12-step Program and Quotes from Reno County Farmers (in Chapter 4) Engaged in Regenerative Recovery (RR) from Industrial Agriculture's Addictions

[1]	Steps for AA[2]	Steps for RR[2]	Illustrative quotations from farmers
1	*Admit powerlessness*	Admit powerless over industrial inputs.	*I'm addicted. I'm addicted to fertilizer. I'm addicted to chemicals.*
2	*Find hope*	Begin to believe that a power greater, Mother Nature, can restore my health.	*God spoke to me, saying 'use what I've given you. Don't create this other crap.'*
3	*Surrender*	Decide to work with, instead of against, Nature.	*You better be working with nature instead of against nature.*
4	*Take inventory*	Which inputs and "ag passengers" do I really need?	*You start building your systems back with regenerative practices and you become profitable. You can be independent again.*
5	*Share inventory*	Share with others what industrial farming has cost me.	*I have worked 73 years of 40-hour weeks in my 37 years of farming. [RA] helped me to manage a much greater operation, made it more economically viable, all with less time.*
6	*Become ready*	Ready to try regeneration because *I* want to.	*If it takes incentive money for you to do something ethically correct or common sense, then why are you doing it? It shouldn't take incentive money for you to try to keep your dirt on your field.*
7	*Ask God*	What does Nature require of me?	*Mother Nature drops in Marestail. Why is that? She's trying to patch…the symptoms of something we're doing. She's curing it on her own. How do we farm synergistically with Her?*
8	*List amends*	I harmed the soil, biodiversity, neighbors, & myself.	*[Industrial] production agriculture has completely failed to provide nutrient dense food. What we provide is low quality…and not the healthiest.*
9	*Make amends*	Admit wrongdoing, apologize, & ask for forgiveness.	*I had too many [industrial inputs].*
10	*Continue inventory*	Admit mistakes made when integrating RA. It may not always be easy but remind yourself that it is necessary.	*There's a lot of things I want to do, but I realize [they're] gonna take time…did I really do my soil justice?*
11	*Pray and meditate*	Sit in silence in nature. Use five senses.	*Each year I love seeing what new species are out in the paddocks, what nesting birds have come back. I like stopping and taking time to observe*
12	*Help others*	Share advice and success with neighbors, write books, speak at conferences.	*I am a recovering conventional farmer*; I've *been in debt, and I've got myself out of it*

Notes: [1]Steps sourced from the original Alcoholics Anonymous (2010) draft; [2]Transitions are complex, nonlinear, and people may skip steps, relapse, and/or repeat. These steps constituted the general stages for addictions to substances and to agri-industrial chemical addictions/afflictions.

Appendix Table A.7. Etymology of 'Addiction'

Era	Dates	Meaning
Early Roman Republic	5th century BCE	*Addicere* meant **'to speak to,'** a **legal and augural definition** used by the Roman courts to enslave debtors. Failure to pay the debt after the lapse of the statutory sixty days, and the debtor became the creditor's permanent property, to be kept, killed, or sold as a slave.
Middle to Late Roman Republics	Mid 3rd century BCE to 133 BCE, & 133 BCE to 30 BCE	For *addicere* and *addictus,* the notion of **enslavement**, a secondary derivation from its legal usage, persisted as **descriptive** but no longer literal.
Early Modern England	16th-18th centuries	"To attach," whether that attachment was good or bad, imposed or freely chosen. It came to mean **devotion to a higher purpose**, used by moralists and clergy, and not associated with enslavement or loss of control.
Modern	19th century	It became used in the **medical, disease model**. The noun *addict* first appeared, shifting the attachment identity from the substances (primarily alcohol) to the person.
Modern to Postmodern	20th-21st century	Broadened to several passive and active, good and bad forms of **behavioral attachment**. If neutral sentiments of the term increase in use, how do we best differentiate 'addiction' from 'values' or 'interests'?

Sourced from Rosenthal & Faris (2019), who detailed these five eras and the etymology of 'addiction.'

Appendix B - Pre-Interview Questionnaire for Chapters 2 and 3

Name: _____ Your age: _____ Date of interview: _____

Farm basics, exit intention, and profitability

Total acres: Own _____, arable _____, & cash rent _____

Do you irrigate? Yes or no (circle one). If yes, what type (flood, pivot, subsurface, precision)?

List current conservation practices (no-till, strip till, covers, livestock rotation, etc.):

List all crop types you've planted in the past 3 years:

Circle all that you use, if any: Fungicides, Herbicides, Pesticides

Do you have substantial off-farm income (to the point where you wouldn't need to farm to make a living)? Yes or no (circle one).

Do you run livestock? Yes or no (circle one). If yes, what kinds, and how many head?

What county or mills do you currently market to? _____

How likely are you to leave farming within the next 5 years?

1. Very unlikely
2. Unlikely
3. Somewhat unlikely
4. Somewhat likely
5. Likely
6. Very likely

Which of these best describes your farm enterprise at the moment?

1. Making a large loss
2. Making a moderate loss
3. Making a small loss
4. Breaking even (neither making a profit or loss)
5. Just making a profit
6. Moderately profitable
7. Highly profitable.

Generally speaking, are you profitable? Yes or no. (Circle one)

Respondent's Rating
(0-10)

Part I (Optional item]: Satisfaction with Life as a Whole

"Thinking about your own life and personal circumstances, how satisfied are you with your life as a whole ?" ☐

Part II: Personal Wellbeing Index

"How satisfied are you with…… ?"

1. your standard of living ? ☐
2. your health ? ☐
3. what you are achieving in life ? ☐
4. your personal relationships ? ☐
5. how safe you feel ? ☐
6. feeling part of your community ? ☐
7. your future security ? ☐

[optional item]

8. your spirituality or religion?¨ ☐

Appendix C - Pre-Interview Questionnaire for Chapter 4

Farm basics, exit intention, and profitability

Personal Wellbeing Index (PWI)

Cummins et al. (2003)

	Respondent's Rating (0-10)
Part I (Optional item]: Satisfaction with Life as a Whole	
"Thinking about your own life and personal circumstances, how satisfied are you with your life as a whole ?"	
Part II: Personal Wellbeing Index	
"How satisfied are you with…… ?"	
1. your standard of living ?	
2. your health ?	
3. what you are achieving in life ?	
4. your personal relationships ?	
5. how safe you feel ?	
6. feeling part of your community ?	
7. your future security ?	
[optional item]	
8. your spirituality or religion?¨	

Appendix D - Interview Guide for Chapters 2 and 3

Background

- The scope of this research project is to better understand derisking cover crop adoption among PT farmers as it relates to the seven community capitals: natural, cultural human, social, political, financial, and built. It is also to assess interest in perennial groundcover adoption in corn-soybean systems. Do we have your verbal consent and permission to record the interview?

Community Capitals

Natural

- What are your primary goals for a cover crop? Potential options include:
    - Improve
        - soil health
        - soil organic matter / sequester carbon
        - water infiltration
        - nitrogen for cash crop
        - weed management
        - environmental stewardship
        - beneficial insects
        - forage for livestock
        - walking/driving surface
    - Reduce
        - erosion
        - nutrient loss
        - input costs
    - To receive an incentive payment
    - Landlord requirement
    - Others (please specify)
- Are you certified organic?
    - If yes…
        - How long and what do your organic inspectors ask you about regarding maintaining/improving soil?
    - If no, why not?
- If you run livestock, what do you graze them on, and how do you finish them?
- In the future, do you want the scale of your operation (acreage, production intensity, additional value-added products) to increase, decrease, or stay the same?
- Do you already plant cover crops?
    - If yes…
        - Which type(s) and why those type(s)?
        - On how many acres?
        - How many acres would you like to target for cover crop adoption?

        - What is your management and rotation plan?
    - If no…
        - What is preventing you from planting them?
        - Within the next three years, do you intend to plant a greater or fewer number of acres of cover crops (based on acreage)?
        - What would it take for you to adopt cover crops? What would be the ideal conditions?
- Where do you learn more about the various types of cover crops?

Cultural

- What is your family's history and/or legacy regarding this farm?
- Reflect on your childhood. Regarding farming, what are the major values your parents thought were important for you to hold? What mechanisms did they use to make sure you learned them?
- What does the *culture* in "agriculture" mean to you? Do you see your role as more of a steward or a manager?
- How do your community's schools, churches, and media impact your perception of cover crop viability?
- What cultural changes would have to take place for you to adopt more cover crops?
- How do you measure your success in adopting cover crops?

Human

- What roles do your family members play in your farming operation?
- How long have you been farming/ranching?
- What inspired you to get involved in agriculture?
- Have you always farmed the same way? If not, why did you change your practices?
- Do you have a transition plan established?
    - If yes, what is the timeline, and who are the actors involved?
    - If no, when do you plan to begin thinking about one?
- Do you think the lives of people in the community would become better, worse, or neutral with more acres planted to covers?

Social

- I would like to start by asking you about the groups or organizations, networks, associations, outside of family networks, to which you belong. These could be formally organized groups, such as farmers coops, union, traders' association, production cooperatives or machine rings or informal groups who get together regularly to do an activity or talk about things (coffee shop).
- Which groups do you belong to? How many and the type?
- Can you tell me about your involvement with the groups e.g. how many times a year do you participate in group activity?
- What do you think are the main benefit of being in these groups?
- How do these social groups, if any or at all, impact your perception of cover crop adoption?

- With which groups are you most likely to discuss best management types?
- Which groups do you learn the most from?
- With which groups do you most regularly share knowledge and resources?
- Would you describe your relationships with other, similar farmers to be more cooperative or competitive?

Political

- What are your main sources of information about what the government is doing to promote more cover crops?
- Which government programs most affect – that is, enable or constrain – your ability to plant cover crops? E.g. CRP, Crop insurance, Climate-smart initiative, etc.
- Which political scales (international, federal, state, county, city) most impact the risk of planting cover crops and/or provide an opportunity to de-risk their adoption?
- Are you concerned about too much foreign or absentee ownership affecting your operation or others in your community?
- Is how leaders approach agricultural conservation a factor for you when voting?

Financial

- What market channels do you engage in? E.g. mills, elevators, direct sale, farmers markets, etc.
- How do you envision cover crops impacting your profitability in the short-term? The long-term?
- What have been your greatest financial challenges? Greatest successes?
- Do you get financial or business advice from anyone?
- What are ways that you plan to keep your business stable when faced with uncertainty in climate, markets, crops, land tenure?
- If the farmer has done cover cropping…
    - Have soil-building practices helped mitigate some of the uncertainties you face as a farmer?
    - Do you see a return on your investment for cover cropping? How do you measure those returns (e.g., soil testing, soil feel, yield, plant health, water infiltration)?
    - How long do you think it will take for your investments to pay off?
    - How do you finance cover cropping? Have you participated in any state or federal conservation incentive programs?
        - If yes, how was that experience, how did you hear about that outside funding, and/or what would you change about those incentive programs to benefit your farm and build healthier soil?
        - If no, will you continue implementing soil-building practices without financial incentives or assistance?

Built

- List the types of equipment you own, as well as buildings, sheds, etc.
- How much debt in built capital do you have, including inputs like chemicals?
- What equipment would help you adopt more cover crops?

- What permanent physical installations and facilities have impacted, or would impact, your willingness and ability to plant more cover crops?
- Does having farm debt impact the size of your inventory?

Appendix E - Interview Guide for Chapter 4

1. How do you (or did you) feel about incorporating the x principle?
2. Often, people talk about 'conventional' or 'industrial agriculture' in terms of a set of practices: mechanized machines, producing standard products with inputs that come from off the farm (fertilizers, pesticides, seeds, etc.), Does industrial agriculture limit your ability to farm the way you want? How? Why? What does that feel like? Has it been frustrating, depressing? What words would you use?
3. Describe the process you are taking when transitioning to regenerative agriculture.
4. Fear, anger, rage, despair, hopelessness: Describe a time when one of these was so strong it paralyzed you or shook you to your core. What were you feeling at the time? Who - or what - was causing you to feel this way?
5. Do you see farming at the core of what makes you who you are?
6. Is it always your goal to get better at farming? What does better look like for you? For your extension agent?
7. If you could do it all over again, would you still choose to be a farmer? Why or why not?
8. Why do you still farm, given all the challenges? Who or what do you do it for?
9. What would it take to push you out of farming?
10. As you make your operation more regenerative, what barriers are most in your way? Who or what are these barriers? Where are they?
11. Where do you find the ability to keep moving forward with your farm?
12. Have you ever lost hope? Did putting these regenerative principles help?
13. Hypothetical: You have a few minutes alone in a room with our two Senators to persuade them to incentivize or support regenerative agriculture. What do you say to put the benefits in human terms that people can understand?
14. What do you care most about on your farm?
15. What parts of industrial agriculture should be salvaged for a regenerative future, if any?
16. Is it possible to straddle, or work with parts of both, the industrial and regenerative farming 'worlds'? Why or why not? What does that feel like on a daily basis? Examples from your operation?
17. When you decided to make the transition to some regenerative practices, were you vulnerable or resilient? Were you at a breaking point where you had to do things differently? Or were you coming into regenerative practices with some solid footing underneath you (financially, socially, family, etc.)?
18. Why do you care about becoming regenerative? Why make the effort?
19. How would you describe your most clear breaking point as you have been trying to change from more conventional practices to regenerative practices. What was that like? How did it happen? Where?
20. What do you generally feel now that you didn't feel when you were farming more conventionally?
21. You only have one word to describe industrial farming, and only one word to describe regenerative farming. What is each word?
22. What part of conventional agriculture do you believe God is most angered by?