THESIS

SMALL-SCALE URBAN AGRICULTURE IN NORTHERN COLORADO

Submitted by

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ABSTRACT

SMALL-SCALE URBAN AGRICULTURE IN NORTHERN COLORADO

Urban agriculture involves production, processing, and marketing of food and related products in urban and peri-urban areas for local consumption (Pearson et al., 2010). The purpose of my qualitative study using a phenomenological approach was to explore urban agricultural practices of small producers in Northern Colorado. I interviewed four farmers from Larimer County, CO, with two to forty-seven years of urban agricultural experience. Farmers supplied representative photographs of their operations.

The motivation for farming was self-interest, food, conventions, and income. Practitioners learned to farm through experimentation, formal, and informal approaches. Learning was experiential and self-directed. Participants experienced both challenges and rewards during farming. All the farmers would farm again with minimal changes to their current practice.

This study highlighted urban agriculture's role in providing healthy food, fulfillment, and generating income. There was a lack in utilization of local educational resources, which could have further improved the farmer's productivity. Examining the scope of urban agriculture would facilitate a needs analysis particularly for complementary adult education programs. Moreover, integration of small-scale urban agricultural production into the regional economic development plans and related business opportunities remains unexplored. Finally, it is critical to identify ways for local governments to support small producers through legislative and other tools.

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It takes a team to accomplish a successful research project. This study was possible because of the willingness of the participants, LE, TJ, Idgy, and Sprinter to share deeply personal stories. I am indebted to them. I am grateful to my advisor Dr. Kalpana Gupta, co-advisor Dr. Kelly McKenna, and committee member Dr. Stacy Lynn for their guidance. These professors allowed me to navigate a field, social science, that I had little experience. They challenged me to support my assumptions and conclusions to ensure validity and its reflection of the practitioners' and my experiences.

My journey began at 13 when my mother Jerida Acio, one of the first licensed teachers in my tribe, impressed upon me her expectation saying "Pe Ilana" as I went to secondary school. That charge has been my life's beacon. Ten years later after graduating from the Veterinary School at Makerere University, Kampala, Uganda she and my father Rwot Adwong Canon Thomas Kelomwaka Otim, MBE, Esq. reminded me that "Wan dong omi jami lung ame imito. En okene dong pe". That conversation heralded a life transition and opportunity to make a difference on this earth. I am eternally beholden to my parents, pioneers who raised, mentored, and otherwise supported hundreds of individuals from diverse background during their life and still influence others after their passing on.

The third phase of this journey occurred when our two youngest children Thomas (Thing 4) and Kaidee (Thing 3) were frustrated with the workload in the International Baccalaureate Program in middle school. I promised I would walk with them and take classes after being away from formal education for almost 30 years. I assured Thomas and Kaidee, if, they did their part

in school, I would do mine albeit with students half may age or younger, and with Professors who were likely younger than me. They did their part, and I am doing mine.

The final charge that influenced my life was from the Amwa Otiratok elders who at my mother's funeral said "Wot inen lobo ento wi pe wil ikan iya iye" permitting me to explore the world and remember where I came from. It was a stark reminder, as I became a Clan Elder of what my role to the community would be. I hope to share what I learn with my people in Uganda.

Three women have been particularly influential in my life. My sister Florence Olal-Odur has been an inspiration and a role model. As an adult educator and later Head of Distance Learning at Makerere University, she trained an array of teachers who continue to change other people's lives. My sister Katherine (Ketty) Mary Ebong has been at my side since I was 13 when my father charged her to be responsible for my wellbeing. She has accompanied me through my moments of joy and at the lowest points of life. She is my "Sister Dad". Ketty, I am ecstatic about your unwavering support all these years. My mother, Jerida Acio whom we call "Bank Manager" has been there for all of us, while hosting countless others, including total strangers. Mama, you made our home a warm, open, and welcoming place. Ageno ni pe alani.

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DEDICATION

I dedicate this thesis to my sisters Florence Olal-Odur and Katherine (Ketty) Mary Ebong and my mother Jerida Acio for their strong influence in shaping my life. I proudly ululate “Awon Adupa, Awon Akec, Awon Atedi, Awon Ming” for you.

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CHAPTER 1: INTRODUCTION

Northern Colorado, a semi-arid region, has been a historically agricultural community (McWilliams, 1995; Weeks, 2016), engaging in irrigated and non-irrigated crop farming and confined animal feeding operations. The area has experienced progressive urbanization (Drummond et al., 2019; Johnson & Schmidt, 2009) which has potential adverse consequences on agricultural practices. Anderson (1984) reviewed the impact of urbanization on agriculture in Boulder, Weld, and Larimer counties, and noted that the biggest losses were felt in the crop lands. The increasing urbanization represents loss of some of the richest agricultural lands in the United States (Johnson & Schmidt, 2009; MacPhail, 1972) with possible negative impacts on food production, particularly as irrigation water is transferred to other uses and the associated farmland fallowed (Dozier et al., 2017). A 2010 study confirmed both the loss of agricultural land and increasing food insecurity in this region (Northern Colorado Regional Food System Assessment, n.d.). Moreover, increasing urbanization such as in Northern Colorado can markedly alter local agricultural land values (Borchers et al., 2014; Delbecq et al., 2014) making the land more appealing for other uses. Increasing land values could shift the interest from traditional farming practices to alternative forms of agriculture or other uses especially, if, those activities are more lucrative.

Urban agriculture is a non-traditional agricultural practice, involving production, processing and marketing of food and related products in urban and peri-urban areas for local consumption (Pearson et al., 2010). Urban agriculture presents an important opportunity for families to access healthy food (Hara et al., 2018; Opitz, Berges, et al., 2016; Walker, 2014; White, 2011) and supplement family income (Galt et al., 2014). It can also be a social movement

(Galt et al., 2014; Poulsen, 2017) or a business venture (Pölling, 2016; Poulsen et al., 2017). According to Tornaghi (2014) urban agriculture remains an area that has hardly been explored despite renewed interest in land cultivation and food production. Urban agriculture is expanding rapidly globally and provides a unique opportunity to address food supply and sustainability concerns in urban areas (Eigenbrod & Gruda, 2015). Moreover, it is an important component of food production and the economy, for which we have limited information in Northern Colorado.

Statement of Problem

Few studies have explored small urban agricultural enterprises in Northern Colorado (Hedden, 2011; Ivancic, 2014; McNamara, 2010). This paucity of information requires further examination since urban agriculture is an important component of food production systems (Eigenbrod & Gruda, 2015) and has a positive impact on food access, health, and education in a community (Cramer, 2017; Hedden, 2011; Ivancic, 2014). Moreover, information from such a study would be useful in identifying the needs of urban agricultural practitioners (Surls et al., 2015) and removing roadblocks to their success (Opitz, Specht, et al., 2016). Given the rapid urbanization of Northern Colorado (Drummond et al., 2019), it is critical to assess the status of local urban agriculture and obtain relevant baseline information.

Purpose of the Study

As discussed, there was limited information on urban agriculture in Northern Colorado. This study was designed to explore local urban agriculture practices of small producers, their motivations, education, and experiences, and fill associated knowledge gaps. The key research questions were:

1. What is the motivation for practicing urban agriculture?
2. How do urban agriculture practitioners learn to farm?

3. What are the practitioner's experiences during farming?

Applications of the findings include support for urban agriculture practitioners through knowledge and skills acquisition, and informed policy. This is critical due to the rapid urbanization with resultant reduction in agricultural lands (Anderson, 1984; Drummond et al., 2019; Johnson & Schmidt, 2009) and associated food insecurity (Northern Colorado Regional Food System Assessment, n.d.).

Significance

The research questions in this project aimed to tease how these farmers acquired knowledge and new skills as they embarked on an urban agricultural endeavor. That component ties in with adult education practices (Beard, 2018). Another goal was to highlight opportunities for improvement in this farming practice. Understanding why the participants are farming is an important component of a possible needs analysis and identifying ways to address those needs (Surls et al., 2015). Moreover, farmer's experiences would illuminate their successes and challenges vis-à-vis expectations, thereby elucidating areas for enhancements. The results of this study will benefit practitioners, community, and adult educators by generating new knowledge about urban agriculture in Northern Colorado. Other benefits may include initiating conversations on policies to promote urban agriculture, a critical cog in the food production system. The study will also identify areas for further research.

Methods

I used a qualitative research approach (Creswell & Guetterman, 2019) based on a phenomenological design (Creswell, 2013) to explore urban agriculture in Northern Colorado through in-depth interviews of adult practitioners. The research focused on small-scale urban agricultural producers in Northern Colorado since there was limited information about them.

Three key areas addressed were motivation, education, and experiences. The first research question identified the drivers for practicing urban agriculture. The second research question focused on the educational opportunities utilized by the practitioners. While the third and final question probed into the farmers' expectations when they initiated the venture and whether they met their expectations.

Definition of Terms

Urban agriculture. Urban agriculture is a non-traditional agricultural practice, involving production, processing and marketing of food and related products in urban and peri-urban areas for local consumption (Pearson et al., 2010). In this study, the term urban farming is interchangeable and synonymous with urban agriculture.

Community supported agriculture. In this study, community supported agriculture (CSA) means an organization made of dues paying members whose goal is to produce food and provide other services that benefit members. CSA members pay fees or dues in return for shares of produce or services. Members may volunteer to perform activities in lieu of or for a reduction in dues. Harvested produce is distributed to members in proportion to the number of shares they own. Additional activities or benefits may be associated with functions of the CSA for example learning other skills directly related to or unrelated to farming.

Producers. Producers are individuals or organizations that are growing crops and/or raising animals for personal consumption, sale, or as a charitable endeavor.

Cooperative Extension System is an educational program operated through land grant institutions, such as Colorado State University, in partnership with federal, state, and local governments to enable farmers and communities nationwide to achieve multiple goals. Goals address adapting to changing technology, improving nutrition, food safety, emergency response,

and environmental protection (USDA NIFA, n.d.). Experts within the system interphase with farmers and the public to provide educational resources. Such individuals are *Cooperative Extension Agents* or *Extension Agents*.

Locavore is an individual who consciously chooses to primarily or exclusively eat locally produced food (Mulvaney, 2010).

Limitations

The study involved in-depth interviews of four urban agricultural practitioners identified through purposeful convenience sampling. Therefore, participants may not be completely representative of the breadth of urban agricultural practitioners in this region. Moreover, the current Covid-19 pandemic limited access to the participants and their farms. I conducted interviews during the busiest time of the agricultural season further constraining availability of the participants. Of the initial seven prospects, three declined to participate as the pandemic became more severe and one eventually moved out of state. The closure of farmer's markets removed a potential source for participant recruitment. Furthermore, my stance influenced how this study was conducted, and interpretation of the findings.

Summary

I introduced the concept of urban agriculture and reasons for practice. The status of urban agriculture in Northern Colorado provided necessary context and background information. Later I discussed the paucity of information on the subject and explained reasons for the exploration. Finally, I explored the motivations, educational resources, and experiences of small-scale urban agriculture practitioners in Northern Colorado because of limited information on this subject. Acquiring this information provides a framework for future research and highlights potential

food production, educational, economic, and other benefits of this practice in a rapidly urbanizing region.

CHAPTER 2: LITERATURE REVIEW

The United States Department of Agriculture (USDA), National Agricultural Statistical Service defines a farm as any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during a census year (USDA NASS, n.d.; Whitt et al., n.d.). The USDA's Economic Research Service classifies farms into nonfamily and family farms. Family farms, the focus of the current study, are subdivided into small (income less than $350,000), midsize (income $350,000-999,999), and large-scale (income $1,000,000 or more) (Whitt et al., n.d.). Small family farms provide an income stream, or fulfill a hobby and are typically under 10 acres (USDA NASS, n.d.), which is appropriately sized to be relatively easily incorporated into urban and peri-urban enclaves. Activities on these farms involve crop (plant) or animal production, or a combination of the two. Farms may produce single or multiple crops or animal types, or both crops and animals.

Adams (2004) discussed the concept of micro farming or micro eco-farming. She posited that people could farm in a plethora of places including urban lots, small town backyards and rural small acreage as an alternative to large-scale monoculture and huge animal production facilities. She asserted that people would be able to produce healthy food and potentially make a living doing so or at least subsidize their income. She based these conclusions on her own experience with micro farming, corroborated by interviews of individuals across the country, and visits to similar enterprises. She suggested such micro farms could incorporate cottage industries such as cheese making, weaving, and other crafts. Moreover, farms six to 15 acres could easily prosper. These micro farms fall into the USDA's definition of small farms due to their size and

income potential. It is worth exploring the concepts discussed by Adams further, especially in the urban milieu given the potential to produce healthy food and supplement incomes.

Urban Agriculture

Urban agriculture is production, processing and marketing of food and related products in urban and peri-urban areas for local consumption (Pearson et al., 2010). Typically this practice facilitates access to healthy food (Hara et al., 2018; Opitz et al., 2016; White, 2011) and supplements family income (Galt et al., 2014). It may serve as a business venture (Pölling, 2016; Poulsen, 2017; Poulsen et al., 2017; Sanyé-Mengual et al., 2015) or be part of a social movement (Galt et al., 2014; Poulsen, 2017). Moreover, urban agriculture has been shown to confer multiple benefits including nutrition (Armstrong, 2000; Blair, 2009; Wakefield et al., 2007), health (Armstrong, 2000; Wakefield et al., 2007), emotional connection to the land (Ivancic, 2014; Kingsley et al., 2019; Scheromm, 2015), and supporting the economy (Despommier, 2019; Pölling, 2016; Stuchtey & Vahle, 2019)

Urban agriculture continues to expand globally as the world urbanizes (WinklerPrins, 2017). In most cities in the United States of America urban agriculture is a survival strategy (Opitz, Berges, et al., 2016; Rogus & Dimitri, 2015; White, 2011; Zezza & Tasciotti, 2010), a social movement (Dimitri et al., 2016; Galt et al., 2014), or an alternative life style choice (Galt et al., 2014; Hardman & Larkham, 2014; Lang, 2005). Therefore, urban agriculture could potentially be part of the solution to the food insecurity highlighted in the 2010 study of food production systems in this region (Northern Colorado Regional Food System Assessment, n.d.).

Urban agriculture in the United States is in its infancy existing often as a niche domain (Kopiyawattage et al., 2019; Rogus & Dimitri, 2015; WinklerPrins, 2017). In Canada and Europe, it is more advanced often with active support from municipalities (Huang & Drescher,

2015; Lavallée-Picard, 2018; Mendes et al., 2008; Mulligan et al., 2018; Nasr et al., 2017; Patel & Macrae, 2016; Pourias et al., 2015; Tappert et al., 2018; Thibert, 2012; Toth & Timpe, 2017). In developing countries, urban agriculture is a survival and income generating endeavor as well as a recreational activity (Asafu-Adjaye, 2012; Bridge, 2011; Foeken, 2006; Prain et al., 2010). Moreover, urban agriculture may contribute to the greening of cities making them more resilient and sustainable (Safransky, 2014; WinklerPrins, 2017; Wolch et al., 2014). Thus, urban agriculture is a very diverse practice performed in backyards, on or in buildings, and public spaces, by individuals, communities, corporations, and institutions. It is a subsistence, for profit, cultural, social, leisure, political or educational pursuit. The activity may involve volunteers and hired staff.

There are approximately 800 million urban dwellers in the world, of which 200 million produce food for their own consumption, as well as earn a living growing crops and rearing livestock for sale in local markets. A further 150 million are laborers in urban agriculture. While the practice generates income and improves local food security, it faces stiff competition from land developers (Millstone, 2008). This observation suggests that huge opportunities exist to amalgamate urban agriculture into the mainstream economic activities and improve local food supply. Some localities have already integrated urban agriculture in their infrastructure planning to take advantage of these new opportunities (CoDyre et al., 2015; Huang & Drescher, 2015; Lavallée-Picard, 2018; Mendes et al., 2008; Mulligan et al., 2018; Nordahl, 2009; Thibert, 2012). Such local policies reflect a change in attitude and represent a way forward for urban agriculture. The City of Denver, Fort Collins and Wheat Ridge appear to promote and regulate urban agriculture (Anon, n.d.-c; FC Gov, n.d.; Wheat Ridge, n.d.), while the stance from other

Colorado cities like Boulder (Anon, n.d.-b; Duncan, n.d.), Longmont, Loveland, and Greely was harder to decipher.

History of Urban Agriculture

Urban agriculture has historically been tied to development of civilizations (Corrêa et al., 2020). Modern day urban agriculture in United States dates to around 1820. It weaves the American romanticization of rural living and land ownership into the homesteading ideas of the 1930s. This concept was spawned from economic collapse during the great depression and the resulting urban flight to gain subsistence living in the rural and peri-urban areas while still accruing the benefits of city living (Carriker, 2010). The current wave of urban agriculture could at least in part be attributed to the "Slow Food Movement" of the 1980's (Adams, 2004; Anon, n.d.-a). Even then the history of farming in the city may not always be straightforward or clear cut (Glasser, 2018) as urban agriculture appears to be a phasic phenomenon (Tornaghi, 2014) involving boom and bust cycles.

Along the Front Range including the City of Fort Collins, marked urbanization of the 1970's and 1980's, led to loss of farmland and retirement of many farmers. Concomitantly there was growing dissatisfaction with the food production methods used by large agribusiness. The community responded by developing community-supported agriculture (CSA) enterprises and community gardens as alternative food sources. The 1990's saw growth of the "Locavore" movement (Colorado State University Public Lands History Center, 2018). Locavores deliberately choose to source their food locally (Mulvaney, 2010). By 2007 the City of Fort Collins entered into a dialogue with some of the stakeholders which culminated into an open house in 2013 (Colorado State University Public Lands History Center, 2018). The City of Fort Collins continues to adjust its approach to urban agriculture (FC Gov, n.d.). In contrast,

Montreal, Canada has established a highly integrated urban agriculture enterprise (Bhatt & Farah, 2016).

Learning to Farm

Farmers obtain their skills through a wide array of means and at various ages, depending on specific circumstances. The approach can be formal or informal, indicating that there are opportunities to deploy effective adult education tools, especially those supporting experiential and self-directed learning. Before delving deeper into how people learn to farm, I will introduce key concepts of experiential learning and self-directed learning, major adult learning theories.

Experiential Learning

Experience has been considered a critical component of learning even by early philosophers (Merriam & Bierema, 2013). The philosophy and thinking around experiential learning crystalized in the 1930's. Dewey (2015), considered the father of experiential learning, posited that there is an "organic connection between education and personal experience" (p. 25). He also argued that not all experiences are equal, and some could be "mis-educative" (p. 25). Thus, "the quality of experience" (p27) matters in current and future learning. It is important to acknowledge this empiricism was based on childhood education and not adult education. According to Knowles (1980), adults accumulate a huge amount of experience which is the basis for learning. Moreover, those experiences can be drawn upon or act as a stimulus for learning (Merriam & Bierema, 2013).

Subsequently, Kolb (1984, 2015) proposed his Experiential Learning Cycle as a way to explain how learning occurs. The model had four components: concrete experience, reflective observation, abstract conceptualization, and active experimentation. In this approach, the learning process is linear. Learning occurred when an individual experienced a dilemma or new

situation, reflected on it, developed concepts to explain the phenomenon, and experimented to confirm the validity of the experience. While, this model of learning has been successfully applied in various fields, there remains concerns about it being overly simplistic and not accounting for cultural and other differences (Bergsteiner et al., 2010; Joy & Kolb, 2009; Kuk & Holst, 2018; Seaman, 2008). Despite these shortcomings, experiential learning approaches have been used to enhance student and farmer success (Malone et al., 2016; Pincus et al., 2017). Experiential learning as discussed above occurs in both formal and informal settings.

Self-Directed Learning

Knowles (1975) considered self-directed learning a process of taking the initiative to diagnose a learning need, formulating learning goals, identifying resources, selecting, and implementing strategies to achieve those goals, and evaluating the outcomes. Self-directed learning is considered a personal attribute and a process. Experience is an important part of the conceptualization of self-directed learning (Merriam & Bierema, 2013). Four types of self-directed learning have been identified including induced, synergistic, voluntary, and scanning involving varying degrees of learner self-direction (Clardy, 2000). Loeng (2020) recently reviewed self-directed learning and considered it a core concept in adult education. According to Loeng, the tendency towards self-directed learning is a critical difference between adults and children. At a minimum, self-directed learners must have control over the time, pace, and place of learning. In addition, the ability and willingness to reflect, critical judgement, and knowledge of alternatives are critical. Farmers often use self-directed learning to acquire new skills or knowledge. For example, small-acreage farmers in Utah rely on social contacts for information relevant to their operations (Brunson & Price, 2009). Likewise immigrant farm workers may use a self-directed learning approach to acquire essential skills they will need in the transition to

becoming farm operators (Minkoff-Zern, 2018). Self-directed learning approaches are likewise used to improve skills and success by farmers in Ethiopia (Leta et al., 2018) and Europe (Šūmane et al., 2018).

Technology

Cooperative Extension Agents are a critical component of agricultural production systems. These agents provide educational resources to farmers and the public (USDA NIFA, n.d.). Cooperative Extension workers are beginning to adopt technologies such as clickers to promote learning during their interactions with farmers (Smith et al., 2012). Likewise, farmers are utilizing new technologies as a means of learning. For example, in Sri Lanka mobile applications are now being used to enhance farmer learning (Dissanayeke et al., 2016). Lozzio and co-researchers (2019) reported that visitors at the Nebraska State Fair preferred hands on or touch screen displays over traditional displays. While respondents were mostly young Caucasian males with farming backgrounds, the authors recognized the need for additional informal learning approaches to reach a diverse audience. Brunson and Price (2009) working with small-acreage owners in four Utah locations observed that farmers showed a strong preference for web-based information. Kopiyawattage et al (2018) too found that urban producers in Columbus, OH preferred web-based sources for obtaining information on increasing food production. Thus, modern technologies appear to be an important tool for augmenting learning by farmers. There are no studies discussing use of these technologies by urban farmers in Northern Colorado.

Formal Learning

Formal learning programs in agriculture can begin as early as elementary school, through college, and post-college. A variety of agricultural learning opportunities exist in elementary through high schools including classroom activities, school gardens and alternative pathways

(Baseke et al., 2010; Cramer, 2017; Dyg & Wistoft, 2018; Fifolt et al., 2018; Fisher-Maltese et al., 2018; Jones et al., 2020; Mukembo et al., 2015; Ramdwar & Ganpat, 2010; Schneider, 2016; Silva & Muller, 2013). Instruction in these settings involves hands-on activities and direct acquisition of skills such as preparing gardens, planting, harvesting, selling, donating, and/or consuming the produce. College learning is often associated with agricultural schools or specific college experiences (Feldpausch et al., 2019; Gonzalez-Redondo et al., 2010; Hendrix & Morrison, 2018; Mahoney & Retallick, 2015; Omotosho et al., 2020; Ramdwar & Ganpat, 2010; Sanderson, 2010; Schläppi, 2017; VanWieren, 2018; Vetter & Wingenbach, 2019). Collegiate learning includes in depth theoretical knowledge and more advanced hands-on activities geared towards career application.

Informal Learning

Informal learning especially those beginning at an early age are usually associated with individuals from farming backgrounds, for example immigrant Latino farmworkers are now increasingly becoming farm operators as white farmers retire (Minkoff-Zern, 2018). Likewise, farm children often continue the family's farming tradition (Kuehne, 2013). Non-formal training for adults is often provided by Extension Agents or equivalent programs (DePhelps et al., 2019; Edwards et al., 2013; Goodwin & Gouldthorpe, 2013; Schreiner et al., 2018). Such training is directly applicable to specific activities and tailored to the audience.

Adults often acquire specific skills informally through self-directed learning, such as conversations with farmers or other knowledgeable individuals (Laforge & McLachlan, 2018; Leta et al., 2018; Pitikoe & Morojele, 2017). Baker et al. (2005) consider conversation a form of experiential learning. In other words, farmers frequently share tips with and acquire new skills from peers through conversations. Informal learning may also occur during interactions at

farmers markets, with friends and other adults, or experiential learning from joining organizations such as CSAs or farm communities, and experimentation (Saldivar-Tanaka & Krasny, 2004; Taylor et al., 2012; Vaarst, Byarugaba, et al., 2007; Zamudio et al., 2016). Marinus and colleagues (2021) recently described a co-learning model in Western Kenya that resulted in a better understanding of farm systems and more diversified crop production with improvement in yields.

Everson (2015) recognized the importance of informal learning in the success of CSAs. While members originally joined the organization to access fresh food, the prolonged interactions evolved into a bonding experience with members gaining new skills. She concluded that informal learning was an intricate part of participation in CSAs. Increasingly new Canadian farmers are preferentially using informal learning approaches to get the necessary skills to succeed (Laforge & McLachlan, 2018). In Ethiopia, most farmers use community level social learning to obtain and disperse knowledge (Leta et al., 2018). Basotho herders rely on indigenous knowledge of the environment acquired as early as six years of age to survive under adverse circumstances (Pitikoe & Morojele, 2017). Utilization of such local knowledge by farmers is critical to sustainability and resiliency in agriculture (Šūmane et al., 2018). Thus, it appears that informal adult education can play a vital role in supporting urban agriculture.

Based on the preceding review, farmers learn skills through diverse means and at various ages via formal and informal approaches. This background indicates that an abundance of opportunities exist to deploy effective adult education tools, especially those focusing on experiential and self-directed learning plus other modalities as identified by several researchers (Everson, 2015; Laforge & McLachlan, 2018; Loizzo et al., 2019; Schreiner et al., 2018; Taylor

et al., 2012). The dearth of information on how urban farmers in Northern Colorado acquire farming skills yields urban agriculture as a relevant subject to explore.

Motivation for Urban Farming

Pourias, Aubry and Duchemin (2015) identified food production or food function as the most significant factor for engagement in gardening while surveying gardeners in and around Paris, France and Montreal, Canada. Similarly, obtaining fresh food appears to be a strong motivator for individuals involved with CSAs in the United States. Participation in urban agriculture through CSAs also provides a sense of community (Everson, 2015). Adams (2004) remarked that individuals engage in micro farming for a plethora of reasons. The farmers' reasons ranged from needing to serve the local population, generating income, supporting local economies, a change in human values, to parents wanting kids to connect with nature and their food source. According to Bridge (2011) individuals practice backyard farming for several reasons including generating income and for non-monetary reasons such as providing high quality family food, as a lifestyle choice, and for recreation or pleasure.

Boston area urban farmers practiced agriculture because of intrinsic and extrinsic reasons (Ramirez-Andreotta et al., 2019). Intrinsic drivers were mental well-being and intergenerational learning while extrinsic factors were economic, community enhancement and building interrelationships. In Australia, Kingsley, Foenander and Bailey (2019) found motivations for participation in community gardens diverse, spanning a range of ancestral, social, environmental, and political domains. In Montpelier, France a major reason for gardening was reconnecting with agriculture and the attendant association with pleasure and happiness (Scheromm, 2015). Kopiyawattage and co-investigators (2019) reported that perceived complexity of urban farming, peer influence, family members, and personal characteristics play a big part in the decision to

continue urban food production. From the above reports, it seems the reasons for practicing urban agriculture are varied and partly related to where individuals are located. This makes it even more crucial to explore urban farming in Northern Colorado.

While individuals may practice urban agriculture as a survival strategy to supplement income or provide food for their families, farming is fraught with obstacles. The obstacles to farming and factors that lead to success follows below.

Obstacles in Farming

Agriculture is subject to several obstacles many of which are beyond the practitioner's control. Problems that prevent farmers from achieving their goals include weather, environmental conditions, and a lack of knowledge, resources, and/or power (Ban van den & Hawkins, 1996). Urban agriculture faces additional constraints not experienced by traditional farmers. These unique obstacles include restrictive urban planning and zoning policies (Castillo et al., 2013; Haines, 2018; Meenar et al., 2017; Nordahl, 2014; Vaage, 2015), lack of economic viability (Goodwin & Gouldthorpe, 2013; McNamara, 2010; Weidner et al., 2019) and lack of awareness of resources available to them (Brunson & Price, 2009; Goodwin & Gouldthorpe, 2013). Moreover, many of these farmers do not own their land (Wekerle & Classens, 2015) and the increasing urban sprawl further limits available agricultural land (Bren d'Amour et al., 2017; Johnson & Schmidt, 2009; Mok et al., 2014). The problems are exacerbated by health risks in urban farming such as Salmonella (Beam, 2013; Dao et al., 2018; Hoelzer et al., 2011; Tobin et al., 2015) and Lead (Bautista et al., 2014; Kim et al., 2014; Sobhakumari et al., 2019).

Success in Farming

Some obstacles to farming discussed above are beyond the farmer's control. However, obstacle due to lack of knowledge or restrictive zoning and planning policies can be mitigated to

facilitate farming success. For example, Basotho cattle herders have learned to use knowledge gained from childhood and interaction with peers to survive adverse environmental conditions (Pitikoe & Morojele, 2017). Educational programs such as Farmer Field Schools have been deployed in some countries to improve agricultural productivity. Vaarst el al. (2007) described a biweekly year-long training of Ugandan farmers which led to more effective milking of dairy cows and reduction in the incidence of mastitis. In Denmark, Stable Schools (akin to Farmer Field Schools) have facilitated transition of dairy farmers into organic farming and improvement of their practices (Vaarst, Nissen, et al., 2007). Comparable methods have been used in viticulture (Krzywoszynska, 2016), pasture management (Karki, 2018), sheep farming (Clifton et al., 2020), and with new farmers (Carey et al., 2006). Thus, education can considerably support farming success. Moreover, some localities have removed zoning and policy impediments in order to promote urban farming (CoDyre et al., 2015; Lavallée-Picard, 2018; Mendes et al., 2008; Mulligan et al., 2018; Nordahl, 2014; Thibert, 2012).

What about Northern Colorado?

A recent study of an enterprise, Group Communications, which practices urban agriculture by leasing 11 acres north of the City of Boulder, found a strong positive impact on its members and the local community. For example, there was transformation in the members' lives, their palates, the land and the community where it is located (Ivancic, 2014). Another study involving a CSA in Fort Collins, found that the organization's members ate more vegetables and fruits as a result of participating in the project (Hedden, 2011). Hedden (2011) and Ivancic's (2014) studies highlight the transformative effects of urban agriculture in this region further strengthening the case for additional exploration of this phenomenon. Likewise, Everson (2015) found that new members joining CSA organizations did not anticipate a learning experience. As

they participated in farming through the seasons, informal learning became a component of the practice and contributed to the success of the organization, their members, and their clients. It appears that incorporating informal adult education, as utilized by farmers in other parts of the world (Laforge & McLachlan, 2018; Leta et al., 2018; Pitikoe & Morojele, 2017; Šūmane et al., 2018), could be beneficial to urban agriculture practitioners.

While there is interest in the local food market in Northern Colorado, the enterprise appears to lack economic viability (McNamara, 2010) despite a growing food insecurity (Northern Colorado Regional Food System Assessment, n.d.). Increasing population (Census, n.d.; Demographics, n.d.) and urbanization such as in Northern Colorado (Anderson, 1984; Johnson & Schmidt, 2009) can markedly shift local agricultural land values (Borchers et al., 2014; Delbecq et al., 2014) to favor non-agricultural entreprises. Such changes could further threaten the stability and viability of a fragile local urban agriculture. An extensive survey of local food production systems and their relationships to public health, economic development, and quality of life here focused on producers with annual sales of $100,000 or more (Northern Colorado Regional Food System Assessment, n.d.), ignored backyard agricultural activities, and did not address urban agriculture or the contributions of very small producers. Therefore, this gap in knowledge needed further exploration.

The paucity of information discussed above required further examination since urban agriculture is an important component of food production systems (Eigenbrod & Gruda, 2015) and has a positive impact on food access, health, and education in a community (Cramer, 2017; Hedden, 2011; Ivancic, 2014; WinklerPrins, 2017). Moreover, information from such a study could be useful in identifying the needs of urban agricultural practitioners (Surls et al., 2015) and

finding possible solutions to roadblocks in their path to success (Opitz, Specht, et al., 2016) in light of the rapid urbanization Northern Colorado is experiencing (Drummond et al., 2019).

Municipal governments as the largest landowners should play a key role in promoting urban agriculture through policies, programs, and funding strategies such as those adopted in Seattle, WA, Portland, OR, and Providence, RI (Nordahl, 2009), and in Vancouver, British Columbia (Valley & Wittman, 2019) and Victoria, British Columbia, Canada (Lavallée-Picard, 2018). Thus, research in this area was critical and worth undertaking given the dynamics, interactions, transformative effects, societal benefits, and potential health risks of backyard agricultural practices (Blake & Cloutier-Fisher, 2009; Head & Muir, 2006; Kim et al., 2014; Sobhakumari et al., 2019; Tobin et al., 2015; WinklerPrins, 2017). These preceding observations made it crucial to explore urban agriculture in Northern Colorado given the paucity of information on the subject. The current study focused on small-scale operators. The information generated may help inform public policy including education, food security, and possibly other areas. Furthermore, the study could identify opportunities to engage in adult education activities to enhance success of potential farmers.

Summary

In this chapter, I reviewed the literature on urban farming around the world including its history, how people learn to farm, motivating factors for farming, barriers faced by farmers and potential ways to overcome those barriers. The impetus for urban farming were both extrinsic and intrinsic. Drivers included food production, income generation, pleasure, building relationships, culture, lifestyle, and benefiting the society. Individuals learned to farm using both formal and informal avenues acquiring knowledge through experience and self-directed learning at various life stages. Major hindrances to success included weather, environmental conditions,

lack of knowledge, lack of resources including land, and policy restrictions. There was limited information on these processes in Northern Colorado.

CHAPTER 3: RESEARCH DESIGN

Pearson et al. (2010) defined urban agriculture as production, processing, and marketing of food and related products in urban and peri-urban areas for local consumption. This practice facilitates access to healthy food (Hara et al., 2018; Opitz, Berges, et al., 2016; White, 2011) and supplements family income (Galt et al., 2014). It may serve as a business venture (Pölling, 2016; Poulsen, 2017; Poulsen et al., 2017) or be part of a social movement (Galt et al., 2014; Poulsen, 2017). Thus, urban agriculture could potentially be part of the solution to the food insecurity reported in this region (Northern Colorado Regional Food System Assessment, n.d.). There is limited information on urban agriculture in Northern Colorado. The purpose of this study was to explore local urban agriculture practices particularly by small producers, their motivations, education, and experiences to fill knowledge gaps associated with this activity in Northern Colorado. The findings may provide support for urban agriculture practitioners through informed policy as well as knowledge and skill acquisition. This is critical due to the rapid urbanization with resultant reduction in agricultural lands (Anderson, 1984; Drummond et al., 2019; Johnson & Schmidt, 2009) and associated food insecurity in the region (Northern Colorado Regional Food System Assessment, n.d.).

Methodology

Creswell and Guetterman (2019) consider research as a systematic process that creates knowledge, improves practice, or informs policy whether it is quantitative or qualitative research. They argue that qualitative research allows us to explore a problem and develop a deep understanding of a central phenomenon. I wanted to get an in-depth understanding of the experiences of small-scale urban agriculture practitioners in Northern Colorado. This type of

study is considered a phenomenological research design (Creswell, 2013). Therefore, for this study, a qualitative approach was appropriate for exploring urban agriculture to develop a deeper understanding of this activity in Northern Colorado. I interviewed individuals engaged in urban farming to gain the relevant information, rephrasing questions as appropriate to improve clarity and elicit responses. Participants provided photographs that included descriptions of aspects of their operations.

Researcher Lens

In conducting qualitative research, the background a researcher brings into the study influences what the researcher seeks to understand. That disciplinary background and experience is their orientation or stance (Merriam, 1998). It behooves researchers to be cognizant of the influence of their background on their assumptions and interpretations of findings (Berger, 2015; Creswell, 2013; Creswell & Guetterman, 2019). It is with these ideas in mind that I will discuss my background to enable readers understand how I approached or interpreted the study findings.

Researcher Background

I grew up about four miles outside of what was then a small town of about 20,000 people in Northern Uganda. My father was an agricultural officer, and my mother gave up her teaching profession to manage the day-to-day family activities. Usually, at any time there were about 20 people at our home including siblings, relatives, and guests. Our family had about 10 acres of land on which we raised most of our food including crops, goats, chicken, rabbits, turkeys, and pet dogs and cats. We kept about 30 head of cattle that grazed in communal lands. I was involved in all aspects of the crop and animal production from clearing land, planting, weeding, harvesting, and processing of crops to caring for the animals such as grazing, milking, vaccinations and assisting with veterinary care. I am a veterinarian by training and profession. I

have worked in academia all my adult life, teaching at primary (elementary), high school, and college levels including veterinary students, graduate veterinarians, and research staff. I have conducted and published scientific research using quantitative approaches for several years.

My formative years, over thirty years' experience in academia, quantitative research background, and veterinary training reflect my overall interest in agricultural practices to improve human and animal health and quality of life. This study is consistent with my interest in process improvement and social justice. This background and the relatively new experience with social science research framed my approach to this qualitative study of urban agriculture.

Research Questions

This qualitative study explored urban agriculture in Northern Colorado by interviewing urban agriculture practitioners. I focused on small-scale urban agricultural practitioners since there was limited information about them. The research addressed three key areas: motivation, education, and experiences. The first research question identified the drivers for practicing urban agriculture. The second research question addressed the educational opportunities the practitioners utilized. The third and final question probed the farmers' expectations prior to farming plus whether they met those goals. The research questions are below:

1. What is the motivation for practicing urban agriculture?
2. How do urban agriculture practitioners learn to farm?
3. What are the practitioner's experiences during farming?

Procedures

Study data was collected using semi-structured interviews after obtaining consent from participants (Creswell, 2013). This approach allowed participants to add more information that may have not been in the original interview guide by incorporating probes (Creswell &

Guetterman, 2019). Interviews were simultaneously audio recorded on two devices, with one as a backup. I transferred the audio recordings to a secure computer before transcribing for data analysis. Whenever possible I conducted facility tours and/or requested participants to provide photographs that depicted the essence of their operations.

Setting

The study setting was Northern Colorado, encompassing Boulder, Larimer, and Weld counties. This arid region is one of the most agriculturally productive areas in the country. The region is undergoing rapid urbanization and population growth with concomitant loss of farmland.

Institutional Review Board

The Institutional Review Board (IRB) is the entity at an institution tasked with protecting human subjects participating in research from abuse. IRBs are guided by the principles of respect for persons, beneficence, and justice (Creswell & Guetterman, 2019). This approach assures privacy of the participants, minimization of harm, and justice. IRB approval is required before a research project involving human subjects can proceed. I obtained the necessary approvals prior to commencing the study (Appendix D).

Participants

I used purposeful sampling to identify and select participants (Creswell & Guetterman, 2019). Purposeful or convenience sampling of individuals that are willing to participate enhances exploration of individuals that will provide rich information (Creswell, 2013) in this case on urban agriculture, the phenomenon under study. A snowball approach facilitated getting more participants. This approach promoted acquisition of rich data from willing individuals. I

conducted interviews after gaining IRB approval and obtaining participants consent. A copy of the consent form is included as Appendix A and B.

Selection of participants occurred at the beginning of and during the study. Participants were adults from Northern Colorado engaged in urban farming. They were small operators producing crops, animals or both. Animal production includes bee keeping (apiaries) and raising of aquatic species such as fish (aquaculture). The ongoing health crisis and associated limitations on assembly complicated participant recruitment. Participants chose the location and time of the interview. I interviewed four participants for this study.

Recruitment

Participants were recruited after securing IRB approval (Appendix D). I verbally solicited individuals that met the above criteria following identification through word of mouth and by referrals. Individuals were interviewed after discussing and signing a consent form (Appendix A and B). Participants had the ability to withdraw their consent at any point during the study without fear of retribution. For confidentiality, I assigned a pseudonym to all participants. Physical addresses and other identifying information were not included in the study notes and results. Signed consent forms were stored securely in my office on campus.

Data Collection

Appendix C shows the interview protocol for this study. I used one-on-one in-depth interviews lasting 45-90 minutes to collect data for this qualitative study. After the interviews, participants provided additional clarifications as needed. Interviews are an accepted and appropriate way to obtain rich data in qualitative research such as this phenomenological study (Creswell, 2013; Creswell & Guetterman, 2019; Magnusson, 2015). I explained the purpose of

the study and used conversations to build rapport with the participants. Interviews were the primary data source. Probes were used when necessary to elicit more data. Responses were audio-recorded using two devices with one serving as a backup. Participants were asked to share other types of relevant information for example photographs with descriptions and videos related to their operations (Appendix B). All participants shared photographs depicting aspects of their operations, but not videos.

Data Analysis

I transcribed audio recordings of the interviews using NVivo (QSR International, https://www.qsrinternational.com/nvivo/nvivo-products/nvivo-12-plus) and saved them as Microsoft word files (Office 365, https://www.office.com/). Accuracy of interview transcripts was verified by reading the transcripts while listening to the audio recordings multiple times. I followed up with participants to obtain additional clarifications after reading the transcripts. For member checking, all participants got a copy of their interview transcript. Participants confirmed that transcripts clearly represented what they wanted to share during the interview. One participant asked for minor edits in the wording (text) of the transcript which did not alter the concept and ideas conveyed. I read the transcribed data multiple times to ensure full comprehension. The interview transcripts were manually color-coded, and, then chunked into data categories. Categories were refined into preliminary themes. Data analysis and interpretation was inductive involving iterative phases of reading the transcripts and writing. This is an appropriate approach to analyze interview data (Creswell, 2013; Creswell & Guetterman, 2019; Magnusson, 2015). Participants described the photographs and the significance of the photographs. Photographs supplied by the participants corroborated the interview findings. I asked for clarifications of the photographs when needed but did not analyze them further.

Qualitative Research Credibility

I employed triangulation, member checking and external audit to increase validity of the data as suggested by Creswell and Guetterman (2019). When available or accessible, I looked at ancillary information such as photographs and videos of farming activities from other sources. I used additional sources such as the Colorado State University Extension Service, County Agricultural Extension Service, USDA, and local governments to provide independent information to confirm or corroborate study data whenever possible. Participants crosschecked the transcriptions to ensure that it represented what they meant to communicate and to improve trustworthiness. I asked an educator from another university to verify the data analysis. This involved reviewing transcripts and reaffirming or modifying preliminary themes to reach the findings of the study. I documented the schedule for research interviews, transcription, and analysis process.

Summary

This chapter discussed the methodology, researcher stance, research questions, participant selection, data collection, data analysis, and research credibility. After obtaining IRB approval, I used purposeful or convenience sampling to identify participants to explore the phenomenon of urban agriculture in Northern Colorado. The adult participants underwent in-depth interviews using semi-structured questions. I recorded and transcribed audio recordings of the interviews before inductively analyzing transcripts into themes. Photographs from the participants provided additional support for the interview findings. Credibility and validity were confirmed using triangulation, member checking and external auditing.

CHAPTER 4: FINDINGS

In this chapter, I present the findings of an inquiry into urban agriculture practices of small producers in Northern Colorado previously discussed in Chapter 1. I conducted semi-structured audiotaped in-depth interviews with four participants from Larimer County, Colorado. This approach may have provided a more robust sample than the planned recruitment from a tri-county area of Boulder, Larimer, and Weld counties. Additionally, I reviewed photographic representations of the farming activities provided by the participants. Audio recordings were transcribed, and analyzed to develop themes to answer three research questions:

1. What is the motivation for practicing urban agriculture?
2. How do urban agriculture practitioners learn to farm?
3. What are the practitioner's experiences during farming?

Participants

Participants for this study were identified and selected using purposeful sampling (Creswell & Guetterman, 2019). Purposeful or convenience sampling of individuals that are willing to participate facilitates gathering relevant information from individuals that can provide rich data (Creswell, 2013). Participant recruitment was through word of mouth or referrals after obtaining IRB approval. I interviewed only eligible adults who consented to participate in the study. All participants lived in Larimer County. Below are participant details and the urban agriculture they practice. I incorporated pictures provided by the participants that captured elements of their journey.

LE

LE is a male veteran and retiree of a manufacturing company in Fort Collins. He was born and raised in Larimer County and spent most of his life in Fort Collins. LE has an apiary, a family tradition (Figure 1).

Figure 1
Grandpa AE's bee yard in Northern Colorado.

Note. "Grandpa AE started keeping bees in 1886, after his father JE died. AE was the eldest child and started at the age of 13 with 13 hives. The honey was sold locally to neighbors and grocery markets in Northern Colorado and Denver. It was sold in bulk to Superior Olive and Honey Company, Rice's Lucky Clover Honey and to SueBee Honey. At the height of the business, the family had over 1,000 colonies of bees. Depending on the weather, honey production averaged between 15 and 30 tons per year, and one of the largest yielding crops was 60 tons. At one time, they had 50 tons of honey in the dining room of a local hotel. Six generations of the family have kept bees for over 125 years". Photograph reproduced with permission from LE. *I have edited family names to protect their identity.*

LE's keeps hiss bees in nearby in peri-urban organic farming areas (Figure 2, 3, 4, 5, 6, and 7).

Figure 2
A queen cage (top) and setting up of new beehives in a bee yard (bottom).

Note. The family is setting up a new hive. Notice they are wearing bee suits to protect them. LE recounted a time when he was relocating his bees to a new bee yard. As he set the last hive from his trailer, "It had come down hard and that hive broke apart and went to the ground" and "man those bees were so ticked off" that they flew and covered him and started to crawl into his bee suit through whatever opening they could find. He was able to get into his car and drive home where he found "I had fifty-six stings on me, all over my arms, ears, my eyes which were starting to swell shut". He and his wife then consulted a doctor on what to do. Fortunately, he recovered after a few days of swelling, pain, and soreness. The bee suit saved his life, and his family makes sure it is on before working with the bees. Photograph reproduced with permission from LE.

Figure 3
One of LE's bee yards with various sized hives.

Note. "Bee yard outside Fort Collins in September 2010". The size of the hives reflect the variation in productivity and quality of each hive even though they are in the same setting. Photograph reproduced with permission from LE.

Figure 4
Family getting ready to harvest honey.

Note. "The hive devotes itself to filling every available cell with honey. When the bees fill up two brood tiers with 50 lbs. of honey, beekeepers put on a queen excluder and add a third tier ('super'). Because the queen cannot fit through the barrier, she cannot lay eggs there. The bees fill the tier with honey. As one tier is being filled, another is added." You can see the family getting ready to harvest honey from a hive with six supers. Notice the two brood tiers at the bottom. That was a very good year for honey production. A family member is holding a smoker,

a device used to deliver smoke into the hive. The smoke calms the bees and concentrates them in the hive. Everyone is wearing a protective suit. Photograph reproduced with permission from LE.

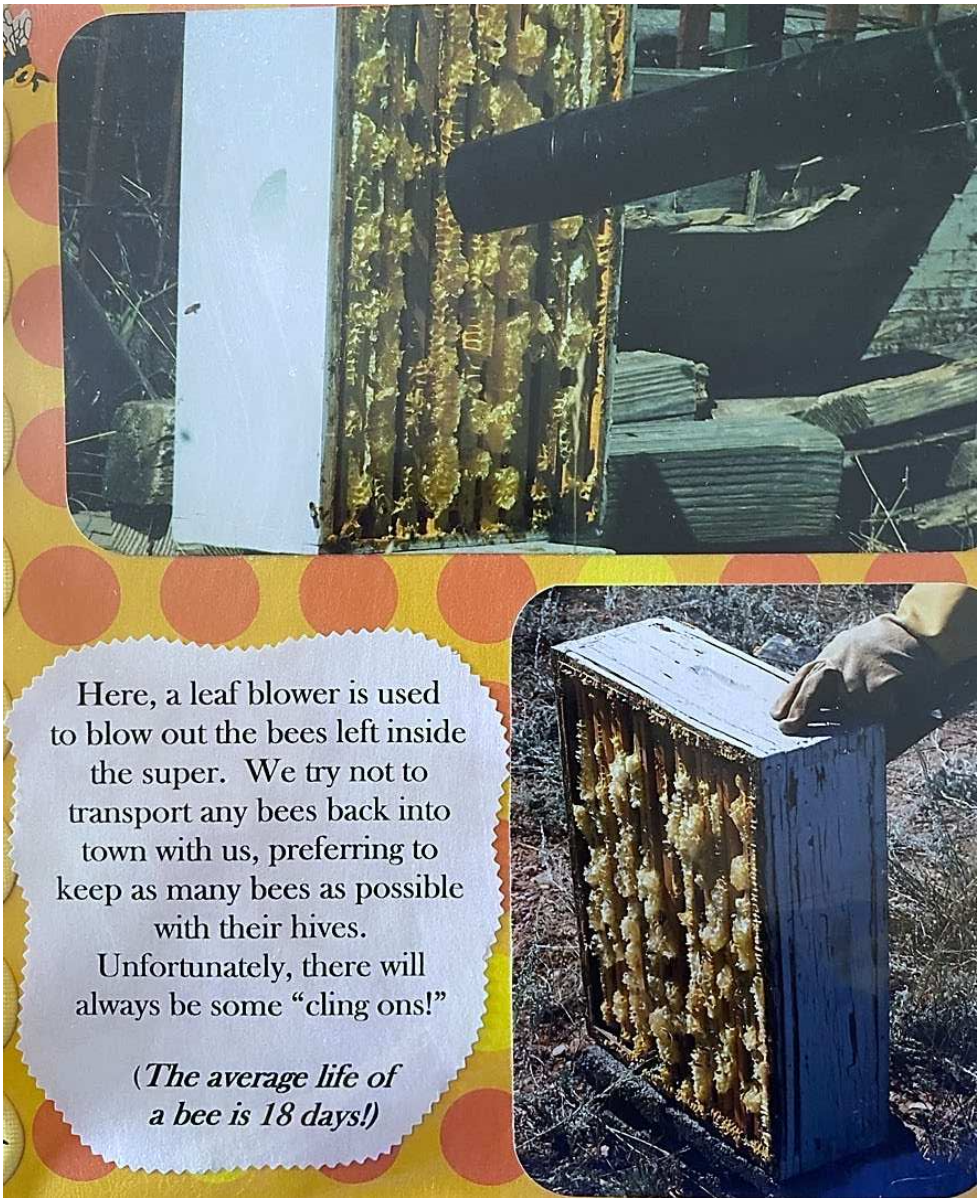

Figure 5
Preparing 'supers' for transport to the extraction facility.

Note. Photograph reproduced with permission from LE.

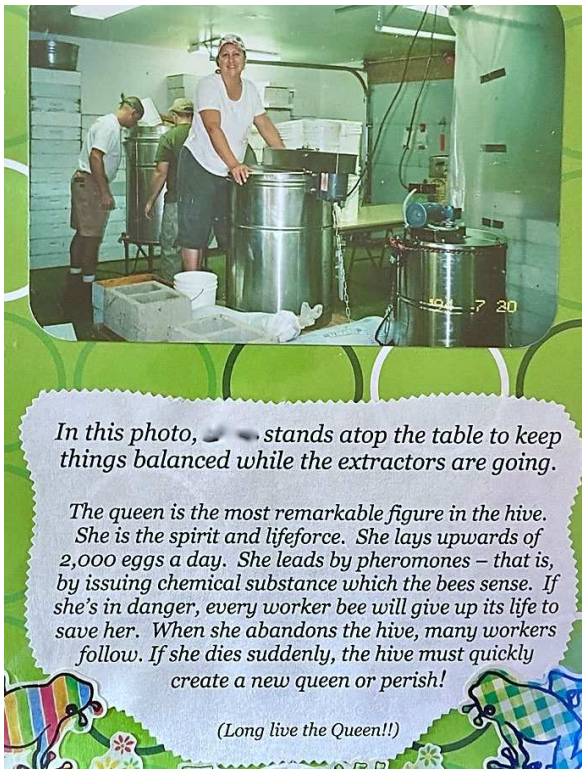

Figure 6
The bee garage where LE extracts honey.

Note. "Filled honey supers each holding up to 30 lbs. of honey are brought to the extraction facility ('bee garage') in Fort Collins. Last minute preparations are made to ensure quality control. One of the first things we must do is trim the wax 'cappings' and excess comb honey from the frame using a hot knife to open up the cells and allow the honey to flow out freely during the extraction process. The cappings and the wax are dropped into a heated wax melter bucket, which separates the honey from the wax. The wax will be melted down later and used to make our candles and lip balm! Nothing goes to waste! The heated bottling tank is turned on to warm the honey before we can start the bottling process. Production varies each year for example in 2013 we harvested 2000 lbs. and the next year we had half of that even though it was a good year for sweet clover production. We have faced many obstacles including mites, drought, and Colony Collapse Disorder … and a few obnoxious horses that broke into the bee yard and ate all

our honeycomb!" Photograph reproduced with permission from LE. *I removed potentially identifiable material from the photograph.*

Figure 7
Bee yard destroyed by a bear.

Note. "About a week after we harvested our 2014 honey crop … which was the best crop EVER with 1500 lbs. of honey … a bear broke into one of our bee yards and had himself quite the party!! LE and EE went out to survey the damage and tried to salvage what they could. Unfortunately, five hives were completely destroyed. To make matters worse the dang bear decided to come back the next day to make sure he didn't miss anything!!" The bear became a threat to landowners and their property, and the Department of Wildlife had to intervene. Photograph reproduced with permission from LE. *I have edited the family names to protect their identity.*

LE interacts closely with farmers to find places for the hives on their fields. He processes the honey inside the garage of the house where he grew up in old town Fort Collins (Figure 6). He has kept bees since 1974 and currently has 15 hives. He usually has on average 20-25 hives, although at one time he had 1,000 hives. Family members are highly involved in the practice, and he considers it family activity/time (Figure 2, 4, and 6). The primary produce is honey and

wax. He has made soap and candles in the past. He sells, uses, donates, and shares the produce. Farmers benefit from the pollination services his bees provide. Since retiring from his primary job, beekeeping has become a secondary income stream. LE retired from full participation in the apiary endeavor after the 2020 season. However, he continues to assist at a reduced level, with his son doing most of the work.

TJ

TJ grew up in central New York and attended Cornell University where he obtained a degree in Animal Science. He moved to Fort Collins and worked in the insurance industry until he retired about 10 years ago. He has an apiary, keeping bees within Fort Collins city limits including at a CSA and some in his backyard (Figure 8, 9, 10, 11, and 12).

Figure 8
One of TJ's bee yards.

Note. This is a picture of one of TJ's hive locations in a serene and peaceful area. The different heights of the hives reflect the level of productivity of each hive. Photograph reproduced with permission from TJ. *I have removed potentially identifiable material from the photograph.*

Figure 9
A beehive in spring ready to swarm.

Note. TJ's photographs (Figure 9, 10, and 11) "show a couple of seasonal events I encounter with the bees that survive the winter. First, the bees of spring begin to build their numbers in late February and by May are making swarming preparations and I as a beekeeper do not want them to swarm away. Swarming is the bees' way of increasing the number of beehives in the world i.e., non-sexual reproduction. This photo shows what I look for in numbers of bees. This is a hive I then 'split' to prevent a natural swarm and the bees 'think' they have swarmed and proceed to add more bees but start storing honey for the winter. I add a new queen bee to the 'split' and then have a new colony to add to my number apiary". Photograph reproduced with permission from TJ.

Figure 10
A swarm of bees.

Note. According to TJ “this is what happens, if, my timing is off and ‘miss’ the bees timing and the swarm has left the home hive, regathered in a tree and I will try to ‘catch’ this swarm. If, successful I put these bees in a new box they will call home, hopefully”. Photograph reproduced with permission from TJ.

Figure 11
A starter colony of bees.

Note. “This is a picture of the split bees, from a hive (like that in Figure 9), starting out in a small box they will shortly outgrow”. Photograph reproduced with permission from TJ.

Figure 12
A photograph showing several honey combs full of honey.

Note. “This is a picture of pure honey still in the comb” before TJ has extracted it. Photograph reproduced with permission from TJ.

TJ processes the honey at home in a basement kitchen designed for that purpose. He has been practicing urban agriculture for about 11 years as a hobby after transitioning from a full-time career to retirement. TJ has had 20 hives in the last five to six years and up to 40 hives at times. The primary produce is honey, wax, and starter colonies of bees. He sells, uses, and shares produce with family, friends, and neighbors. Farmers benefit from the pollination services. He provides bees to individuals who want to start colonies.

Idgy

Idgy was born and raised in a farming community in Minnesota. She has a minor in Animal Science and is a research associate for a professor, helping conduct research and care for research animals. She owns a 40-acre ranch north of Fort Collins in Larimer County and raises grass-fed (grass-finished) beef cattle in an idyllic peri-urban setting (Figure 13).

Figure 13
Cows grazing in a pasture.

Note. According to Idgy, the picture shows “a healthy pasture with native grasses and makes me happy because it is a lot of hard work to maintain healthy land, but it is worth it”. Photograph reproduced with permission from Idgy.

She maintains four to six steers which she describes as “happy and healthy” (Figure 14 and 15) for one to two years before selling the beef. Idgy produces beef and related byproducts that she sells to a regular customer base and retains some for personal use.

Figure 14
Cows playing in the snow.

Note. Idgy said, “I like this picture because it shows they are playful, energetic, and happy”.

Photograph reproduced with permission from Idgy.

Figure 15
Cows standing in the shade.

Note. According to Idgy, “This is one of my favorites it shows their beauty and good health”.

Photograph reproduced with permission from Idgy.

Sprinter

Sprinter is a High School Science teacher and an Olympic athlete. She grew up in a tropical island nation surrounded by and engaging in a range of agricultural practices. She keeps chickens (Figure 16) and grows vegetables and herbs (Figure 17 and 18) in Fort Collins.

Figure 16
A chicken coop with a hen standing outside.

Note. A sturdy and secure chicken coop is required to provide a safe and private environment for the chicken. The fence stops the chicken from straying too far and discourages predators. Sprinter has cleared snow to give the chickens opportunity to enjoy the outdoors. Photograph reproduced with permission from Sprinter.

Indoors Sprinter practices hydroponic gardening and uses her recently acquired AeroGarden (Aerogarden, n.d.) (Figure 17) to supplement traditionally potted plants. Sprinter collects rainwater to water her garden. In addition, she generates compost for use on site. The produce is primarily for personal consumption. She shares the excess with neighbors and friends.

Figure 17
Vegetables and herbs maintained in an indoor setting.

Note. Sprinter acquired the AeroGarden in October 2020. She loves it because “it has an in-built timer which turns the lights on and off. It reminds her when to add water. She does not have to worry about anything”. The AeroGarden complements her indoor garden. After experimenting with various crops, she now uses the AeroGarden primarily to grow microgreens or start her seeds. The convenience of the AeroGarden supports her travel schedule. Photograph reproduced with permission from Sprinter.

Figure 18
A raised bed containing vegetables in a backyard.

Note. Sprinter installed a soaker hose in the garden bed prior to planting her outdoor garden, however, she opted to use rainwater to water the garden instead. The plastic fencing secures the garden from pests. The hoops (the white semicircular rods) are for hanging different types of shade materials to protect the plants from sun, hail, or snow and to extend the growing season. Photograph reproduced with permission from Sprinter.

Themes

The following stories and thematic areas arose while interviewing these practitioners. Photographs corroborated the responses provided by the participants during the interviews. I saw features comparable to those presented in participant photographs during a serendipitous tour of different neighborhoods in Larimer and Boulder Counties. All the four participants were highly engaged with and enthusiastic about their practice. As the interviews progressed, I could feel the

energy and see the love for the work they were carrying out and why they were doing it. Figure 19 below highlights the key elements that the participants conveyed during their interview.

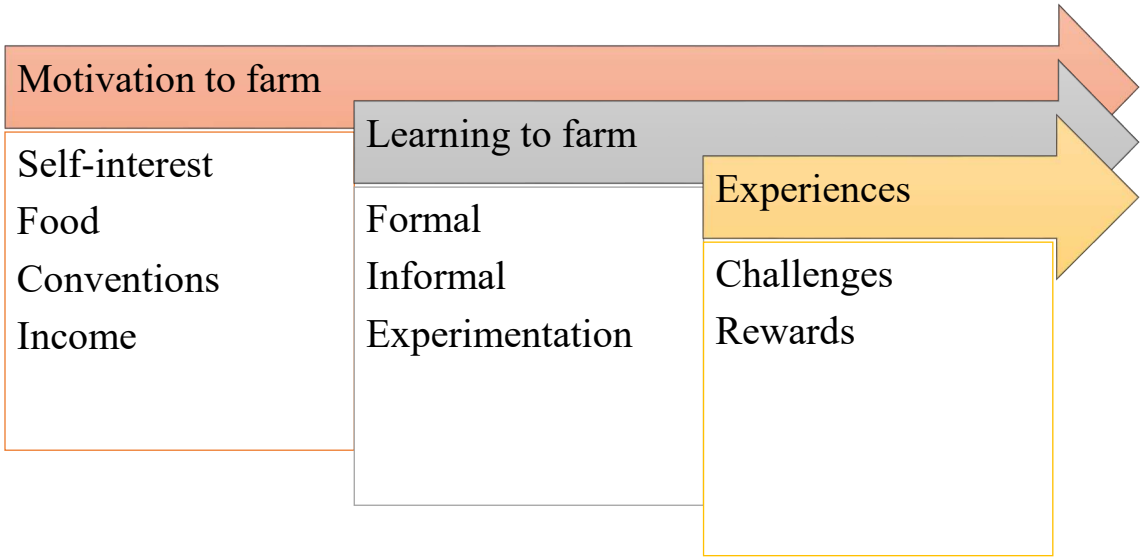

Figure 19
Main themes elucidated from interviewing small-scale urban farmers in Northern Colorado.

Motivation to farm

Urban agriculture is expanding rapidly around the world. The reasons for engagement in the practice is varied and may be location specific. Figure 19 shows the drivers identified during participant interviews for assimilating urban farming. Further details on those impetuses are below.

Self-interest

In the beginning, each of the urban farmers started with goals. LE's goal was to produce honey because he loved to eat honey (Figure 5). That quest expanded into a business opportunity, a second income, and strengthened family bonds (Figure 2, 4, and 6). A secondary goal was to continue the family tradition of keeping bees (Figure 1). He met all goals and is now passing the torch to his son to maintain the business and family tradition.

"To establish myself and a hobby that would interest me and occupy me in the free time that I was going to have" was TJ's aspiration when he embarked on this journey (Figure 8). He started with two hives to help "recognize, if, one was not prospering or thriving and the other was" and "to try to figure out why one was doing better than the other". Those two hives immediately expanded to three in the first year and up to 40 at times. TJ has been able to explore his curiosity while simultaneously pursuing other activities.

Idgy always wanted to be a farmer because she loved animals so much and wanted to be truthful to herself. Her expostulation was "could you actually raise an animal yourself, bond to it, accept its purpose for you, and be okay with that?" She felt that animals should be, "responsibly raised, humanely raised, honored, and respected" (Figure 13). While the journey has been tough and very emotional, Idgy managed "to raise really happy animals that give us good quality meat" (Figure 14 and 15). Idgy "exceeded her expectations" and does not think she "could ever give this up". That endeavor has yielded an agricultural business, something that was not in her original dreams.

Sprinter's goal was to produce food. She wanted a kitchen garden (Figure 17 and 18), something she could not do until two years ago when she acquired a property. She is now able to "just pick something fresh from the kitchen garden and then cook with that". She is tremendously excited about that outcome vis-à-vis her goals. These farmers engaged in urban farming because they had lifetime goals related to agriculture that they wanted to fulfil. When the opportunity became available, the participants started farming and succeeded.

Prior to commencing their urban agriculture journey, these individuals had a curiosity and an inherent interest in farming which mirrored their backgrounds. LE for example had multiple generations of beekeepers in his family including a grandparent, father, uncles, and cousins,

which in turn gave him the confidence to engage in the venture (Figure 1). He was already assisting with beekeeping operations, coupled with a love for honey, which he asserted is “how I come by it”. His interest in urban farming was so great that after a long pause and a sigh he told me, “I will be honest, truly I hated to give it up, but I was not real crazy about doing it” as he transitioned to a much smaller role in the project.

TJ got into urban farming by happenstance. Spending countless hours watching bees execute “their activities while they were at the comb” in an observation hive at Cornell University sparked his interest in bees. That interest was reinforced by taking a course he dubbed “Bees 101” taught by a professor who “loomed very large in the industry of apiculture”. That experience was profound according to TJ “and had that lingering interest my whole life”, such that with approaching retirement he considered it his “opportunity to try beekeeping just as a hobby”. Moreover, that was consistent with his lifelong interest in the natural world and “being active in nature and outdoors”.

Idgy expressed that “ever since I was a little girl, I always wanted to be a farmer”. When she started her grass-fed beef operation, it was the culmination of a childhood dream. As a way of life, Sprinter had a lifelong interest in agriculture and was ready to farm as soon as she had the space. All four participants expressed a strong desire and love for their practice. Based on long held interests, the participants embraced urban agriculture.

Food

Each of the participants engaged in urban farming to produce food. When asked the reason for keeping bees, LE’s animated response was “we love honey. I will be right honest with you. I love to eat honey”. He continued, “I thought you know I ought to do some bees and make my own honey”. TJ had a more laid back and cerebral view of beekeeping that closely aligned

with his fascination with pollinators and the environment. He too considered the food aspect based on bee biology namely “they produce honey, and they produce more than they need to winter over. And so, a byproduct of keeping bees was having more honey than we could use” (Figure 12).

Idgy was especially passionate and connected with the steers she raised because she felt “going to the grocery store is a disconnected way to buy meat”. If, she was going to eat meat she had to be involved in the whole process. Sprinter laughed heartily when I asked her why she farmed. “Food. Simple as that. Food, convenience, and the mere fact that I could just go and pick parsley from my garden and throw it in the pot”. Moreover, she felt strongly that the eggs from her chicken (Figure 16) and the food she grew (Figure 18) tasted better than store bought including organic produce. Thus, food production was major activity for these urban farmers.

Conventions

The culture of farming and related conventions was a large part of the participant lives. LE’s family for example have kept bees for multiple generations. The male line has kept bees starting with his grandfather acquiring a colony in the late 1800s from a neighbor in a small town just south of Fort Collins, Colorado (Figure 1). He was so proud of this tradition and joyfully shared this family history including a photograph of his grandfather in his first bee yard plus other historical pictures of the family’s involvement in bee keeping activities.

Idgy was born and partly raised in a farming community in Minnesota where she witnessed her uncles raise dairy and beef cows. She explained, “I just thought it was always a very hard and honorable work. Ties you to the land, and I have always been very in love with land and animals”. That childhood experience was a powerful driver for her to raise cattle.

Sprinter described her farming as “it is in my culture. It is the way I grew up”. She added excitedly in her melodious voice, “It is a way of life. It is an extension of myself. It is not so much just as a hobby. It is just a way of life”. This early and sometimes continuous exposure to agricultural activity laid the groundwork for the participants to immerse in urban agriculture later. Urban farming activities are now an integral part of their lifestyle.

Income

While the practitioners may have not initially considered urban farming as a business venture, it became apparent to some that it could be. LE loved to eat honey and that was his initial reason for keeping bees. He soon realized “it is fun to think here you produced a little something natural that people enjoy. It is a product that a lot of people want. Never had any problems selling it”. Thus, he was able to sell the extra honey and the wax a byproduct of extracting honey.

TJ was intrigued by the unexpected benefits of beekeeping which led to his remark that, “I have a hobby that pays for itself, which is quite nice”. He attributes it to “having more honey than we would use” thereby “having honey available to sell and give away”. This ability affords him flexibility to experiment and explore his academic interests in bees as natural creatures.

In being “truthful” to herself about where her food came from, Idgy was able to start a grass-fed beef business. As a farmer, she generates income by selling her products, enjoys some of the produce with her family and friends, and benefits from the associated agricultural tax rates. Urban agriculture appears to offer opportunities to generate income for those interested in that aspect of the industry, providing further incentive to persist in the venture.

Learning to farm

There are multiple ways an individual can learn to farm. The learning process involves formal and informal approaches, and experimentation. These farmers utilized at least one of the approaches to develop their skills. Below is how these individuals learned farming.

Formal learning

Formal training in agriculture occurs at multiple levels in a society including pre-college, collegiate, and adult stages. The process involves an organized curriculum taught in schools or in community settings. LE took a course at Colorado State University, taught by an Entomology Professor named Bob, and found it extremely valuable in his beekeeping venture. TJ has a degree in Animal Science from Cornell University. He also took a course on bee Biology which helped sustain his lifelong interest in nature, conservation, pollinators, and insects especially bees. However, he does not believe any of the courses directly helped his beekeeping endeavor. Idgy believed her undergraduate minor in Animal Science was basic and not helpful in her farming. Sprinter has not taken any courses related to farming or agriculture.

It appears that while most of the practitioners had taken some formal classes, the classes were not congruent with their context except for LE. One of them, Sprinter did not have formal education in agriculture. Thus, formal training in agriculture or farming likely played a minimal role in these participants' journey as practitioners.

Informal learning

All the participants learned to farm mostly through informal means. LE for example participated in beekeeping from an early age because his family kept bees. One of the earliest episodes LE remembers was his cousin David asking LE and LE's dad to go with him to help a farmer in Mead, Colorado harvest honey. The farmer was a family friend and in failing health.

LE and David returned to the bee yard in subsequent years to help that farmer with his bees. LE learned most of his skills by working with his cousins. When LE started his beekeeping enterprise, he joined the local Bee Club and acquired additional skills. He also read many books on bees and subscribed to a couple of Bee Magazines where he picked up more beekeeping tips. He maintains several books on bees and beekeeping in his library for easy access.

Similarly, TJ joined the local Bee Club where he learned basic bee husbandry. Through the Bee Club, TJ met several passionate people from whom he learned a lot. While the observation hive at Cornell University sparked his interest in beekeeping because it felt like "it was a live show going on in front of you", managing a beehive was a different story. He recalls being at a loss what to do at the end of his first year keeping bees, in the spring when the bees were ready to swarm (Figure 9). In the end, he somehow managed to capture the swarm (Figure 10) and place them in a new hive (Figure 11). Over the years, he acquired the necessary skills mostly by reading Bee Magazines and actively participating in Bee Club activities including their educational offerings, Swarm Hotline, and the Road Show. He feels he has pursued educating himself very aggressively describing his life as "I am reading about bees in the off season almost all the time and practicing bees in our beekeeping season very heavily in May and a little bit less in June".

When I asked Idgy how she learned to farm, she laughed, paused to think and to recall then said

> I do not know, if, I have yet. I just got the steers and, if, something comes up that I am curious about I just research it. If, there is something weird, like a little growth on, or minerals that they might need in addition to grass I just look it up.

After a while she added, "I just listen to what they need" (Figure 15). Idgy is tuned into her animals, describing the steers as "petable". She spent a significant amount of time expressing

her love for them through her demeanor, vocal variety, and body language. When she was not at her job, which also involved caring for animals, she would be checking on her animals, fences, and pastures. She adored the steers and reflected, “You will see them out in the field, and they are running, bucking, and playing (Figure 14). When it is warm, they lay down and absorb the sun”. This attitude could in part be due to her admiration since childhood of her uncles who raised beef and dairy cattle. Observing her uncles work instilled the love for animals and farming. Her profession reinforced and supported her ability to care for cattle.

For Sprinter farming began when she was a child, as part of her culture and lifestyle. When she was in High School, one of her main tasks was taking care of the chickens and collecting their eggs every morning. Therefore, as an adult transitioning to farming was a natural and almost expected progression. Like Idgy, she does a lot of research to answer questions about her farming activities. For example, through research she identified two types of fabric to protect her plants from sun, hail, snow, and to extend her growing season outdoors. She also figured out how to improve her indoor gardens. In addition, she likes to visit Botanic Gardens when she is following her passion for travel. During those visits, she asks the gardeners many questions to gain new ideas and share tips. While in Fort Vancouver, British Columbia, Canada, she spent over an hour chatting with gardeners, and got advice, that she implemented with her zucchini garden in Fort Collins. Another caretaker in Calgary, Alberta, Canada gave her counsel on how to get rid of Aphids from her plants. Those conversations were a crucial learning tool for her. She also exchanges ideas with people around the world that she meets. By utilizing various informal learning approaches, the participants were able to adapt and improve their farming techniques.

Experimentation

All the four participants have experimented with different techniques to enhance productivity, maintaining those that worked and discarding those that did not work. For example, Sprinter started with a tumbler to make compost for her garden. She soon ran into difficulties balancing "the greens and the browns". After a bit of research, she changed her approach and transferred the compost pile into her chicken yard, covered it, and periodically would open it and let the chickens "have a go at it". With that approach, she no longer had to worry about the balance between greens and browns or mixing the developing compost. Moreover, she started to add chicken manure to the pile. She has successfully produced this year's compost and is working on next year's compost. Based on experimentation, she no longer uses the tumbler to generate compost.

After experiencing several failures with her indoor potted plants Sprinter transitioned to growing them hydroponically which worked well with her travel schedule. When she acquired an AeroGarden (Aerogarden, n.d.) (Figure 17), to expand her indoor garden, she soon realized that the Tiny Tim tomatoes and lettuce grew too big for the AeroGarden. She now uses the AeroGarden as a seed starter or for microgreens. After experimenting with spinach, Sprinter has stopped growing it and is now focusing on chard instead (Figure 18).

Following several trials and tribulations with irrigating her pastures, Idgy has settled into a new approach in which she lets her spring flow to specific fields and follows careful rotational grazing. She described at length her frustration with the process of setting up her irrigation system. A "call" on the Poudre River water by traditional farmers with senior water rights easily upends all her preparations. This means all the labor and time invested in setting up the irrigation

results in no benefits. By watching, testing, and letting her animals tell her "What they need", she has set up a process that works remarkably well. She no longer sets up her irrigation system.

With over 45 years of beekeeping experience, LE has seen it all, and has tried more approaches than he can remember. He has found a way that works for him and came to the realization that "there is a lot of different techniques of working with bees and stuff. Probably every beekeeper you talk to has got a little bit different slant on how they do things". Over the past 10 years, TE has experimented with various techniques gleaned from his readings and incorporated appropriate ones in his practice. Through experimentation, these farmers have been able to adapt their practices successfully to suit their unique needs.

Experiences during farming

These farmers came from very different backgrounds and had varying experiences prior to embracing urban agriculture. Despite those differences, commonalities began to emerge as they engaged in farming. Below are the major experiences of the farmers based on the interviews.

Challenges

Agriculture is fraught with obstacles often beyond the farmer's control. Such challenges include climate, diseases, predators, labor, time, land, and inexperience. Below are some of the challenges that the four urban farmers experienced in their practice.

Hard labor. Farming involves a lot of hard labor and time commitment. Idgy described it as "tons of hard work. I mean blood, sweat, and tears but also extremely rewarding" for example she explained "this weekend I just moved 6 tons of hay". There is a lot of physical work in feeding the steers, maintaining, and building new fences, checking the animals twice a day, and walking miles of paths in the pasture to make sure all is fine according to Idgy.

LE talked about sometimes having to move hundreds of supers full of honey a day each about 35 lb. When he was younger that was not a problem, however, at his age now that is no longer a viable option. I could feel the emotion and the heaviness in his heart as he very slowly shared those experiences. He does not want to stop but he understands that he must listen to his body and confront the reality of his physical limitations. That is why he is reluctantly winding down his role in the operation.

TJ expressed a similar view though slightly differently saying “I guess maybe what I would do differently is maybe try and control my appetite for it a little bit so that it would allow me more time to do other things that I like to do, hiking and traveling”. He too is beginning to feel the pinch of the hard labor involved. Moreover, he feels his body is urging him to slow down.

Idgy does not spray chemicals to kill the weeds in her pastures instead; she pulls each weed by hand. She reckons that task takes her at least 120 hours during the hot summer season. Not only that, because of the time commitment in managing the operation she feels “I can never go on vacation” except for a rare long weekend since she cannot afford a farm sitter.

Sprinter mentioned that farm work requirements occasionally conflicted with her travel schedule. In response, she acquired an automated indoor system (Figure 17) to accommodate those needs. She also lets her chickens help with turning the compost, which saves time for her. The process allows the chickens to practice their natural behaviors, thereby enriching their lives, while providing access to kitchen scraps and a reward of earthworms from the manure pile. The combination of hard work and time expenditure weighs heavily on these farmers. These farmers realize they must strike a delicate balance between farming and other activities.

Climate. Climate has a big impact on agriculture as it influences moisture availability, heat, wind, and other weather-related events. Farmers have no control over all those elements. Northern Colorado is a semi-arid region with very little cloud cover and temperatures can fluctuate 40-60 °F in a day. LE a longtime practitioner, when asked about his honey production levels responded, “It depends on the weather” and continued, “The amount of honey we get varies. If, you have a dry year, you do not get much honey. If, you have this wet year, you do not get much honey”. He explained there must be a balance between moisture for plants to grow and warmth for flowers to secrete nectar for the bees to collect. Figure 3 and 8 shows the variation in productivity of individual hives in the same location and season demonstrating the complex issues that influence farming.

Weather has a direct impact on Idgy’s pastures and availability of feed, she must pay particular attention to the balance between how much grazing to allow the steers and how much hay to purchase and feed. Thus, Idgy practices a highly orchestrated rotational grazing dance with her cattle supported by hay supplementation. One of the hardest things Sprinter had to adjust to having grown up in the tropics with a year-round growing season was temperature variability and aridity. She reminisced, “You just throw seeds out the window. That is how most of our gardens are started”. Part of her adjustment to the climate was to buy fabric to shade her plants from the sun, hail, and snow. “It was helpful to get the tips before I even started. Some of those conversations I had with individuals when I travelled, seeing their gardens, that did help” as she recounts her Colorado farming journey.

Diseases. Diseases have a direct impact on the productivity and welfare of animals, and influence whether plants can thrive. TJ’s words “Well, if, I seem to talk about the varroa mite a lot because my singular challenge is to control the mite and the mite are the number one problem

in the industry. It is the biggest challenge to the honeybees" sums the critical importance of disease. Both TJ and LE discussed Colony Collapse Disorder of bees at length along with bacterial and viral diseases of bees as major concerns. The timing and labor involved in the control of these agents can wear out the beekeeper, because, if, they get it wrong they can lose a whole colony or worse the whole bee yard. Both Idgy and Sprinter have been fortunate not to experience diseases in their farming. They too must constantly be vigilant for diseases and pests that may adversely affect their animals and plants.

Predators. LE shared a picture of the devastation caused by a bear over two days in his bee yard. Every hive was shredded, pieces of wood were scattered everywhere (Figure 7). The bear then proceeded to a nearby cornfield and wreaked havoc there. After that, he recounted the story of another nemesis skunks whom he says will sit and scratch in front of the hive and wait for the bees to come out. They "just gobble them down" he continued, taking just a day or two to destroy a hive. Mice will dig into a hive, chew through the comb, and build a nest in there dragging all kinds of debris from outside for their young, thereby destroying the nest. He was not quite sure why wax moths enter a hive, regardless the impact was the same a hive destroyed by the spider like webs they build. TJ is aware of those predators but has not yet had to deal with them.

Idgy lives surrounded by predators including mountain lions who take deer just outside her fence, bobcats who snoop around her yard and bears are a normal part of her ecosystem. She recounted a time while taking pictures of her cows, she looked up only to see a bear up the ridge less than 100 yards away. The bear was looking intently at her cows. She wondered whether he was stalking them. She yelled, "Hey, what are you doing Mr. Bear?" The bear started turning around ever so slowly, seemingly annoyed, before moving away.

Sprinter had to predator-proof her chicken coop as required by city ordinance since bears, mountain lions, and bobcats periodically waltz into town and can depredate chicken. She has not experienced predators. However, this spring a bear visited her neighborhood for a few days and fortunately did not raid her chicken coop.

Predators are something farmers, including urban farmers must deal with routinely. They can destroy a farmer's produce within a very short time. These practitioners certainly feel the burden from the presence of predators in their neighborhoods.

Inexperience. Farming requires a lot of skill to succeed. A farmer must decide what kinds of crops to plant, when to plant, where to plant, how to take care of them, and when to harvest. The situation gets more complicated with animals as other factors such as preventing escape, keeping them safe from predators, and how to manage waste enters the picture. It takes knowledge and experience to be a good farmer. Inexperience can lead to disastrous consequences. LE noted that, "a lot of people buy a colony of bees thinking they are being a good environmentalist and set up a colony of bees in the backyard or wherever. They will set them up in strange places and expect them to survive" without accounting for the bees needs to tremendously expand the number of bees in the hive within a short time and simultaneously produce honey. He strongly believes that, if, that is all you are doing you will kill the bees. He calls it "an environmental kill zone".

TJ echoed similar sentiments stating that "altruistic individuals" wanting to help bees and pollinators without understanding the amount of work or involvement end up practicing "benign neglect" and losing the bees. That lack of experience ends up being fatal for the bees. He realized the extent of his inexperience at the beginning of the second year. He did not know what to do when his bees swarmed or how to take advantage of it (Figure 10). That knowledge came later

with experience (Figure 11). That is precisely why Sprinter was very appreciative of the guidance she got before beginning her urban agriculture journey in a new environment and considered her operation a “learning process”.

Frustration. LE was concerned about the impacts of herbicide use on his operation and talked of losing over 50 hives on more than one occasion from herbicides sprayed in the fields. He now practices in areas where there is no or minimal herbicide use. That shift has minimized those negative impacts on his operation.

Local ordinances (FC Gov, n.d.), came up during the discussions, resulting in conflicting reactions. For example, TJ was very appreciative of the City of Fort Collins’ leaders for enacting ordinances that facilitated keeping animals within the city limits specifically bees, chickens, and goats. Sprinter felt those “rules” were limiting because she could not keep roosters and could only have a certain number of chickens, something she was not used to and uncomfortable for her. Idgy did not feel the impact of any ordinances and liked the ability to claim Agricultural taxes for her business.

LE felt anxiety and frustration over giving up beekeeping. After almost 50 years as an apiarist, this internal turmoil at the thought of retiring from something he loves is an understandable dilemma. Idgy likewise expressed deep feelings of sadness when shipping her steers to the processing plant. That separation was very hard for her. She also indicated that the business aspects of her practice were stressful especially when dealing with some clients.

Rewards

Farming is a difficult occupation, yet many people practice it because of the rewards the endeavor offers. Rewards span a wide spectrum including joy, contentment, a sense of purpose, and monetary factors. I will discuss some of the rewards these urban farmers experienced.

Pleasure. Individuals derive pleasure for a plethora of activities they engage in. Farming can be a source of pleasure. LE was extremely excited as he talked about beekeeping saying, "Yes, it is fun. Very interesting. We have had a lot of fun over the years". I could hear, see, and feel the emotions and joy as he described the pleasure, he and his family derived from the beekeeping activities and the long-term relationships developed with farmers. After a long silence of pondering he continued, "We have made some very good friends out there, you know, places we have had bees in". Moreover, according to him "we were outdoors. We were doing our own thing and just being outdoors with bees was worth it". Thus, the outdoor opportunities, friendships, and family bonding contributed to the pleasure associated with the venture. LE's experiences were profound. It explains partly why LE spent most of his life caring for bees.

TJ's experiences at the bee observation hive at Cornell University formed the basis for his lifelong passion and ignited a lot of excitement that he has carried since then. He compares the experience to "a live show going on in front of you. I spent a lot of time there very interested". He cherishes meeting and learning from other passionate individuals, mentoring young beekeepers, and greatly appreciates their contributions to a healthy environment. He relishes the self-sustaining hobby, which is consistent with his family's schedule while allowing him to enjoy nature. In time, his hobby has expanded and become more involved, yet he asserted that "was fine with me because I enjoyed it immensely" and welcomed the challenge.

Idgy beamed with emotions that words could not capture. She exuded passion, eyes wide open and a smile spread across her face as she expressed her delight for the steers and, her interactions with them. "When I get those new steers, I am pep in my step and happy and excited to see them and, meet them, get to know them", she explained.

Sprinter's remarks for example reflect how she and her peers felt about farming "Oh, it has been fun". When I pressed her some more, she answered excitedly "Oh, besides how much fun it is, and I get to share it with family and friends?" Then she recounted an experience when her family came from the islands to visit and saw her chickens. She settled herself comfortably in the sofa and prepped me for the story by saying "I am going to spit some twang" emphasizing the point. In her lovely soprano voice, she belted out "Wait [stretched out], look here, I can't believe I come to Colorado and see chicken back a yarda" [expressed using the local accent with "wait" stretched out in a high-pitched voice] (Figure 16). Her family was shocked that Americans kept "yardies" [local term for backyard free range chicken]. Nothing could have better expressed her joy and pleasure at urban farming. Farming has been a deep source of pleasure and satisfaction for these practitioners. It is hard to for me to express those sentiments in words.

Fulfilling. LE has "enjoyed it over the years" calling it "kind of a family thing". The rewards have extended deep ties with farmers who welcomed them. He and his family "were always willing to stop and chat with them when we went to the bee yards". Those interactions and being outdoors were very important to him. A secondary income from the honey and beeswax was icing on the reward cake.

TJ was grateful that his hobby accorded him the flexibility to do what he loved, being outdoors in nature. Moreover, he has been able to share his experiences with and mentor novices. Interacting with individuals that were passionate about bees, and other pollinators and the environment in general has been a boon for him. He remarked on pursuing a "lingering interest my whole life" since this was going to be his "only splash in agriculture. Something that my

parents helped me spend a fair amount of money and time doing, and then I did not do anything with it". He feels that all the effort he put in has paid off with tremendous dividends.

Idgy effused the rewards she has derived from the endeavor, including having happy, healthy cattle, a dream fulfilled, good food, income, friendships, and gaining "a lot of respect for the human race". From modest beginnings, her view of the enterprise has expanded tremendously.

Sprinter wanted to live her culture, the way she grew up "eating essentially from the land". As she envisioned, Sprinter is living from the land, and sharing what she has learned with her neighbors, people she meets on her travels, and with her family. She loves the "bartering" that she does, sharing her excess produce and reliving all her childhood experiences. To her farming "is like real living and true living" because "it is part of myself, part of my heritage, part of my culture". That experience makes her completely fulfilled.

These urban farmers through their practice have gained much more than they originally set out to achieve. The rewards have been tremendous, and it is what keeps them going. Moreover, the rewards allow them to overcome or compensate for challenges they experience in their projects. Furthermore, these urban farmers have shared their produce and knowledge with others. During the journey, the farmers met diverse individuals and created long lasting friendships. These experiences have enriched the participants' lives, something they did not expect.

I have presented the main themes identified from the participant interviews and reinforced by the photographs they supplied. I will now link the findings to the three research questions that this exploration into small-scale urban farming in Northern Colorado set out to uncover.

Research Question 1: Motivation to farm

All the urban farmers were motivated to start their journey by various goals including food production, curiosity, fulfilling a lifelong interest, continuing a family tradition, identifying a hobby, and meeting a challenge. As they farmed, several found that the practice could be a secondary income source, which in turn spurred them to stretch themselves. Through farming, they met others who served as mentors, protégés, friends, and willing audiences further encouraging them to continue. Thus, while the original driver to engage in urban agriculture may have been simple and straightforward, continued practice served as further incentive to farm creating a positive feedback loop.

Research Question 2: Learning to Farm

Farming is a complex process that takes a long time to master. Individuals learn the practice through a variety of methods including informal and formal approaches and experimentation. Skills often pass down through generations and from experienced individuals to novices, sometimes in the form of apprenticeship. Most of the urban farmers in this study were involved in agricultural practices from childhood or had the opportunity to observe adult relatives engage in the practice.

As adults, they used informal means such as reading books and magazines, online research, watching YouTube videos, joining supportive organizations, and having conversations with experts and mentors to hone their farming skills. Moreover, as they farmed, they gained experience and learned new and better ways of performing their tasks. Interestingly, those who took formal classes in agriculture while in college found the courses very basic and not helpful to their current practice, except LE's class with Professor Bob. The beekeepers found the non-formal classes and mentorship offered by the Bee Club very helpful and directly applicable to

their practice. They subsequently used that knowledge to support new beekeepers. One individual was not aware of the Cooperative Extension Service, a national organization meant to support farmers; however, even those who were aware did not use their services.

A key tool deployed by the farmers to enhance their success was experimentation. As they became aware of new approaches, the farmers would test them and incorporate the ones that worked into their repertoire, discarding those that did not work. Experimentation is a key component of adult learning. These individuals utilized experimentation to learn effectively.

Research Question 3: Experiences during farming

The urban farmers in this study had a cornucopia of experiences centered on their initial goals of food production, family culture, inherent interest, and lifelong dreams. They all met and, in most cases, exceeded their original goals, deriving tremendous pleasure from the pursuit. While the practice involved hard labor and was often time consuming it was extremely rewarding for them. One reluctantly gave up and another considered scaling back farming activities as the physical work took a toll on their bodies despite the enormous rewards. Most of the practitioners realized that farming could be a source of secondary income, a surprise they relished.

Along with the successes, there were challenges. Farmers had to cope with several constraints including climate and unpredictable weather in Northern Colorado, predators, diseases and pests, and inexperience. Despite these obstacles, the urban farmers were successful and productive, made new friends, shared their knowledge, loved their pursuit, and would do it over again.

Summary

In this chapter, I discussed the findings from an exploration of urban agricultural practices in Northern Colorado. The four individuals who participated in the study engaged in beekeeping, raising grass-fed beef, and a mixture of chicken egg production and vegetable gardening. Participants had two to forty-seven years of experience in urban farming in this region. The farmers initially sought to produce food and fulfill lifelong dreams. They soon extended beyond those early goals and in some cases developed a secondary source of income. The practitioners acquired almost all their farming skill informally. Most of the learning was experiential and through self-directed approaches, primarily by reading, researching, conversations, and being mentored or mentoring others. By experimenting, the urban agriculturalists improved their skills by adapting practices that worked well and discarding those that did not. These farmers enjoyed their agricultural activities, strengthened family bonds, made new friends, and shared their knowledge and produce even as they faced challenges inherent in the agricultural enterprise. Through research and conversations, they overcame individual challenges and prospered.

CHAPTER 5: DISCUSSION

The purpose of this phenomenological study was to explore urban agricultural practices in Northern Colorado focusing on small operators. The study addressed knowledge gaps associated with this activity by asking three research questions:

1. What is the motivation for practicing urban agriculture?
2. How do urban agriculture practitioners learn to farm?
3. What are the practitioner's experiences during farming?

As presented in Chapter 4, farmers were motivated to farm because of self-interest, food production, conventions, and monetary reasons. The farmers acquired necessary skills through experimentation, and experiential and self-directed learning. During the endeavor, they experienced challenges and reaped rewards. I will discuss how those findings relate to the research questions and practices across the world. It is important to acknowledge the limitations of the study, which may point out directions for future research on this subject. Such limitations include researcher stance, number of participants, and an ongoing health crisis.

Research Question 1: What is the motivation for practicing urban agriculture?

Farming is a tough occupation involving hard work and significant investment of time and other resources without a guarantee of success. Why would anyone want to farm given these constraints? As revealed by the interviews, these individuals harbored long-term aspirations of becoming farmers (Figure 20).

Northern Colorado	Global perspective
• Food • Self-interest • Conventions • Income	• Food • Income • Connections • Lifestyle choice • Family and peers • Social and cultural • Pleasure and recreation • Environmental and political

Figure 20
Motivation for practicing urban agriculture in Northern Colorado and the global perspective.

Note. I based the data for the global perspective on the references discussed below.

As they practiced, additional factors encouraged them to continue and expand their engagement with farming. A critical reason was early exposure to and culture of agriculture in the family. For example, watching her uncles raise farm animals programed Idgy to emulate them. Similarly, Sprinter grew up in a society where planting crops and raising animals was the norm. She considered that "real living and true living", and it was no surprise that as soon as she acquired space, she commenced urban farming. LE's family kept bees for multiple generations and relayed the knowledge to their sons. He, therefore, followed the same conventions by keeping bees and passing that heritage to his son.

Another major driver for all the participants was to supply their own food whether it be honey, beef, vegetables, or chicken eggs. Urban farming provided a means to that end, and often the food tasted better than store bought as Sprinter described it. While developing a second income was not a primary motivator, it became a major reason for most of the individuals to farm. Moreover, the exercise was a source of love, joy, pleasure, and allowed them to meet a challenge or develop a hobby.

How do these motivators compare to those of urban farmers elsewhere (Figure 20)? Pourias, Aubry and Duchemin (2015) identified food as the most significant factor for engagement in gardening in and around Paris, France and Montreal, Quebec, Canada. Similarly, obtaining fresh food is a strong motivator for participation CSAs in the United States in addition to providing a sense of community (Everson, 2015). Adams (2004) remarked that individuals engage in micro farming for a plethora of reasons including connecting kids with nature and their food source. Bridge (2011) reported that backyard farming is a source of high quality family food and pleasure for individuals. Globally, urban agriculture facilitates access to healthy food (Hara et al., 2018; Opitz, Berges, et al., 2016; Walker, 2014; White, 2011), is a survival strategy (Opitz, Berges, et al., 2016; Rogus & Dimitri, 2015; White, 2011; Zezza & Tasciotti, 2010), supplements family income (Galt et al., 2014), and can be a business opportunity (Pölling, 2016; Poulsen et al., 2017).

Urban agriculture has been reported to be a lifestyle choice (Galt et al., 2014; Hardman & Larkham, 2014; Lang, 2005), and a social movement (Dimitri et al., 2016; Galt et al., 2014; Poulsen, 2017). In developing countries, urban agriculture is a survival and income generating endeavor as well as a recreational activity (Asafu-Adjaye, 2012; Bridge, 2011; Foeken, 2006; Pitikoe & Morojele, 2017; Prain et al., 2010). Other stimuli for urban agriculture include pleasure, mental wellbeing, relationships, intergenerational learning, supporting the community, income, cultural, environmental, and political reasons (Kingsley et al., 2019; Kopiyawattage et al., 2019; Ramirez-Andreotta et al., 2019; Scheromm, 2015).

The major inciters for practicing urban farming in Northern Colorado were personal goals, food, conventions, and income. Those reasons were consistent with the diversity of reasons for engaging in the practice around the world (Figure 20). However, there appears to be

regional variations in the underlying motivators. Such local variations call for more exploration of the phenomenon in Northern Colorado.

Research Question 2: How do urban agriculture practitioners learn to farm?

Farming is a complex process that takes a long time to master. Individuals learn the practice through a variety of methods including informal and formal approaches and experimentation (Figure 21).

Northern Colorado	Global perspective

• Informal
  • Reading
  • Conversation
  • Online research
  • Local organizations
  • Mentoring
• Experience
• Experimentation
	• Formal
	• Informal
	  • Indigenous knowledge
	  • Conversations
	  • Web-based
	• Experience

Figure 21
A comparison of how urban agriculture practitioners in Northern Colorado learned to farm with the global perspective.

Note. I derived the data for the global perspective from the references discussed below.

Skills often pass down through generations and from experienced individuals to novices, sometimes in the form of apprenticeship. Informal learning especially among individuals from farming backgrounds usually begins at an early age. For example Basotho herders rely on indigenous knowledge of the environment acquired as early as six years of age to survive under adverse circumstances (Pitikoe & Morojele, 2017). Likewise, farm children often continue the family's farming tradition (Kuehne, 2013). LE, Idgy, and Sprinter all came from farming backgrounds and pursued the practice as adults. They were involved in agricultural practices from childhood or had the opportunity to observe adult relatives engage in the practice.

Adults acquire specific skills informally through self-directed learning, including conversations with farmers or other knowledgeable individuals (Laforge & McLachlan, 2018; Leta et al., 2018; Pitikoe & Morojele, 2017). Baker et al. (2005) considered conversation a form of experiential learning. Farmers frequently share tips with and acquire new skills from peers through conversations. Informal learning may also occur during interactions at farmers markets, with friends and other adults, or experiential learning from joining organizations such as CSAs or farm communities, and experimentation (Everson, 2015; Saldivar-Tanaka & Krasny, 2004; Taylor et al., 2012; Vaarst, Byarugaba, et al., 2007; Zamudio et al., 2016). LE and TJ for example, acquired several skills during interactions with other beekeepers at the Bee Club. LE and TJ's learning experiences at the Bee Club was very close to that of smallholders in Western Kenya who participated in a co-learning Project (Marinus et al., 2021). Likewise, Sprinter attributes her learning to conversations while visiting Botanic Gardens.

The farmers in the current study engaged in self-directed learning, a core adult learning concept (Knowles, 1980; Loeng, 2020; Merriam & Bierema, 2013) to acquire knowledge for success (Figure 21). The participants used informal means such as reading books and magazines, online research, watching YouTube videos, joining supportive organizations, and conversations with experts and mentors to hone their farming skills. Their approaches are consistent with the adult learning tools used elsewhere (Leta et al., 2018; Minkoff-Zern, 2018; Šūmane et al., 2018) (Figure 21). While the participants used web-based source, a modality preferred by farmers in other settings (Brunson & Price, 2009; Dissanayeke et al., 2016; Kopiyawattage et al., 2018; Smith et al., 2012), there is little information on the use of web-based tools by small-scale urban farmers in Northern Colorado. This lack of information warrants further exploration.

Experimentation and experiential learning are an important part of adult learning repertoire (Merriam & Bierema, 2013). Farmers across the world learn through experience and experimentation (Taylor et al., 2012; Vaarst, Byarugaba, et al., 2007; Vaarst, Nissen, et al., 2007; Zamudio et al., 2016). A key tool deployed by these Northern Colorado farmers to enhance their success was experimentation. As they became aware of new approaches, these urban farmers tested them and incorporated the ones that worked into their repertoire, discarding those that did not work.

Interestingly, those who took formal classes in agriculture while in college found the courses very basic and not helpful to their current practice. The beekeepers found the classes and mentorship offered by the Bee Club very helpful and directly applicable to their practice. They subsequently used that knowledge to support new beekeepers. Formal training in agriculture has traditionally been a critical component of raising future farmers. Such training extends from elementary school level to college and beyond (Baseke et al., 2010; Cramer, 2017; Dyg & Wistoft, 2018; Fifolt et al., 2018; Fisher-Maltese et al., 2018; Jones et al., 2020; Mukembo et al., 2015; Ramdwar & Ganpat, 2010; Schneider, 2016; Silva & Muller, 2013). College learning is often associated with agricultural schools or specific college experiences (Feldpausch et al., 2019; Gonzalez-Redondo et al., 2010; Hendrix & Morrison, 2018; Mahoney & Retallick, 2015; Omotosho et al., 2020; Ramdwar & Ganpat, 2010; Sanderson, 2010; Schläppi, 2017; VanWieren, 2018; Vetter & Wingenbach, 2019). It may be worth finding the reason behind the disparity between these farmer's experiences and the expectations from formal training programs.

Utilization of local knowledge by farmers is critical to sustainability and resiliency in agriculture (Pitikoe & Morojele, 2017; Šūmane et al., 2018). One of the participants was not aware of the Cooperative Extension Service, a national organization meant to support farmers

(USDA NIFA, n.d.). The other participants did not interact with the Cooperative Extension Service either. This represents a missed opportunity to leverage local resources. Understanding the reasons for lack of utilization of this resource, and a broader information on farmer education (Schreiner et al., 2018) locally would be an important area to probe.

Research Question 3: What are the practitioner's experiences during farming?

The urban farmers in this study had a cornucopia of experiences centered on their initial goals of food production, family culture, inherent interest, and lifelong dreams (Figure 22).

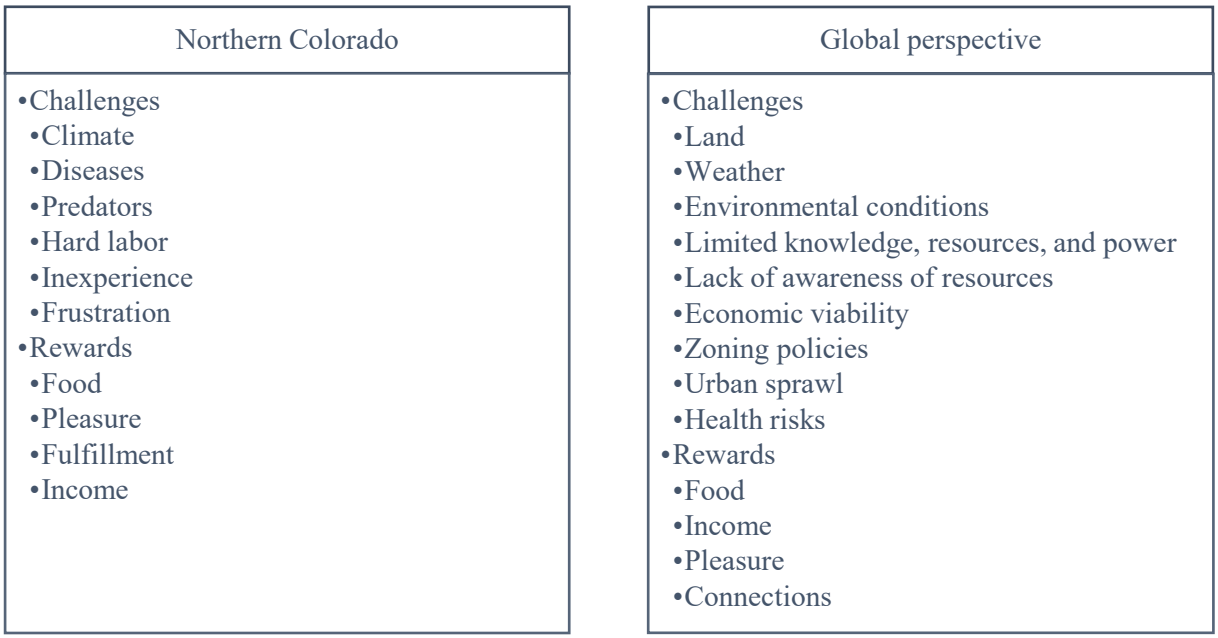

Figure 22
Challenges and rewards of practicing urban agriculture in Northern Colorado and the global perspective.

Note. I extrapolated the data for the global perspective from the references discussed below.

The participants met all and, in most cases, exceeded their original goals, deriving tremendous pleasure from the pursuit. While the practice involved hard labor and was often time consuming it was extremely rewarding for them. One reluctantly gave up and another considered drastically scaling back agricultural activities as the amount of physical work took a toll on their bodies

despite the enormous rewards. Most of the practitioners realized that farming could be a source of secondary income, a surprise that they relished. Along with these successes, there were challenges. Farmers had to cope with climate and unpredictable weather in Northern Colorado, predators, diseases and pests, and inexperience. Despite these obstacles, the urban farmers were successful, productive, made new friends, shared their knowledge, loved their pursuit, and would do it over again.

The Northern Colorado farmers' experiences were comparable to those of farmers elsewhere. The rewards (Bridge, 2011; Hara et al., 2018; Kingsley et al., 2019; Opitz, Berges, et al., 2016; Ramirez-Andreotta et al., 2019; Sanyé-Mengual et al., 2017; Scheromm, 2015; WinklerPrins, 2017), were quite similar. The challenges (Ban van den & Hawkins, 1996; Brunson & Price, 2009; Dao et al., 2018; Goodwin & Gouldthorpe, 2013; Haines, 2018; Meenar et al., 2017; Tobin et al., 2015; Wekerle & Classens, 2015) differed slightly (Figure 22). The small differences could be because Northern Colorado farmers were highly educated middle-class individuals with access to resources and had minimal zoning restrictions to their activities. Maini and colleagues (2021) recently described how differences in the level of education can influence on farm decisions, which impacts ability to enhance their skills and human capital. This in turn could affect productivity. Moreover, farmers in the current study lived an area with little or no chemical contamination of their environment, a major issue in other urban and industrial regions. While most of the study participants sold their produce, this was not their primary source of income. Moreover, the participants had a solid client base; therefore, economic viability was not a concern. The farmers in other parts of the world had a more diverse demographic compared to this Northern Colorado study cohort which could account for some of the differences.

As reflected in their journey (Figure 23), the participants met others who served as mentors, protégés, friends, and willing audiences further motivating them to continue. This profile could serve as a roadmap to facilitate supporting other small-scale urban farmers.

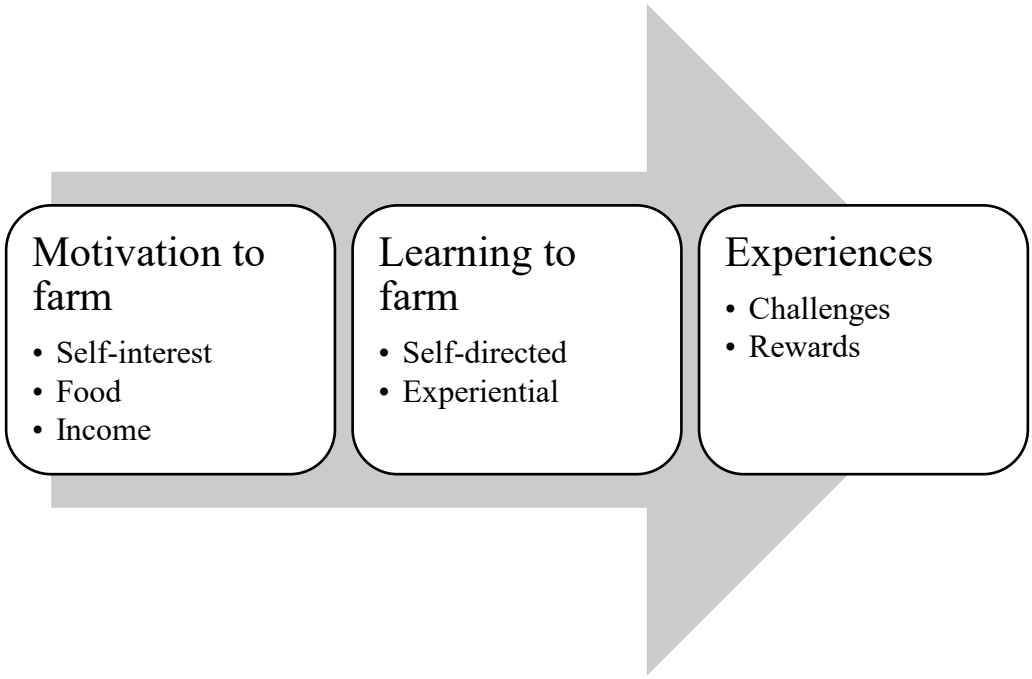

Figure 23
Pathway to urban farming in Northern Colorado.

Note. The journey of the urban farmers of Northern Colorado highlighting their motivation for involvement in urban farming, approaches they used to learn to farm, and their experiences with urban farming.

Limitations

I conducted the study during a pandemic when most of the country and various activities such as farmers' markets was not operational or operating at a minimal level. The university had strict mandates on how to conduct human subject research in addition to the standard IRB requirements. This context placed severe restriction on interactions with the participants. The only protections available was "social distancing". Moreover, individuals were nervous about

interacting with non-family members. Those conditions compromised facility visits, although I observed some aspects of apiary activities. Most of the information on the farm setting relied on photographs supplied by the participants and their site descriptions. To corroborate my findings, I drew inferences from a later visit to six other urban farms that did not participate in the study. I was not aware of these farms until I saw a community event highlighting them when the data analysis was virtually complete.

The timing of the study coincided with the peak of agricultural activity, further constraining availability of the participants. TJ remarked during small talk prior to starting the formal interview "you were only able to get me today after more than 2 weeks of consistent asking because, it has been raining today the whole day and I can't work on my bees". In agriculture, timing is critical, and farmers cannot afford to lose time during critical windows. Participating in research is a trivial activity or a luxury compared to generating their produce.

While I originally planned to have participants from Boulder, Weld, and Larimer Counties, I eventually interviewed participants from Larimer County only. However, this could have contributed to a more consistent participant pool and a more robust data set. The findings may not necessarily reflect the conditions in the broader region. Moreover, the findings and associated interpretations are through my lens. Therefore, the conclusions apply to this study and is not necessarily representative of the diversity of urban agriculture practiced in Northern Colorado or generalizable.

Implications for practice

This study highlighted the need to evaluate adult education opportunities for urban agricultural practitioners in Northern Colorado. While Colorado State University offers formal training in agriculture and the county Cooperative Extension Service offers non-formal programs

to support farmers, these programs did not feature strongly in the learning of these farmers. It was not clear why this disconnect existed. Given the wide range of approaches available for farmer education (Schreiner et al., 2018), it is worth examining the reasons for this discrepancy, and the availability or accessibility of other adult education opportunities for farmers.

The City of Fort Collins, Denver, and Wheat Ridge appear to accept and possibly support urban agriculture. In other surrounding cities, it was hard to find clear evidence of support for urban farming particularly as practiced by small producers. The City of Boulder's efforts seemed directed mainly at traditional farmers and preservation of open space (Anon, n.d.-b; Duncan, n.d.). Urban agriculture benefits individuals, the community and is part of the food production system (Despommier, 2013; Dimitri et al., 2016; Galt et al., 2014; Hara et al., 2018; Hardman & Larkham, 2014; Ivancic, 2014; Stuchtey & Vahle, 2019; White, 2011), therefore, local governments need to pay attention to and support this activity. Several cities have developed highly progressive and strong policies to promote urban agriculture (CoDyre et al., 2015; Harris et al., 2016; Huang & Drescher, 2015; Lavallée-Picard, 2018; Mulligan et al., 2018). It is critical to initiate such measures in Northern Colorado.

Suggestions for future studies

This study offered preliminary findings on the motivations for practicing urban agriculture by small-scale producers in Northern Colorado, how they learned to farm, and their experiences during this venture. These findings provided a snapshot of urban agricultural practices during a pandemic. The study was limited in depth as it was for a Master's thesis suggesting that there are opportunities to probe deeper using a more extensive assessment. Three areas worth examining are:

1. The scope of urban farming in this region including who the farmers are and type of farming they practice. Such knowledge would facilitate a needs assessment of the practice.
2. Another area of inquiry would be the kinds of educational resources they are using and how they are accessing it vis-à-vis the kinds of resources being offered.
3. The policies regulating urban agriculture, how that information is disseminated, and who is accessing it provide another opportunity for investigation. Are the practitioners aware of the policies? Were all stakeholders included in the policy development? What supports are there to ensure success of the practitioners?

Exploration of these areas would give a more complete picture of urban farming in this region. Identifying the farmers would allow deployment of appropriate resources for a successful urban agriculture enterprise and incorporation into the regional economic activities.

Summary

In this chapter, I discussed the findings from the exploration of urban agriculture in Northern Colorado (Figure 23), implications for practice, and future directions. The four individuals who participated in the study engaged in beekeeping, raising grass-fed beef cattle, and a mixture of chicken egg production and vegetable gardening. Participants had two to forty-seven years of experience with urban farming in this region. The farmers initially sought to produce food and fulfill lifelong dreams. They soon extended beyond those early goals and in some cases developed a secondary source of income. Through farming, the participants met others who encouraged them to persevere. They enjoyed their activities, strengthened family bonds, made new friends, and shared their knowledge even as they faced challenges inherent in the agricultural enterprise. Using research and conversations, the participants overcame

individual challenges and prospered. It is important to conduct further research to identify the scope of urban agriculture; who is involved; what their needs are; and how to incorporate urban farming into regional economic development activities.

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APPENDICES

APPENDIX A: CONSENT FORM FOR PARTICIPANTS

Informed Consent Form

Title: Small-Scale Urban Agriculture in Northern Colorado

The following information is provided to help you decide whether you wish to participate in the present study. You should be aware that you are free to decide not to participate or withdraw at any time without any repercussion. This study was approved by the Institutional Review Board at Colorado State University (IRB #21-10519H)

The purpose of this study is to gain a deeper understanding of urban agriculture in Northern Colorado, particularly small operations focusing on motivation, education, and experiences of the farmers.

Data will be collected using a semi-structured interview. The interview will be recorded. The recording will be transcribed before analyzing. Photographs of the agricultural activities may be taken.

Do not hesitate to ask questions about the study before participating or during the study. I will be happy to share the findings with you after the research is completed. Your name will not be associated with the research findings in any way, and only the researchers will know your identity.

There are no known risks and/or discomforts associated with this study. There are no direct benefits associated with your participation, however, your experiences of urban agriculture will contribute new knowledge to this area. This study will used for a class project only.

Please sign this consent form. You are signing it with the full knowledge of the nature and purpose of the procedures. You will get a copy of this form to keep.

_____ _____

Signature Date

James R. Owiny, Graduate Student, Colorado State University (970-491-5668).

APPENDIX B: CONSENT FORM FOR PHOTOGRAPHS

SCHOOL OF EDUCATION
209 Education Building
1588 Campus Delivery
Fort Collins, Colorado 80523-1588
www.soe.chhs.colostate.edu

Release Form for Use of Photograph/Videotape

Urban Agriculture in Northern Colorado
Release Form for Use of Photograph/Videotape

Dr. James Owiny
Dr. Kalpana Gupta, Thesis Advisor
Department Name: School of Education
970-491-5668
James.Owiny@colostate.edu

Please print:

Name of Participant: _____

Address: _____

I am 18 years of age or older and hereby give my permission to James Owiny to use any photos or videotape material taken of myself, or agricultural setting or agricultural activities during his research on Urban agriculture in Northern Colorado. The photos and videotape material will only be used for research purposes and for the presentation of the research. My name will not be used in any publication. I will make no monetary or other claim against CSU for the use of the photograph(s)/video. As with all research consent, I may at any time withdraw permission for photos or video footage of me to be used in this research project.

Signature: _____ Date: _____

IRB No.: 21-10519H
Date of IRB Approval: 03/04/2021

APPENDIX C: INTERVIEW PROTOCOL

Interview Protocol Project: Small-Scale Urban Agriculture in Northern Colorado

Date:

Time:

Place:

Interviewer:

Interviewee:

Role/Position of Interviewee:

Description: Urban agriculture involves production, processing and marketing of food and related products in urban and peri-urban areas for local consumption. The purpose of this study is to gain a deeper understanding of urban agriculture in Northern Colorado, particularly small operations focusing on motivation, education, and experiences of the farmers. I will interview individuals from Northern Colorado. Confidentiality will be protected in several ways. I will give interviewees pseudonyms. No identifying information will be used in this project. Interviews will take approximately one hour. Your participation in the study is voluntary and you can withdraw consent at any time without repercussions.

I voluntarily consent to participate in this interview. I understand that I may withdraw from this study at any time without repercussion. I understand that the privacy of my information will be protected.

Signed _____

Questions

1. Tell me about your background.
2. How did you get into urban farming? What drew you into farming?
3. Why do you farm (practice agriculture)?
4. Walk me through the type of agriculture you practice
5. How did you learn to farm (practice agriculture)?
6. What were your original expectation for this endeavor?
7. What has been your experience as you engaged in farming?
8. How has this activity met or failed to meet those expectations?
9. What factors have worked for you?
10. What barriers have you faced or face?
11. Knowing what you know now, what would do differently and what would maintain?
12. What other things would you like to share with me?
13. Whom else should I talk to about urban agriculture?

Thank you for your cooperation and participation in this interview. We will protect the confidentiality of your information. We may contact you for a brief follow up interview clarify specific points.

APPENDIX D: INSITUTIONAL RVIEW BOARD APRROVAL LETTER

Colorado State University

Knowledge to Go Places

eProtocol
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 eprotocol
TEL: (970) 491-1553

DATE:	March 05, 2021
TO:	Gupta, Kalpana, School of Education Faircloth, Susan, School of Education, Owiny, James
FROM:	Chromiak, Angie, Compliance Review Assistant Administrator, CSU IRB Exempt
PROTOCOL TITLE:	Urban agriculture in Northern Colorado
FUNDING SOURCE	None
PROTOCOL NUMBER:	21-10519H
APPROVAL or DETERMINATION PERIOD:	March 04, 2021

NOTICE OF IRB REVIEW FOR HUMAN RESEARCH

Thank you for submitting your application for exempt review to Colorado State University IRB (CSU) (FWA0000647). We appreciate the work you have done on your proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above-entitled project meets the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects, specifically .

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at the OHRP Website www.hhs.gov/ohrp/humansubjects/guidance/belmont.html.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an amendment to the IRB. Exempt determinations are active for five (5) years. Please be aware that changes to your protocol may change this determination for exemption from 45 CFR 46.101 and may require submission of a new IRB application or other materials to the IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite the best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete written explanation of the event and your written response. Other actions also may be required depending on the nature of the event.

Please refer to the protocol number denoted above in all communication or correspondence related to your application and this approval. Should you have additional questions or require clarification of the contents of this letter, please contact the IRB Office. On behalf of the IRB, we wish you success in this scholarly pursuit.

Please direct any questions about the IRB's actions on this project to:

IRB Office - (970) 491-1553; RICRO_IRB@mail.Colostate.edu
Claire Chance, Senior IRB Coordinator - (970) 491-1381; Claire.Chance@Colostate.edu
Tammy Felton-Noyle, Senior IRB Coordinator - (970) 491-1655; Tammy.Felton-Noyle@Colostate.edu

Chromiak, Angie

Initial exempt determination has been granted March 4, 2021 to recruit with the approved recruitment and consent procedures. The above-referenced research activity has been reviewed and determined to meet exempt review by the Institutional Review Board under exempt §46.104(d)(2)(i) & (2)(ii) of the 2018 Requirements. This study has no funding. Approved documents include: Interview Protocol UA; Data Management plan JO February 2021 UA; IRB_PhotoVideo Release Form UA; IRB_Recruitment Consent Verbal with Identifiers UA; IRB_Signed Consent For Non-Federally Funded Minimal Risk Research UA; IRB_Consent Model Cover Letter UA; 21-10519H Gupta INTAKE.

None