

Farming with Draft Animals: Using Retro Innovations for
Sustainable Agrarian Development.
A case study of organic small-scale farming in Northern Italy.

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*Two farmers working with their draft horse in a cabbage field in Northern Italy.
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Abstract

To farm more sustainably, some farmers are rediscovering and innovating knowledge, skills, and technologies that were used before the modernisation of agriculture in the 1950s. One such 'retro-innovation' is the use of draft animals as a source of labour on farms. As modern farming and agronomy pay little attention to 'retro-innovations', not much is known about why and how farmers reintroduce draft animals on their farms. Therefore, the potential of draft power to contribute to the sustainable development of agriculture also remains unclear.

To fill this gap, this study uses interviews and participant observation with seven draft animals' farmers in Northern Italy. Results indicate that these farmers are organic small-scale farmers using both draft animals and tractors. Engaging in multiple farming activities is an important aspect of these farms. Although draft animals are primarily used in vegetable growing, they can, among others, be involved in logging, marketing the farm production, and used for horse-riding. Their reintroduction as source of labour aligns with the so-called "peasant logic" to farming. This style of farming is reflected in farmers' craftsmanship, co-production, and autonomy, and the use of draft animals as a skill-oriented technology. Farmers engaged in a peasant style of farming use draft animals as: (1) a technology to increase the farm autonomy and sustainability; (2) work companions with whom they collaborate and develop a strong relationship; and (3) a retro-innovation that is motivated by their self-perception as local stewards.

The study indicates that the relationship between farmers and their draft animals is the most rewarding aspect of animal traction, confirming the meaningful role of non-humans in farm practices and emphasising the central role animals can take in a peasant logic of farming. Future research should continue exploring the role of retro-innovation and of relationships between humans and non-humans for sustainable agricultural development.

Keywords: *craftsmanship, interpretive method, draft animals, non-representational theory, Italian Alps, Po Valley, retro-innovation, farming styles, stewardship, sustainable agrarian development*

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Table of Contents

Abstract.....	3
Acknowledgement	4
1 Introduction.....	6
2 Literature review- How have DA been studied previously?	10
3 Theory: Farming styles, peasant logic, retro-innovation, and DA.	12
4 Methods.....	16
4.1 <i>Epistemological background</i>	<i>16</i>
4.2 <i>Case study- Northern Italy, between the Po Valley and the Alps.</i>	<i>16</i>
4.3 <i>Data collection.....</i>	<i>18</i>
4.4 <i>Analysis</i>	<i>25</i>
5 Results	26
5.1 <i>How do farmers use DA on their farms?</i>	<i>27</i>
5.2 <i>How can farmers that use DA be characterised?</i>	<i>32</i>
6 Discussion.....	41
6.1 <i>Peasant logic of farming applied to technology</i>	<i>41</i>
6.2 <i>Peasant logic of farming applied to relationships</i>	<i>42</i>
6.3 <i>Peasant logic of farming applied to stewardship</i>	<i>44</i>
6.4 <i>Implications of findings for sustainable agrarian development</i>	<i>45</i>
6.5 <i>Discussion of methods and limitations of the approach adopted</i>	<i>45</i>
7 Conclusion	47
8 Epilogue	48
References.....	49
Appendix.....	59
Appendix A <i>Ethic Review – Final Review.....</i>	<i>60</i>
Appendix B <i>Critical reflections on methods and data sources</i>	<i>62</i>
Appendix C <i>Non-representational investigation applied to Participant Observation.....</i>	<i>64</i>
Appendix D <i>Analysis – Final inductive and deductive codes</i>	<i>71</i>
Appendix E <i>Results Characterizing DA’ farmers</i>	<i>76</i>
Appendix F <i>Interview guide</i>	<i>79</i>
Appendix G <i>Plain language statement (PLS)</i>	<i>89</i>
Appendix H <i>Consent form.....</i>	<i>94</i>

1 Introduction

After a long drive through the Langhe (a hilly part of Piedmont in Northern Italy), Laura, a retired farmer, and I reached a valley giving access to the Alps. I had planned a meeting with a small-scale farmer who writes history books on agriculture in Piedmont and Laura had offered to drive me there. We were welcomed by the farmer and his wife, who invited us to the kitchen table. The building was made of stones and built in the mountain. The farmer had a checkered jacket, working pants, and boots. I explained to him that a university professor had recommended to meet him, so I would understand the local context of my study better. After explaining the evolution of farming in various parts of Italy, and why he found it interesting himself, he went to his bookshelf, took a book, and showed me the extract written on the back cover, that summarised the kind of farming he believed in:

"When you talk to a socially technical man, he only dreams of times when machines will do all the work and man will work only a few minutes a day pushing buttons on machinery or raising and lowering switches. And what will he do the rest of the time? We ask him. And he answers us: he will cultivate himself; this poor man has forgotten, he does not know, he cannot know, in his anti-natural position, that the true culture of man is precisely his work, but work that is his life, which is obviously not the case with any technical work. One cannot know what the true work of the farmer is: whether it is ploughing, sowing, mowing, or whether it is at the same time eating and drinking fresh food, having children, and breathing freely, for all these things are intimately united, and when he does one thing, he completes the other. It is all work, and nothing is work in the social sense of the word. It is his life."¹

Jean Giono, *Letters to the Peasants on Poverty and Peace*, 1938

¹ "Quando parlate con un uomo socialmente tecnico, egli sogna solo tempi in cui le macchine faranno tutto il lavoro e l'uomo lavorerà soltanto qualche minuto al giorno per spingere pulsanti di macchinari o alzare e abbassare commutatori. E cosa farà per il resto del tempo? Gli chiediamo noi. Ed egli ci risponde: si coltiverà; questo pover'uomo ha dimenticato, non sa, non può sapere, nella sua posizione antinaturale, che la vera cultura dell'uomo è precisamente il suo lavoro, ma un lavoro che sia la sua vita, il che, evidentemente, non è il caso di alcun lavoro tecnico. Non si può sapere qual è il vero lavoro del contadino: se è arare, seminare, falciare, oppure se è nello stesso tempo mangiare e bere alimenti freschi, fare figli e respirare liberamente, poiché tutte queste cose sono intimamente unite, e quando egli fa una cosa completa l'altra. È tutto lavoro, e niente è lavoro nel senso sociale del termine. È la sua vita."

The poem struck me, as the themes present in it had been evoked by the farmers I had interviewed the weeks before: the value of good work, that farming does not only mean to produce, and the interdependence between farm work and the rest of life. The commitment to farming is celebrated in this quote, even though it implies many hours of labour. Giono warns us that machines that could replace farmers' work, and by doing so removing farmers' purpose. Since Giono wrote this poem, machines, and external inputs (fertilisers, oil...) have taken a predominant place in farming, which has increased farms' greenhouse gas emissions as well as vulnerability to the external market, leading to unsustainable modern agricultural practices (Battaglini et al., 2014; Jepsen et al., 2015).

Agriculture, forestry, and other land uses account for 24% of global greenhouse gas emissions per economic sector (The Intergovernmental Panel on Climate Change, 2014). Although cattle belching, the addition of natural or synthetic fertilisers, and wastes to soils represent 65% of those emissions, fuel consumption, from use of machinery such as tractors, has increased too. In 2018, emissions from energy consumed in agriculture were 0.9 Gt CO₂eq, having increased by 23 percent since 2000 (Food and Agriculture Organization of the United Nations [FAO], 2020). How farming will exit its dependence on fossil fuel remains a challenge (Pfeiffer, 2006; Wright, 2012). Nevertheless, agricultural developments have been largely influenced by technologically-driven industrialisation rather than alternative adaptation strategies (Knickel et al., 2018). This is reflected in policies: in the European Union (EU), subsidies favour regions with large-scale farmers, that often rely on emission-causing inputs, rather than marginalised areas that generate high-level of public goods (Scown et al., 2020).

Many consequences of industrial farming are well-known, both for the regional landscape (e.g., loss of biodiversity, rural exodus) as well as for farmers' wellbeing (e.g., tight profit margins for farm products, see Offermann & Nieberg, 2000; van der Ploeg, 2010). For farmers in Europe, tractors are vital tools, just as the paintbrush for the painter or the calculator for the accountant. While being essential to the farmer's work, their sustainability can be questioned. Ecologically, their weight contributes to soil compaction and erosion (Gürsoy, 2021). Tractors come with social costs too: the financial investments that are needed to maintain a modern farm enterprise are the second largest source of stress for farmers, after pesticide exposure (Yazd et al., 2019). Moreover, due to their heavy dependence on fossil fuels, modern farms become vulnerable to price spikes (Eriksson, 2022).

Therefore, in response to the costs and vulnerabilities of fossil fuel farming, a growing number of small-scale farmers are exploring alternative farming methods to mitigate environmental and social impacts they otherwise face with conventional farming (Morel & Léger, 2016). In Europe, the movement towards regenerative agriculture focuses on the soil and aims to restore or maintain its health through practices such as no tillage or green manure (Rhodes, 2017). Some farmers engaging in regenerative agriculture seek alternative energy sources to tractors and moto cultivators. Thus, they re-introduce draft animals (DA) to their farm organisation. DA are typically horses, but also cattle, mules, and donkeys. Working with DA becomes an alternative adaptation strategy that contributes to regenerative agriculture and can tackle some of the sustainability issues presented above, by reducing soil compaction (García-Tomillo et al., 2017) and carbon emissions (Johansson et al., 2013). However, the benefits of using DA are not just to improve and restore soil health, but also the farmer's own wellbeing, as working with an animal eliminates the isolation experienced on a tractor, and the vibrations and noises experienced with a motor cultivator. These benefits of regenerative agriculture echo and in some cases are articulated by farmers through concepts of environmental and social-ecological stewardship.

DA can potentially contribute in several ways to sustainable farm and agrarian development (Rodrigues et al., 2017). They can be used to work on the field (tillage, weed controls), to transport various loads, for logging, or be part of an agritourism project. Their presence on farms can help closing nutrient cycles by producing manure (Bernués et al., 2011), which can be transformed into organic fertiliser. This is an asset, especially given the recent drastic increase of synthetic fertilisers prices (European Commission, 2022; L'Informatore Agrario, 2021).

In the Global South, DA are still a common feature of farming. There are 300 million DA in the world, with numbers increasing in South America and Africa (FAO, 2010). In Europe, animal traction almost disappeared with the advent of the tractor in the 1950s (Carreras, 2006). Nevertheless, the use of DA is promoted by some NGOs (such as *Schaff mat Päerd*; FECTU; and *Noi e il cavallo*).

It remains unclear, especially in the European context, under which conditions the use of DA becomes a viable and workable provision of labour on farms. Using DA is often considered a return to a premodern form of agriculture that is less productive and therefore undesirable by

current agronomy and agribusiness principles. The aim of this thesis is therefore to explain why farmers in Europe are still working with DA. To achieve this aim, I ask the following questions:

1. How do farmers use DA on their farms?
2. How can farmers who use DA be characterised?
 - a. Under which socio-economic, environmental, and technological conditions becomes working with DA a viable and desirable option?
 - b. Which skills, farm organisation, and external conditions (network, market demand) are needed to work with DA?
 - c. What are DA farmers' values and aspirations?

To answer these questions, I have formulated the following objectives:

1. To uncover how the use of DA in a European context has been studied in the (non)-academic literature.
2. To unwrap how a practical case study can be linked back to more abstract concepts with the help of theories exploring not only interpretive data but also embodied practice- namely farming styles and retro-innovation, to see how this can contribute to stewardship literature.
3. To explore farmers' motivations in using DA, through interviews and participant observation, to identify for whom DA farming is most suited, based on individual capacity, values, aspirations but also on socio-economic, geographic, environmental, and cultural factors.

This thesis is based on qualitative interviews and participant observation of farmers using DA in Northern Italy. The field site was selected because of its agricultural history. Independent small-scale farms dominate the mountainous areas and are present in the Po valley, despite being one of the Italian regions that was mechanised early on (Davis, 2014).

2 Literature review- How have DA been studied previously?

Current agronomic development is oriented toward high-tech innovations such as precision agriculture, which are advocated in terms of sustainability (Bongiovanni & Lowenberg-Deboer, 2004), food security (Gebbers & Adamchuk, 2010) and greenhouse gas emissions mitigation (Balafoutis et al., 2017). In this literature DA is not considered as a viable alternative for farming in the Global North (Valette & Upjohn, 2014). However, there is a small body of literature that addresses DA. I particularly focus on perspectives and narratives chosen when studying DA.

Agronomic studies are the field that has most interest in DA. Here DA are studied as an alternative source of energy that can contribute to exit fossil fuel dependence in farming (Johansson et al., 2013; Mulder & Dube, 2014). DA transform what they consume in energy and natural fertiliser (Hoffmann, 2010). Likewise, life-cycle assessments are used to compare the environmental impact of the transition from animal power to tractor power and vice versa (Spugnoli & Dainelli, 2013), to evaluate and study DA as sustainable technology for agricultural production (Morrissey, 2009; Tosco, 2012) or to assess draft performances regarding motion and force (Cui, 2012). Tests are conducted to assess draught force of horses (Spugnoli, 2008) and to compare requirement and performance of modern DA technology with tractors (Herold, 2017). Additionally, reviews and assessments of multipurpose implements for DA traction are a subject of research (Starkey, 1988).

The use of DA is also discussed in non-academic literature or ‘grey literature’. Overall, a common purpose is to provide teaching material and to promote working with DA. Several books take a holistic approach, presenting a step-by-step approach, including breed selection, training, and choosing the right tools (Bonnin et al., 2019; Leslie, 2013, 2015). Technical guides describe newly developed tools, hitches, and harnesses that focuses on the animals’ ergonomics (Equi Idea, 2021; Moscardo & Schmit, 2018, 2021) This shows that innovations still occur working with DA. Other books focus on preserving knowledge on implements (Miller, 2016a).

DA magazines and fair events promote DA and display it as “possible, practical and profitable” for sustainable small-scale farming and land stewardship (Horse Progress Days, 2020, p. 11) as well as depict the various evolutions and events around DA (Noi e il cavallo, 2019).

These books, articles and events describe working with DA as a craft (Miller, 2016b). They describe that to work with DA, a combination of strong knowledge on DA needs, animal welfare, and farming practices is necessary, as well as other skills such as intuition and patience.

A common feature of agronomic publications is that DA are analysed as an alternative technology for agricultural production. Consequently, these studies focus on ecological and technical aspects of working with DA. Non-academic literature is technical, too, but also highlights other elements such as that working with animal is a craft, and advocate for the relevancy of DA for sustainable agriculture. The emotional and social aspects of working with animals is mentioned in this literature but remains largely implicit. From this review, I can hypothesise that farmers are interested in DA primarily for functional and economic reasons, i.e., because they want an affordable, efficient, and sustainable tool. Less is said if the use of DA stems from moral, emotional, or ecological motivations. To study both type of motivations I will use theories that conceptualise farming as styles rather than an enterprise or system.

3 Theory: Farming styles, peasant logic, retro-innovation, and DA.

Farming can be studied using various dichotomies: small-scale vs. large-scale; organic vs. conventional; subsistence vs. industrial farming; etc. A similar duality can be applied to using DA, i.e., farmers can be classified into DA and tractor users. However, this dichotomy poorly represents the reality of European farming which is much more complex. First, most farmers in Europe relying on DA have not renounced using tractors. But more importantly, the group of farmers working with DA differs considerably in the way they farm. Thus, to understand motivations why farmers continue to use DA, it is essential to pay attention to the diversity of practices in which these farmers are engaged.

Farming style is a theoretical concept within rural sociology, that embraces the complexity of farming, going beyond those dichotomies. Farming styles focuses on how farmers use primary resources and how those patterns of use are influenced by the social-ecological context in which they work (Boonstra & Hentati-Sundberg, 2015). Farming styles demonstrate that farmers' deliberation and choice making is not only rational, but also emotional, habitual, and cultural. Styles can help uncover farmers' understanding and responses to pressures and opportunities coming from technologies, markets, and policies (van der Ploeg, 1994).

Farmers have been framed as entrepreneurs since the end of World War II and policies have stimulated farms to grow larger and more intensive (den Hond et al., 2003). In Italy, farmers are named *agricoltore* (agricultor) or *imprenditore agricolo* (agricultural entrepreneur) and are the owners of *azienda agricola* (agricultural enterprise). Those terms can seem to describe administrative jargon, but they reflect a distinct model for agrarian development that became dominant in Europe after WWII. This model incentivises farmers to intensify and expand their production through the input of resources – whether funds, technology, or knowledge – from outside the farm. In this “modernisation paradigm” (van der Ploeg & Roep, 2003, p. 39), DA would be framed as inefficient and backward. By using these animals instead of tractors, farmers would block the speed and scale of farming.

However, this applies within the modernisation paradigm, but not to other forms of rural development model that give emphasis to sustainability and the role agriculture can hold (Marsden, 2009) or to all farming styles. Van der Ploeg (2019) identifies two farming styles as

ideal-typical representations of the diversity of farming worldwide: entrepreneurial and peasant farming. These different styles reflect contrasting logics to farming as indicated in Table 1. I will highlight three central aspects of peasant farming: autonomy, co-production; and craftsmanship, before introducing the concept of retro-innovation.

Table 1. The main differences between the peasant and entrepreneurial modes of farming (from van der Ploeg, 2012, p.114)

Peasant mode	Entrepreneurial mode
Building upon and internalizing nature; co-production and co-evolution are central	Disconnecting from nature; 'artificial' modes of farming
Distancing from markets on the input side; differentiation on the output side (low degree of commoditization)	High market dependency; high degree of commoditization
Centrality of craft and skill-oriented technologies	Centrality of entrepreneurship and mechanical technologies
Ongoing intensification based on quantity and quality of labour	Scale enlargement as the dominant trajectory; intensity is a function of technology
Multifunctional	Specialized
Continuity of past, present and future	Ruptures between past, present and future
Increasing social wealth	Containing and redistributing social wealth

The degree of farmer's autonomy is the main difference between the entrepreneurial and the peasant style (van der Ploeg, 2012). Peasant farmers are less dependent on external resources because they produce most of the resources needed to complete a production cycle themselves. This includes commodities used as inputs (fertiliser, seeds, loans, technologies) and their output (production).

Co-production is a key concept in the peasant mode (van der Ploeg, 2012). Natural resources are ecological capital (Toledo, 1992 in van der Ploeg, 2012) that farmers transform and improve through co-production (van der Ploeg, 2012). Co-producing generates lower costs for farmers, which can be a motivation for some, while for others it will be the sustainability concerns that will drive those choices. Organic manure for instance is preferred over synthetic fertilizers.

Craftsmanship is at the heart of peasant logic (van der Ploeg, 2019). The term in Italian - the study is based on an Italian case - is *cura*, which translates to care. Hence, the notion of

craftsmanship and care are interrelated. Farmers need to produce in a normative way - producing good yields but in a way that is identified as sustainable, relying on farmers' self-provision, high labour input, passion, and knowledge (see *Figure 1*).

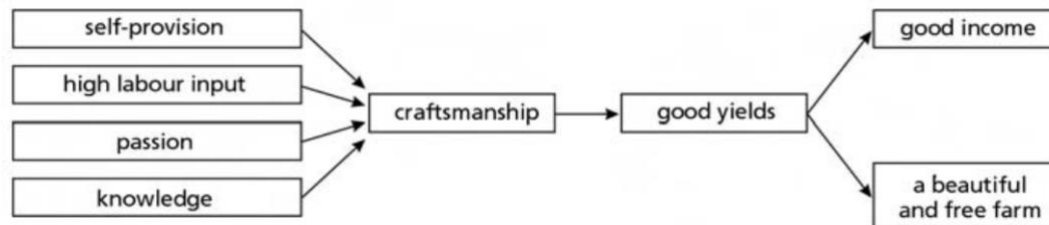


Figure 1. The peasant (contadino) logic of farming, from Van Der Ploeg (2012, p. 118)

Retro-innovation enables the exploration of local development, describing innovations coming from the farmers themselves rather than from outsiders such as agronomists, agribusinesses, or extension services. Using DA means reminiscing technologies and knowledge that has been marginalised and adapting it to modern practices. Retro-innovation is a concept enabling an understanding of the shift from tractor to DA farming by some farmers. Stuver (2006, p. 163) defines retro-innovation as “developing knowledge and expertise that combines elements and practices from the past (read; from before the dominance of the modern regime) and the present and configures these elements for new and future purposes”. Zagata et al. (2020) identify four key mechanisms which enact retro-innovation: reflexivity (1), reminiscence and revival (2), integration (3) and learning (4). After a critical reflection of what needs to change (reflexivity), individuals are reminded of forgotten practices (reminiscence). They bring back those forgotten practices (revival) and implement those old practices in a modern context (integration). Finally, actors need to learn both how to revive the old and integrate it within the current context for the retro-innovation to last.

Working with DA can be related to a peasant style of farming for different reasons:

In terms of autonomy, DA (apart from mules) have a reproductive capacity that the tractor does not have. The manure produced from DA provides natural fertilisers generated on the farm, internalising nature (see Table 1). Regarding craftsmanship, DA are more of a skill-oriented technology (see Table 1) than tractors. The latter corresponds better to the entrepreneurial mode of farming due to the high degree of commoditisation, centrality of entrepreneurship and

mechanical technologies (see Table 1). With DA, farmers rely on ecological capital to co-produce and develop their farm and production.

However, it is not so clear how DA are to be conceptualised in theories on farming styles and van der Ploeg's theory of peasant farming. Are they mere labour object, helping the farmer to produce but objectifying or something more? The need to consider the role of non-humans in farm practices is advocated by other sociologist scholars (Buller, 2014; Darnhofer, 2020; Murdoch, 2001; Peggs, 2012). I will use literature on the role of non-humans to consider if DA can be more than labour objects in farming styles.

4 Methods

The aim of this study is to highlight the relationship of farmers to their DA, farms, and surroundings, to better understand why they decided to farm with DA. I grounded my research in a qualitative interpretive approach, which is suitable to emphasise the meanings participants assign to their practices (Yanow & Schwartz-Shea, 2015). Critical reflections on methods and data sources can be found in [Appendix B.1](#).

4.1 Epistemological background

The choice of methods reflects the epistemological background of the study: I opted for interviews, a commonly used methods for farm-level studies (Darnhofer, 2020). However, following st. Pierre (2008), I did not assume that voices were the only means to understand farming strategies. I included participant observation, which could give more importance to the many ways in which farmers are entangled in relationships at the farm-level with human and non-human (Darnhofer, 2020). I operationalised this approach through non-representational theory, which aims to address the embodied dimensions of being in the world (Maclaren, 2019). Focus is put on materiality rather than on framings and discursive phenomena, like traditional interpretive methods usually do (Yanow & Schwartz-Shea, 2015).

The research design was abductive, which entails according to provide scientific explanations by testing the most plausible hypothesis with the data (Peirce, 1929 in Swedberg, 2014). An abductive approach is based on mixing an inductive approach (emerging from data) and confronts it with a deductive approach (relating data to existing theories). To understand the phenomenon of farmers (re)turning to DA, I opted for an in-depth case study that could deliver interpretations specific to this context (Cronbach, 1975).

4.2 Case study- Northern Italy, between the Po Valley and the Alps.

Interviews and participant observation were embedded in a field study in Northern Italy and conducted in Italian (see Figure 2).

Historically, there have been three farming property systems in Italy. In the South, land tenure was structured around *latifundium*, where an aristocrat owned a large amount of land and hired landless agricultural workers. In the centre of Italy, *mezzadria* (sharecropping) dominated, where the landowner rents their land to someone in return for a portion of the crop. In Northern Italy, land tenure stands out as it is characterised by a tradition of small independently owned property (Benedictis, 1981). As a consequence, farmers in Northern Italy have had more autonomy than in the centre and the south. Since the aim of the thesis is to understand why some people decide to use DA, it is more interesting to focus on Northern Italy, where historically farmers have had more agency in decision making regarding their farms, a tradition which has persisted up to the present.

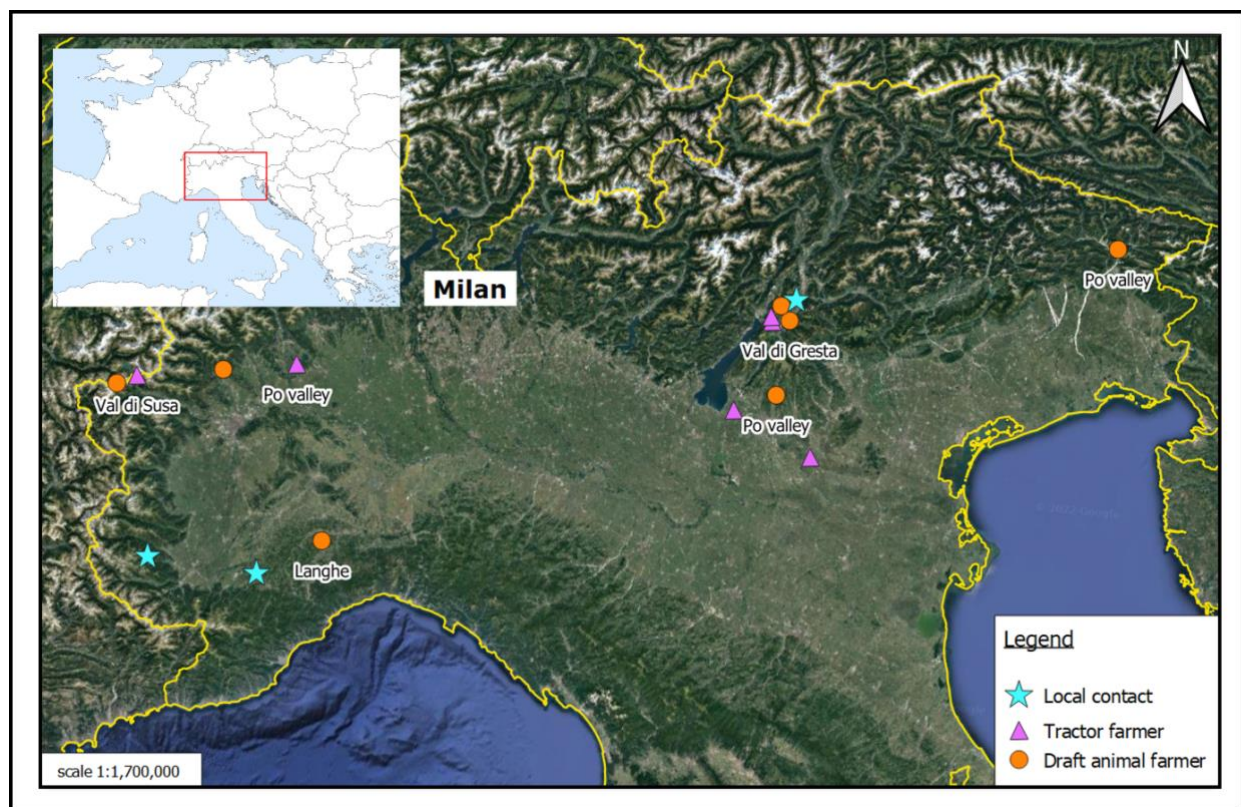


Figure 2. Geographical location of the case study area. Maps downloaded from Natural Earth, 2021 using QGIS Software (v3.20 Odense; QGIS Development Team 2021)

The research for this thesis was undertaken across four regions: Friuli Venezia Giulia, Piemonte, Trentino Alto Adige and Veneto. Two distinct geographical landscapes characterise these regions: the Po Valley, which spans those regions, and the surrounding mountains, including various parts of the Alps and Prealps as well as the Langhe. The Po Valley is the largest plain and the most important agricultural area in Italy (Noya et al., 2015). Industrial

agriculture dominates, producing mostly livestock and crops intensively and at a large scale (Noya et al., 2015; Soldati et al., 1992). Small-scale farmers are a niche in this context. Their farms and fields are concentrated in one area which differs from smallholders in the mountains. Due to the mountainous context, land fragmentation is common. The fields, farms, and cattle are scattered among a multitude of parcels of land, or terraces in the steepest areas. As a result, farmers need to travel back and forth between those different places.

Small-scale farming dominates in the mountains, as it would be impossible to carry out large-scale farming in steep terrain and on small parcels of land. Mechanisation remains quite low, and farming is labour intensive (Franco et al., 2020). Polyculture (crops, livestock, vineyard, honey, vegetable, orchards) is predominant. Nevertheless, specialisation has grown in the mountain areas too. In fact, the hazelnut production has considerably increased in some parts of Piedmont (Cerutti et al., 2013). However, many mountain areas which per definition have steeper slopes and higher altitudes are abandoned, like in the rest of Europe (López-i-Gelats, 2013). This is not a new phenomenon, many terraced landscapes were abandoned in the 1950s and 1960s in Europe (Varotto & Lodatti, 2014), and mountain farming has been decreasing ever since, due to the difficulty of making a decent living from it. (López-i-Gelats, 2013).

DA were used in agriculture in Italy until the advent of the mechanisation of agriculture in the 1950s (Benedictis, 1981). Oxen were most used on the farms for tillage as they have more strength than most others DA; mules, horses or donkeys were sometimes paired with oxen (Segre, 1998). Horses, donkeys, and mules were used to transport the farm production. Today, there are a few organic small-scale farmers who have decided to return to using DA, both in the valley and in the mountain.

4.3 Data collection

Most participants were identified with the help of the non-governmental organisation (NGO) *Schaff mat Pærd* (Work with horses). This NGO aims to promote research on the welfare of DA, develop new implements, and participate in knowledge exchange. The NGO helped to identify a country suitable for the research and most importantly, connected me with a local NGO based in Northern Italy. The latter recruited participants interested in the study. Once

they gave their consent, the NGO provided a list of participants which I contacted directly. In addition, one participant was identified via a video promoting working with DA on Youtube.

The fieldwork took place between December 2021 and January 2022. In total, I visited 13 farms of which 7 farms relied on DA and tractors, and 6 solely on tractors. In most cases, I interacted not only with the farm owner but also their spouse, with whom most shared half of the responsibility and ownership with. In addition, friends or workers were present. Table 2 below shows that besides recorded interviews, many informal conversations took place during participant observation.

Table 2. Participants and farms visited. The table shows the diversity of respondents. Recorded interviews always include participant observation. In yellow: participants included in the data analysis.

	Farm Owners	Workers	Family	Visitors (Friends/ Client)	Use DA	Location
Farm a	Recorded interviewed (couple, interviewed together)	-	Informal conversation	Informal conversation	Yes	Val di Gresta
Farm b	Recorded interview	-	Informal conversation	-	Yes	Val di Gresta
Farm c	Recorded interview	-	-	-	No	Val di Gresta
Farm d	Recorded interview (farmer and his son-in-law, each own a farm)	-	Informal conversation	-	No (used to until 10 years ago)	Val di Gresta
Farm e	Recorded interviewed (couple, separated interviews)	Informal conversation	-	Informal conversation	Yes	Udine
Farm f	Recorded interview	-	-	Informal conversation	Yes	Val di Susa
Farm g	Participant observation	-	Informal conversation	Informal conversation	No	Val di Susa
Farm h	Recorded interview	-	Informal conversation	-	Yes	Langhe
Farm i	Participant observation	-	-	Informal conversation	No (used to but is selling the farm)	Langhe
Farm j	Recorded interview	-	Informal conversation	-	Yes	Verona
Farm k	Recorded interview	Informal conversation	Informal conversation	-	No	Verona
Farm l	Recorded interview	Informal conversation	Informal conversation	-	No	Verona
Farm m	Participant observation	-	Informal conversation	-	Yes	Torino
Farm n	Participant observation	-	Informal conversation	-	No	Torino
Farm o	Participant observation	-	Informal conversation	-	No	Demonte

4.3.1 Participant observation

Participant observation is a qualitative method which enables the researcher to immerse and participate in the studied context to understand why and how a phenomenon occurs (Guest et al., 2017). It implies going where the action is happening, building relationship with participants which enable the necessary trust to behave naturally, and spending sufficient time to collect the data. Participant observation provide a highly contextual understanding (Guest et al., 2017), shaped through interaction between the researcher and the participants. It generates a lot of data which needs to be systemised through note taking, voice recording or pictures. At the same time, participant observation helps the researcher to intuitively understand the meaning of the collected data, as it is embedded in its context (Bernard, 2017).



Farm visits ranged between 2 hours to 5 days, depending on farmers' availabilities and time constraints. On average, I spent half a day and shared at least one meal with participants. In general, participants were encouraged to take the lead to highlight what was most important.

I engaged in many activities with the farmers, which provided non-representational data (see Table 3). I used the walkabout method, which consisted of visiting the farm and its surroundings with the participant to conduct participant observation. The walkabout enabled to collect social, ecological, and historical data *in situ* (Strang, 2010; Cooke & Lane, 2015). It showed how participants' practices and values materialised in the landscape.

Sharing meals was an activity that build trust with the participants. It mostly occurred after the walkabout, and participants often reflected on what we had done. Moreover, meals were often shared with the farmer's family and different members added their perspectives on the topics mentioned. Food offers a window on people's identity and history and invites to reflect on global, political, or economic developments (Haider & van Oudenhoven, 2018). Of all these experiences, working with a DA were some of the most valuable because I could see how they practically applied what they had theoretically discussed with me before and experienced it myself. Farmers are connected to their families and to the local community, and when visited by relatives, I could observe how they confronted each other on topics relevant for my study. In addition, visuals were sometimes used, asking participants for personal photos or videos. Some participants spontaneously share pictures and videos on What's App, sending voice messages, pictures, and videos.

Table 3. *The Five Primary Subjects of Non-Representational Investigation applied to participant observation (From Thrift, 2008, p. 236). For the complete table, see Table B.2. in [Appendix B.2.](#)*

<p style="text-align: center;">The Five Primary Subjects of Non-Representational Investigation applied to participant observation</p> <p style="text-align: center;">From Thrift, 2008, p. 236</p> <p style="text-align: center;">Activities I took part in are described (therefore “work in the farm”)</p>	
<p>Relations</p> <p><i>The entanglement of actors (human and non-human) which comprise the lifeworld where meaning is negotiated</i></p>	<p>1. In the car</p> <p>Terraces, for the most part abandoned, were at sight while we were driving. Alessandro explains to me why the terraces have been built in certain locations, and how he relates to them: “We need innovation, but we also need traditions”.</p>
<p>Events</p> <p><i>The happenings (e.g., accidents, adventures, mishaps, crises and occasions) which reveal and alter expectations, raising the possibility of alternative perceptions and outcomes</i></p>	<p>1. Walks along (visiting the farm and its surroundings)</p> <div data-bbox="486 675 1155 1123" data-label="Image"> </div> <p><i>Michele's field (left), Michele's neighbour's field (right) [farm h] - Michele works with his mule and donkeys on his field. While visiting the farm, he shows me that his neighbour's field is much more compacted, by rolling a ball of soil in his hand.</i></p>
<p>Doings</p> <p><i>The practices and performances (physical and</i></p>	<p>1. Cooking for the farmer and their family</p> <p>In two farms I cook for the farmers and their families to thank them. I make a dish that requires a bit of time. The farmers express how happy they are to eat what I prepared because they never have time to make food that takes a long time to prepare, since they work so much. This shows me to what extent farmers are busy.</p> <p>2. Working with DA</p>

<p><i>mental actions) which produce effects</i></p>	 <p><i>Sowing wheat with Luca and one of his horses</i></p> <p>Luca and Chiara let me guide the horse, to sow wheat. Although I am surprised by how easy it seems, Luca stays focused the full time, and explains me from where danger could happen- when the horse feel spatially trapped (closer to the woods and has less visibility). Horses' strategy is to flee from danger, which could be dangerous when they have an implement and harness attached to them.</p>
<p>Backgrounds</p> <p><i>The situated spatial contexts in which practices and events unfold</i></p>	<p>1. Working on the farm</p>  <p><i>I help Luca cleaning the leek before a delivery</i></p>

	<p>The wash and packaging area can be a highly sociable place, where farmer' families and friends come and help. Luca's grandmother always made sure to provide tea and homemade cake.</p>
<p>Affects</p> <p><i>A set of flows moving through bodies of humans and other beings – automatic, relational, and unreasoned responses to places and events, including but not limited to emotions.</i></p>	<p>1. Sharing meals</p> <p>Teo and his wife invite me for lunch. I interview him afterwards and he uses what we ate as a thread to develop how and why a product should be acknowledged for its qualities.</p> <p>2. Working with DA</p> <p>Matteo trains his two horses to show me how he works with them. Before working with the horses, he showed some signs of stress- speaking a lot, he got annoyed when the donkey was not behaving well...after working with the horses, he took the time to groom the donkey for 10 min. Matteo was much more calm too, he looked much more relaxed, was speaking in a calmer and quieter manner, and he tells me he feels much more relaxed from working with the animals. While all the farmers told me they had little time to do all their chores, after working with the horses Matteo could take the time to care for the donkey and for himself.</p> <p>3. Spending time with family, friends, and workers</p> <p>Chiara's mom and daughters walk me around the tranches, a few minutes only from their home. While we admire the panorama, Chiara's mom shows me where she used to bring the cows to pasture and tells me "Everyone was poor, but everyone was equal and happy back then. It has changed now".</p> <p>4. Using visuals (personal photos & videos)</p> <p>Michele shows me various videos they created in partnership with other farmers to promote the use of DA. He then starts looking up other content, that he wants to share with me. The topic gets broader and broader- from DA in Italy to France. It's getting late and I am tired, but I am not sure when to stop him because I find the role, he takes very interesting-of a teacher, helping me to conduct my research as best as he can.</p>

4.3.2 Semi-structured interviews

Interviews consist of an exchange between one or more participants and the researcher, in which the researcher leads the conversation. Interviews are used to explore how people understand and explain a phenomenon (Healey-Etten & Sharp, 2010). I opted for semi-structured interviews due to their flexible structure, which enables to ask follow-up questions based on participants' answers, rather than following strictly the interview guide (Kelly, 2010).

Semi-structured interviews ranged from 25 min to 1h40. I performed the interviews toward the end of my stay. In that way, I could return to topics that had been unclear. I could also use the interview to validate findings from the participant observation.

I conducted 11 interviews (see Table 2). Interviews took place in participants' homes, farms or while driving. It is important to acknowledge that farmers are extremely busy. Therefore, I tried to be respectful of their time. Interviews were recorded and transcribed. Consent to register was verbally sought beforehand. Questions were structured around an interview guide (see [Appendix D](#)), that was divided into two parts- a visit to the farm (the walkabout method described above), and a registered interview after the visit of the farm. The main themes of the interview guide were:

1. Farm layout, landscape, and history
2. Inputs/outputs
3. Work on the farm including extensive questions on working with DA

I pre-tested the interview guide with a Swedish DA farmer prior to the fieldwork, which enabled me to review which questions of the interview guide were essential.

4.4 Analysis

Transcription can be seen as an interpretive act more than just a technical one (Bailey, 2008). Thus, I transcribed the recorded interviews manually, to have a first round of interpretation of the data. Transcribed interviews were coupled with the field observation, visual materials, and field reflections. All materials were coded using the software MAXQDA 2022 (VERBI Software, 2021). Interviews and field observations with farmer using DA were fully coded, whereas the five interviews and field observations with farmers who did not used DA were coded only when they referred to DA.

The first round of coding included both deductive and inductive coding. I used deductive coding based on frameworks of farming styles (van der Ploeg, 2012, p. 29, p. 114; van der Ploeg, 2013, p. 41, see [Appendix C.1](#)) to align my research with previous works. I also coded inductively to see what would emerge from the data, following grounded theory principles (see for example Corbin & Strauss, 2012).

At the end of the first cycle, I reorganised codes as recommended in Saldana (2009) and Bazeley (2009) to analyse how codes are related to one another. I revised my research questions, so they are coherent with my current findings. This was a reiterative process. Eventually, I identified three main themes (stewardship, relationship, and technology). Pseudonyms were used to protect participants' identity.

5 Results

In this section, I present the main findings of my field study.

The seven DA farmers I visited work and organise their farm according to the peasant style of farming explained in the theory section. Yet, the way they work with DA, and how the animals relate to different other aspects of peasant farming differs. The heterogeneity of the farmers and farms working with DA is one of the main findings. However, they share some characteristics that trace back to a peasant style of farming:

First, all seven farms are small-scale farms, ranging from 5 to 16 ha, including crop, fruit and vegetable production, woods, and pasture. Although giving an exact number of how large the farm is, is not that simple: *“I work on 12 to 15 ha, but I don’t own a lot of it. It changes every year”* (Alessandro).

All seven farms are organic farms. Interestingly, only the production that is sold is organic. Meat produced for farmers’ personal consumption did not have an organic label. Five farms grow primarily organic vegetables. Of the other two farms, one produces cheese with a label of protected designation of origin and one produces vegetables and eggs and trains horses. Farmers all engage in pluriactivity, that enables them to earn an additional income. Examples of activities are ploughing snow in the wintertime, giving horse-riding lessons, apiculture, and carpentry. One farm earns its main income from designing and selling implements to work with DA. Pluriactivity also enables farmers to produce for household consumption: some farmers produce meat, eggs, fruits, processed products such as fermented vegetables or tomato sauce. On one farm, the spouse is a teacher. In all others, the spouses are either involved in farm activities or are housewives and involved in the farming activities, but to a lesser extent.

All farmers are newcomers to working with DA. Although all but one come from farming families, they are the first to reintroduce DA on their farms. Their grandparents, and sometimes parents had worked with DA, but they had been replaced by tractors or walking tractors and knowledge regarding DA had not been passed on. All farmers in this study made an active and conscious choice to resort to DA instead of following a family or community tradition. The reasons for returning to DA vary greatly, from being passionate about horses to adaptation in response of global processes such as financialisation of agriculture.

Following, I first describe how DA are integrated to the farm practices. Through one farmer's narrative I then illustrate how DA are retrofitted to modern, small-scale organic farms.

5.1 How do farmers use DA on their farms?

DA are integrated to farm practices in many ways. Michele, one of the farmers, describes them as a “*swiss knife*”:

“With an extremely low investment, you have a multifunctional tool, and it's like having a swiss knife, instead of have a knife for the bread and scissors, etc., you have a swiss knife that cost you little but that is useful in all your tasks.”

DA take different roles, although these varies across farms. Activities are differentiated by being part of farms' commodity circuit or enhancing farm's autonomy and relationships with organic farmers.

5.1.1 DA in relation to the farms' commodity circuits

DA are used to produce marketable output, mostly vegetable production. There, DA contribute to soil preparation, weed control, harvest and transport of the produce.

The first work in the field can be split in two phases. First, preparing the parcel with a tractor, followed by superficial preparations with the DA. Farmers begin ploughing or spading most of their parcels, especially if they have not been used for crop production recently. Ploughing is always done with a tractor, except for some minor exceptions. Matteo says: “*When we have a [new] parcel, the tractor ploughs it, or makes a first passage, milling the parcel*”. Luca explains: “*we use the horse only for non-invasive work [that does not penetrate the soil deeply] it would require the strength of two horses and be time-consuming to plough with the horses*”. Then, the soil is prepared superficially. It is during this phase of the cultivation that DA are used most, along with weed control. “*The horse in the context of my production, I use it to refine the carrots' seed bed, maybe also after ploughing with the tractor I go in twice [with the*

horse] with the tine harrow, once with the harrow to refine it well because for carrots the soil needs to be well refined, for the other vegetables sometimes I use only the harrow” (Alessandro).

Weed control is one of the main challenges of organic farming (Liebman & Davis, 2015). Luca gives a summary of how they use their horse in relation to weed control:

“On all the [parcels], we go in at least once with the horse, but on so many parcels we go in 3, 4, 5 times, it depends a little bit on the type of production. And we use hoes first, for additional passages sometimes we use the weeder harrow which eliminates the smaller weeds, and the tine harrow on the field before to sow to eliminate here too...let’s say the weeds that are still small”

In the valley, using tractors is possible. However, in the mountains, steepness of slopes and the narrow dimensions of terraces do not always accommodate tractors. Without DA, manual labour or walking tractors are the alternatives. The first is time-consuming, and the second a source of stress for farmers:

“If I work one afternoon with a horse, it’s physical work, but it’s manageable, if I work an afternoon with the walking tractor, the evening I am dead, the vibrations are really tiring and impacting physically.” (Teo)

Farmers who had worked primarily with walking tractors before say:

“Here it’s never so many hectares to do in one day, so with the horse you can do more than with the small walking tractors that we have here” (Luca)

In addition, farmer claims research should investigate small tractors functioning with electricity, as this would reduce vibration. However, if those machines existed, Teo, one of the mountain farmers would still rely on DA:

“If tomorrow this machine [existed] I would not abandon horses [...] I would continue doing the work I do with the horse. But this is linked to a way of being, to a...way of

being close to animals, which in short is a personal declination that must not be accepted, shared by all”

Therefore, DA are preferred for their efficiency but also because they reduce stress for farmer and because they have a strong bond with animals in general.



Figure 3. Luca & Teo, managing weeds with a hoe and the horse they bought together. Credits and permission granted to use by Marco Simonini.

Not only the bond with animals but also with other farmers is important. In Figure 3, Luca and Teo are managing weeds. They are friends and supported each other when Luca decided to reintroduce DA to his farm and when Teo started farming, after being a horse trainer. They are farming cabbage, an iconic product of their region. They bought the horse, Agata, together. She was already trained to work with logging, and Teo taught her to work in vegetable farming, which requires more precision, to not step on the plants.

In both cases of vegetable and cheese production, DA are occasionally used for harvesting and transporting produce. However, transport is mainly done with trailers or tractors, although some farmers use donkeys up to certain quantities “*up to 4 bins of milk, I can use the mule instead of the tractor*” (Michele). Michele prefers to use donkeys or his mule to save gas, both for economic reasons but also because he prefers that the energy he uses is developed on farm rather than provided by external inputs. He states that oil contributes to pollution and war.

Additionally, DA can facilitate other activities. In Figure 4, Alessandro logs with his horse for the forestry consortium. Previously, he was also hired to clear an area for a high voltage line project.



Figure 4. Video of Alessandro and one of his draft horses logging. (Double click on the image to see the video). The farmer guides the horse with his voice and his hands, through the reins. The sound of the video was removed to preserve confidentiality.

Other farmers had contract works with their DA, which varied depending on farmers' knowledge and the context. Two farmers engaged in activities related to teaching and training. One of them was originally a horse-riding teacher. The other bought and trained donkeys for farmers who lacked experienced with DA but showed interest in starting to work with DA. One farmer lives near a mountain hut, where food is often delivered by helicopter. Last year, he was hired to bring food with his mule and hopes to reiterate this partnership. Another farmer

occasionally works in vineyards with his draft horse. All these activities enable farmers to secure an additional income, as well as to develop skills beyond vegetable farming.

Finally, DA are attractive for customers. Some farmers explained that having a DA on the farm was appealing for the community: *“a client comes and ask me ‘can I go pet the horse’, maybe I waste some time doing so [...] but it’s fine like this. [...] it makes me happy that someone come here even just for 5 minutes”* (Giulia). DA were incorporated in some of the farms’ logos and present on farms’ social media. However, other farmers said that their customers did not care that they worked with DA and that this was not a driver to attract clients.

5.1.2 DA in relation to farm’s autonomy and organic farmers

DA are also used to develop the farm itself. First, DA contribute to regenerated resources. Manure is used as a fertiliser and four farmers logged with DA for their own consumption of firewood and timber (among those four is the farmer that is also hired for logging with his DA). The example of the wood shows how one activity can take multiple dimensions, as Giulia explains:

Regarding the wood, there the question of the educational farm, so to organize the food to be able to use it with children, more than anything else, so maintaining the wood clear, to produce logs to heat our home and to maintain the horses in shape during the wintertime.

Therefore, taking care of the wood holds benefits lower electricity cost, to provide a physical activity for the horses and to contribute to additional farm activities that can take place in the wood once the latter is practicable when a few trees have been removed.

Having DA is also a means for farmers to develop informal partnership and to support tractor farmers. Five out of seven farms cooperate with other farmers, who not have DA. They develop informal partnership in which they exchange work:

“He makes the first passage with a tractor, then we continue with a horse after, and then we divide the product, let’s say that we find an economic agreement to sell the

product or to use it directly in the farm [...] we will do this with the potatoes this year [...] and we will see if this collaboration functions.” (Giulia).

They also help fellow farmers in case of unexpected conditions in the field. Giovanni, an organic farmer who does not use DA states:

“They came once [Teo, with a horse] just because it was an emergency the potatoes had grown too much, I could not enter the field with the motor cultivator anymore, but with the horse you do less damage, so I had called him [...] it was a period in which it was continuously raining”.

5.2 How can farmers that use DA be characterised?

To characterise the farmers using DA I present a narrative portrait using farmer’s quotes and participant observation. The portrait addresses the research sub-questions in a narrative style, giving insight into farmers’ perspectives on:

- a. Socio-economic, environmental, and technological conditions
- b. Skills, farm organization and external conditions (network, market demand)
- c. DA farmers’ values and aspirations

A summary of the result for all seven farmers can be found in ([Appendix C.2](#)).

Matteo’s portrait was chosen because he is one of the farmers I spent the most time with (3 days), and his portrait enables comparison with other farmers. In addition, I interviewed his partner, who also works on the farm although she is not involved in working with DA.

Matteo is a young farmer who has recently started his own vegetable farm. He is a dynamic, curious, and talkative person, who is open and welcoming. The couple started farming on Matteo’s grandmother’s lands in the periphery of a town. Additionally, they bought their own land ten minutes away, in the countryside. Everything is at its beginning: last winter, Matteo built a stable for his DA, and many projects are still developing, like a didactic farm for children

and adults to gain awareness on agriculture. Iris, the main DA, is a Percheron from a French stud farm. Percheron are a French breed with cold blood, reflected in their calm characters.

5.2.1 Matteo's narrative

Farmers have different aspirations and values motivating their farming practices:

“The aim is also to be able to feed families. Ours and of the surrounding community. The objective, which has grown little by little is to reproduce the way of the peasant and its farm, with the various roles of the peasant from the past, which in substance contributed to develop social relations within the local community. Before, the farmer knew how to do a bit of everything and played a social role.”

Relating to the social role local farmers and communities had in the past, he wants to develop a network based on the local provision of work, income, goods, and services his farm can offer. This is an important aspect of farming for all participants, although younger farmers discussed it more extensively than older farmers. Networks could hold many benefits, both for the farmers, the community, and the local territory. Developing a network means to create formal jobs across sectors (for instance a leather craftsman would be needed if more people farmed with DA), but also informal partnership between farmers. However, for this it is needed for farmers to agree on farming practices. Developing a network also means to develop activities not directly related to farming but that contribute to the local landscape and community. Farmers are willing to share the space they have with others to create various activities such as inclusive project that introduce disabled children to farming.

DA farmers engage in a holistic approach to farming. Matteo continues explaining why he opted for non-conventional practices:

“We are looking for circularity in the farm, and all the other choices turn around this central idea of the project. Personally, I saw conventional farming as very impracticable, because the idea of a farm with tractors...with big investments not coming from a family of farmers was impossible. So, the horse is only one of these means to reach circularity, it is not an end.”

Farming conventionally is not Matteo's interest, but also something he perceives as 'impossible' since he has not inherited many hectares or equipment from his family. Beginning from scratch, buying a horse was cheaper than a tractor. DA farmers all advance that farming with animals is cheaper than with tractors. However, there was also some divide between DA farmers. One farmer working with donkeys, felt that the choice of the equid' race showed how wealthy the farmer was. Donkeys are much cheaper and safer animals than horses since they respond to danger by stopping, whereas horses respond by escaping, as three farmers explained.

Matteo describes how the farm is organised and how this shapes the relationship with his customers:

"We are in an interesting place here, because on the one hand in the fields on the outskirts of town there is a kindergarten and two schools attached to the fields and then most of our fields are in the countryside, in a beautiful place, where people like to come say hi and have a walk."

Figure 5 is a picture of Matteo's grandma's field. The position is strategic to attract potential customers. However, this can also slow down the work, as people get curious about Matteo working with his DA and interrupt him.



Figure 5. Matteo's family fields in the suburb, located near schools, a retirement home, and a tennis court.



Figure 6. Matteo and Giulia's main fields, out of the suburb. The surroundings are beautiful, and the door is always open, so people can feel free to come for a walk.

Matteo continues to develop on the position of his fields and how people relate to DA:

“I like the idea that people can come and see how we work... but the fact is that even with animal traction there is a memory of a lot of hard work. There was a lot of ignorance about how to work with the horse, certainly many more people worked with the horse, clearly, it was a different job.”

DA are associated to memories of hardships in the countryside, especially by older people. This is a potential explanation for the lack of transmission regarding working with DA. However, farmers explained that working with DA was different now that only a handful of people use them, compared to the time when everyone worked with DA. The fact that more people used them does not mean there was more knowledge, just that it was the only available technology at the time.

Today, perceptions around animal welfare have evolved and some people express pity for the DA, which exasperates Matteo. He explains that in the end, the relationship with his horse is the most important aspect of animal traction:

“I always get annoyed when we work in the fields in the suburbs when people come and say we're doing something from the past, or they say, “poor horse.” The real social aspect of animal traction, it's not the people that come and are curious, it's the animal itself and the relationship you build with the horse.”

Matteo and other farmers highlight the importance of the social aspect of farming. However, the relationship with their DA is the most rewarding aspect of working with them. Alessandro clarifies: *“When we speak, we say using the horse, but in reality, you use machines [you don't use animal]. Instead, the horse is a work companion”*. Farmers saw the value of technology to achieve tasks faster: *“if we had not taken the car up to give hens water, it would have been a completely different type of tiredness”* (Teo). However, farmers work with DA whenever they can because they find it more enjoyable.

Matteo addresses two important aspects of farming with DA. His passion for horses comes from early memories associated with family members, while riding was not appealing:

“Horses have always been a passion. Because when I was a child my grandfather had a horse, until I was 5 years old, so I don’t have any great memories, but maybe the photos [of his grandfather and him with the horse] of when I was a child have nourished my desire to have something to do with horses, and so as a child I went riding, and as an adolescent I realised that the horse riding community was not mine, I needed to feel a bit more about what I was doing, but often in riding schools you go there, the horse is ready, with the saddle, you get on the saddle, you ride, you get off, they teach you a few things.”

Although horses have always been a passion, riding horses in the proposed format was not challenging enough for him. Everything was already arranged. Farming can be a challenging job, which is an element most farmers mentioned and liked. However, two farmers with extensive experiences on DA and riding horses criticised that some farmers with insufficient knowledge and education began working with DA before having sufficient skills. Indeed, Matteo describes learning to work with DA as a continuous process:

“I learned with a gentleman who had draft horses in the region, and then I learned a lot on my own with Iris. You have to try to understand the horse. It’s the one who gives you the solutions, who explains you what to do. You definitely have to be an observer; you have to be attentive to everything; Iris is a working companion and a valuable helper.”

Matteo describes working with DA as a collaboration, which implies that both the farmer and the animal need to be committed to be active in the task. Michele describes how some of their DA were dedicated and took part of the work process:

“it’s really in her character, like people who never stop working, also in the weekends [...] they do it out of generosity [...] Kara is very available, she involves herself completely in the work, but sometimes you need to be cautious that she does not exaggerate [...] she trusts me quite good, in the sense that she does what I ask her to do, but at the same time she keeps an eye on me, because she knows that if I make a mistake she has to correct me. It’s great to work with the mule [...] who has a way to be aware of the collective, responsible, and analyses what is happening around her.”

The tractor does not enable farmers to see and feel the soil, animals and landscape like a DA can. Working with his horse makes Matteo more attentive of his environment:

“Because with the tractor you don't see anything, you don't feel anything, but the horse: it stops, and maybe it's because there are stones...so it's good for the equipment, it's better preserved. When you're on the tractor, you're in front, you don't see anything, instead with the horse you're behind, you have a lot of control, at the same time you see if there are insects, where you must harvest first, where the soil dries faster.”

DA are living beings with needs and limits, which must be respected. The farmer needs to be observant and constantly focus. Farmers said that respecting DA' needs was rewarding, as they then work better. When communication is clear, there is less risk of accidents, DA know what to expect and can be led only by voice. Farmers feel that they are in symbiosis with their DA. In Figure 7, Matteo prepares Iris for work. Her ears are oriented toward the front, which is a sign of trust and tranquillity. The stable is open, but she does not try to escape. Instead, she waits for Matteo's guidance.



Figure 7. Iris is calm while Matteo prepares her for work.

Matteo has both old and new tools, as well as some invented tools. Farmers were enthusiastic to describe their tools, where they came from, how they had improved them and how they used them. Some identified features of a ‘good tool’ include: affordability and ergonomics (for the farmer and the animal), easy use and suitability for maintains, possibility to repair them and multiple use. This shows that farmers rely substantially on themselves.



Figure 8. Iris' harness is a mix of reused, new, and invented parts.

In Figure 8, Iris wears her harness. The leather parts are the one in closest contact with the horse, which are more comfortable than the ropes. A part of the equipment broke and that's when Matteo added the ropes (yellow and green), which cost him 10 euros, instead of 500 euros for new leather parts. Another harness can be seen in Figure 9, where the farmer also invented its own harness, considering the donkey's comfort by adding sheep wool.



Figure 9 Pasco's harness has been invented by its farmer, using a horse's harness, some ropes, and sheep wool for comfort

6 Discussion

The motivations for working with DA and how those practices occur in small-scale organic farming in a European context can be approached using the theory/concept peasant style of farming. Based on this, the discussion highlights three aspects: DA farmers applying peasant logic of farming (see

Figure 1) to (1) technology; (2) relationships; and (3) stewardship.

6.1 Peasant logic of farming applied to technology

DA as a retro-innovation invites us to reflect on our interpretation of technology, and to see technology and innovation not as a constant improvement and shift to the new, but instead as an unfolding process and recombination between the old and the new (Edgerton, 2007). It also questions what is being valued by technology users: in the case of DA farmers, they value that DA can be used as a swiss knife, that are practical, affordable and are multipurpose.

The DA farmers in this study relate to technology as craftsmen and they adopt a peasant logic to farming by convoking crafts that can replace external technological design (van der Ploeg, 1994). This increases farmers' autonomy. Autonomy is another aspect of a peasant style of farming that differentiates it from a more entrepreneurial style of farming (van der Ploeg, 2012). This autonomy is a way for farmers to dissociate themselves from globalisation processes, which was reflected in how they related to innovation. Reasons emerging from the analysis were that a market logic to farming favoured large-scale farmers, led to exploitation of people (illegal work contracts, pesticide exposure) and of the planet (wasted harvest because it is cheaper to plant and get subsidies than harvest too). Subsidies provided by the Common Agricultural Policy (CAP)² were perceived as obsolete and covering only partially small-scale farmers' needs.

Agronomic and education sciences have investigated northern Italian farmers' reluctance to adopt new technologies (Caffaro & Cavallo, 2019; Marescotti et al., 2021). Findings suggest there is a relationship between farmer's age and the reluctance to adopt new technologies, with

² The CAP is a common policy in the EU that aims to support farmers and ensure food security.

older farmers being the less inclined towards new technologies. The studies mentioned here describe innovations that apply modern information and communication technologies, hence not including appropriate technologies or retro-innovations (Franco et al., 2020). However, all the DA farmers in this study were newcomers and adopted DA before their 40s (support available for young farmers is available until that age; European Commission, n.d.) and perceived it as an innovative way to farm. When recognising that different farming styles coexist, those farmers can be perceived as innovative by how they combine technologies and practices from the past and remodel them to fit their current farms.

Following the retro-innovation process, reflexivity of current practices occurs for farmers working with DA following two trajectories (Zagata et al., 2020). The first one is in reaction to their dissatisfaction with tractors as a reason to explore alternative technologies. The second one emerges from a passion towards horses. In that case, farmers worked with horses and took an interest in farming either for personal (spouse is a farmer) or financial reasons.

The DA farmers interviewed in this study aim to produce ‘good yields’ and have a ‘beautiful and free farm’ (see

Figure 1). Three farmers explained that the role of a farmer should not be to produce but to produce *products of good quality*- nutritionally, environmentally, and that provide fair livelihoods. Working with DA might be a passion, but it is also a way for farmers to make a living. Therefore, in the retro-innovation process, they combine DA with modern technologies. Farmers identify where DA are most appropriate and where tractors are still needed. For instance, transportation of produce was mainly carried out by tractors. The peasant logic of farming stating that good yields matter is thus respected (see *Figure 1*).

One novel aspect compared to the past is that farmers in the mountains, confronted with land fragmentation, can use their tractors to transport DA to the fields. This is part of the retro-innovation process, where previous skills and uses are remodelled to be adapted to the present needs.

6.2 Peasant logic of farming applied to relationships

Farmers need to learn new skills to work with DA, some that can be learned from the interaction with DA themselves, when working with them. Indeed, how humans position themselves in the world can occur through thinking but also by doing, through embodied interactions with non-humans (Cooke et al., 2016).

Learning is a key component of the retro-innovation process (Zagata et al., 2020), occurring when working with DA. Co-production is an important aspect of farming styles, in which farmers rely on the local ecosystem and interact with the latter, by converting nature into goods and services (van der Ploeg, 1997, p. 42). In this study, it is expressed by farmers choosing to rely whenever possible on DA, who are living beings, rather than on exogenous inputs such as tractors. However, animals remain labour objects, hence the full potential of the relationship between a farmer and their DA is yet unexplored (van der Ploeg, 2012). The Actor-Network-Theory (ANT) approaches the material world and non-human agency in a way that can capture farmers' everyday experiences with DA. ANT helps understand how those experiences contribute to continuous learning and ultimately to farmers' decisions to work with DA. Intermediaries and mediators are two concepts in ANT that illustrate the importance tractors and DA have for DA farmers. Intermediaries enable farmers to achieve their tasks. For instance, the hay farmers' produce enables them to feed their animals. However, mediators are more interesting according to Latour (1992), because they do not only carry the farmer's will to perform a task, but they also shape how the task can be achieved. In that sense, DA are mediators. As described previously, farmers collaborate with DA, which take an active part in the farm work and improve the farmers' perceived quality of work. When working with DA, farmers reported that they were not the only one making decisions. They had to respect their animals' needs and adjust to them. It could seem that the empathy required to work with a DA nurtured empathy and care for other non-humans. It could also be the opposite, that this general awareness is one motivation for farmers to gain interest in DA. In sum, how farmers relate to their DA reflect how they relate to nature in general.

The peasant logic of farming values social capital, which was confirmed by the inductive coding, where relationships emerged as one of the most prominent themes. Relationships with

family, peers and developing a network were highlighted, but also relationships with non-humans, mostly with DA.

The relationship with DA is valued and respected by farmers. All stated that DA are work companions and as such they are rather compared to human colleagues than to other animals. Applying the lens of ANT reveals that social ties are established with the animals and are essential for farmers. This could be considered as ‘passion’ in

Figure 1. Yet, it is not only passion that determines the place and role of non-humans in shaping farm practices. The co-producing aspect of DA is missing from *Figure 1*, and could be further analysed.

6.3 Peasant logic of farming applied to stewardship

Local environmental stewardship encompasses the actions that individuals take, based on their motivations and capacity, to pursue sustainability (Bennett et al., 2018). Knowledge and care are two of the main dimensions of stewardship (Enqvist et al., 2018). Knowledge is both central to stewardship and the peasant style (see

Figure 1). Among the farmers, information and understanding about DA and how they are contributing to sustainability at the farm-level seems to be obtained partly relying on sources external to their local region, which can be contradictory to peasant style literature and retro-innovation. Working with DA used to be a common practice in Northern Italy, but farmers who had the initial idea to revive this practice, could often only find limited information at the local level. Farmers described how they travelled across regions, sometimes countries, to find the knowledge they needed for working with DA. This knowledge includes horses’ ethology (some farmers took courses in France every year), implements and harnesses (found in Northern Italy but also in Europe, one farmer had even travelled to the United States), but also DA (three farms bought DA in France). This shows that working with DA has been lost and is extremely difficult to revive in the Northern Italian context. However, individuals wanting to bring back DA are proactive in this effort, suggesting that individual preferences and interests are strong drivers to revive the use of DA. This resonates with the literature on adaptive management highlighting the central role individuals can take to initiate change (Olsson et al., 2004; West et al., 2016).

A prominent motivation for reintroducing DA is care. One aspect of this dimension entailed farming in a way that benefits the farmer, future generations, and respects past efforts. Thinking about the past was particularly present in the mountains, where one of the motivations of DA farmers was to preserve the terrace landscapes through farming practices and valorisation of the local landscape. Retro-innovations like DA are means to link past and present, which is why it resonates so well with a peasant logic of farming. At the same time, DA farmers relate differently from the past than most other farmers, as they recognise that for many the past is connected to memories of hardships, and DA are a symbol of such hardship. However, they also valorise the past and lessons that can be learnt from it, by reintroducing DA.

A primary goal of the DA farmers in this study was to work in a ‘good’ way using any means of support. This may also explain the occurrence of using DA on the small-scale level. Only when the scale is sufficiently small, farmers can control processes surrounding their farm. In that sense, choosing to work with DA enables farmers to care for their farms, fields and animals in the way that fits them best, rather than having to comply with external entities. Farmers explained their practices as means to contribute to sustainability challenges within their sphere of influence.

6.4 Implications of findings for sustainable agrarian development

First, organic small-scale farmers are the most likely to be attracted to working with DA, at least in a European context. Farmers can be newcomers or long-term farmers, located in attractive valleys or marginalised mountains. Farmers embracing a peasant logic are found most likely to engage in animal traction. A farm with other animals, such as cattle, is not necessary but can facilitate having a horse, donkey, or mule, as they require the same kind of daily care.

Second, policymakers and agricultural schemes such as the CAP could better incorporate retro-innovations and valuing local rural development. Although farmers get support from those institutions, they primarily perceive them as an obstacle due to the heavy administrative burden.

Farmers need demand to produce. Thus, customers need to better understand the cost of producing food. Farmers through direct contact try to educate their customers, but broader awareness can help people to understand why some products are more expensive than others.

6.5 Discussion of methods and limitations of the approach adopted

The chosen methods enabled rich elicitation, through the combination of both interpretive and non-representational approaches. Farmers' interpretation of their motivations and farmer's practices could both be captured. However, these methods generated abundant data, which is challenging to navigate to succinctly depict farmers' motivations.

Participants were recruited if working with DA, to understand the potential that DA hold for sustainable agrarian development. However, interviewing participants who have tried working with DA and given up could bring insights on the challenges they encountered. This could help to understand to what extent these practices can be amplified (Lam et al., 2020).

Despite the rich data, there are several limitations of the adopted methods. First, qualitative methods, especially participant observation are influenced by what the researcher notices. In my case, my previous education is situated in Humanities and Human Geography. Therefore, I might notice more related aspects than agronomic and technical details farmers also mentioned. Second, the participants recruited owned their own farms and DA. This neglects another sector where working with DA still occurs prominently. In vineyards, farmers hire contract workers and their DA to perform specific tasks. Motivations could be different for those farmers and should be addressed by future research.

7 Conclusion

The aim of the thesis was to uncover why people still worked with DA in a European context, where modern agriculture relying on external inputs such as fossil fuel and fertilisers has been the “normal” path, despite negative consequences for the planet and the farmers alike.

I have shown that working with DA can be explained by a peasant approach to farming, in which preferences regarding technologies, manner of apprehending relationships and local environmental stewardship are key drivers in building interest in working with DA. DA is a retro-innovation that Northern Italian farmers revisit by investigating the past (getting hold of old implements e.g.), as well as exploring what is currently done (traveling abroad to get educated in animal traction).

This thesis contributes to the transdisciplinary literature by demonstrating how the farming style theory is useful to comprehend a case study on local transformation. Future research should continue exploring the role of retro-innovation in local agricultural development and explore how retro-innovations can be supported across scales, so that local initiatives flourish.

Farmers reintroducing DA are satisfied with this retro-innovation. This can contribute to reflections on what is considered old and new. Reframing our perceptions on technology can open the door to the re-emergence of other retro-innovations, exploring technologies that fit well the user itself, which can contribute to improved wellbeing.

Finally, the relationship farmers establish with their animals opens for reflections on how to include animals in sustainability transitions, giving them more agency than we usually do. In western worldviews, there is a clear separation between human and non-human, which leads to an objectification of the latter. This shapes sustainability actions, that can often be associated to words such as ‘managing’, ‘conserving’, ‘using’ or ‘controlling’. DA farmers on the opposite invite us to see the practices they engage in with DA as participatory and bilateral. This can encourage sustainability efforts to see non-humans as co-producers and to explore further how relationships between humans and non-humans can shape sustainable agricultural development.

8 Epilogue

Choosing to apply to this Master program was part of a personal exploration- in which way(s) can I contribute to the wellbeing of humans and the biosphere in a manner that feels right for me?

Hearing farmers' stories in the field, and going back home to a scientific institution, I was startled by the common points I found between both worlds. Administrative processes, funding, confrontation with frightening topics such as climate change or biodiversity loss, are challenges that both farmers and sustainability science researchers are confronted with. Welcomed initiatives are emerging in response, both in farming practices, with the slow food movement, and in academia, with researchers advocating for care practices (Corbera et al., 2020; Sellberg et al., 2021). How can one sustainably perform meaningful work such as producing food or advancing knowledge without burning out?

Although those are questions that will probably follow me for the rest of my life, knowing that I want to avoid ending up in a "bullshit job" (Graeber, 2013) is central and was strongly encouraged by meeting the farmers and their families. Craftsmanship is central to their practices, which means that they are in control of their work, can display something they are good at and experience value from their own labour. Although administrative processes, mainly caused by the CAP but also by local entities, reduce their autonomy, they resist and find ways to continue working meaningfully (Sayer, 2009). The cost is high: they work sometimes fourteen hours a day. But as Chiara tells me, at the end of the day, they are proud of their work and their conscience is at peace. I can only follow their example.

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Appendix

Appendix A Ethic Review – Final Review

As mentioned in the ethic review, DA farmers in Northern Italy are a small community. As such, they often gather once a year or so, to take part into courses related to animal traction. My main contact knew most of the other farmers, and they knew that he was the one that had given me their contact. When I visited farmers, they often asked me who else I was visiting. Some of them knew each other and asked me “Have you met x”? Since they were the one giving names, and that the study was not set in a conflictual context, I answered them. Farmers also asked me what I thought of their practices, and of others’. Being hosted by someone for three days and not answering felt unnatural. Therefore, I did answer, although I did my best to make observations and to be descriptive, but I did not give my opinion.

Those considerations made me reflect on the role of the researcher. During the full year, I reflected and struggled to identify my thesis’ reader- the farmers, the NGO that had connected me with them, the SRC? I finally opted for the latter since this is an academic work. I will rewrite this thesis in Italian and in a newspaper format to share with the farmers. Parallel to this, I wondered how I could match farmers’ generosity. During the field study, I already identified that developing a network was very important for these farmers. Therefore, whenever I could- and that it did not break my ethic review- I contributed to this effort. This included for instance to carry a gift from one farmer to another, or to put in relation two farmers that had expressed the desire to expand their network. These two farmers had met before but had lost contact. This did not stop at the end of the field study. When I contacted a farmer to ask for his consent to use pictures in which he could be identified, he asked me for pictures of the horse of one specific farmer. He had met that farmer a long time ago and they had not kept contact, but he was admirative of that farmer’s horse and wanted to see the horse working. I did not share pictures I had taken myself, but I shared the farmer’ social media account. Indeed, that farmer had told me that I could use those pictures as I wanted, and since he publishes them publicly, anyone can have access to them. I therefore did not see it as a breach of my ethic reviews. I also do believe that those small actions contribute at least as much as the research I conducted (Horcea-Milcu et al., 2020; Wittmayer & Schöpke, 2014).

Finally, I planned to seek written consent from participants, which I obtained in most case. Interviews were something finished abruptly (I finished an interview in the car and the participant had to run to a meeting), and in that case, verbal consent was given instead. When

I contacted farmers again and the photographer who had taken pictures that some of the farmers had shared with me and that I use in the final thesis, they all gave consent either on the phone, or by voice messages. In Italy, verbal communication is still much more common than written, so this represents a small deviation from my original ethics, to adapt to participants' preferences.³

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³ A paragraph was removed to ensure anonymity of participants.

Appendix B Critical reflections on methods and data sources

The section that follows critically examines methods and data sources.

B.1. Critical reflection of methods

Despite the depth these methods offered, having participants as the main source of data entails a set of challenges and limitations.

First, the season in which the field study was conducted affected data collection. I decided to conduct the study in wintertime as this is the least busy season for farmers. However, this limited the data collection regarding participant observation, as farmers use DA mostly during the spring and the summertime. Nevertheless, farmers themselves mitigated this limitation. Some shared videos of their work that they had previously recorded, and in one farm, the farmer had waited for my visit to sow a part of a field with his horse.

Second, farmers opened their home to me. They often invited me for lunch, and some even hosted me for a few nights. This led to uneven amount of data for each participant, but as the aim of the study is to understand people's motivations, this was not perceived as a shortcoming.

I found myself in a delicate position of not being only a researcher but also a guest, which required to act accordingly. Kuehne's (2016) reflections on interviewing farmers helped me to prepare beforehand but I still found it difficult in some participants' homes to not be just a guest but also a researcher and hence ask to begin the interview. In one home, only the participant observation was conducted, and I did not manage to establish the correct rapport to conduct an interview.

B.2. Critical reflection of data sources

As mentioned before, the NGO Schaff mat Päerd connected me with most of the study's participants. The NGO supports all DA farmers, regardless of the DA they work with, their level of experience or how long they have been working with DA. The NGO's only determining criteria to exclude a participant was non respect of animal welfare. Two participants were winegrowers and excluded for this reason, as winegrowing is different from vegetable and crop growing.


Of course, a reason that indirectly excluded participants was if the NGO did not know them, or not well enough to know how they worked.


During the field study, several participants mentioned farmers using DA either out of tradition, lack of resources or for marketing purpose. The latter was mostly regarding winegrowers. A participant mentioned farmers working with DA because they could not afford tractors, and that DA fitted their farm organisations. I met this participant right before Christmas and was going to pursue my field study in January in another region. Since Covid-19 was increasing a lot, I decided to not meet additional farmers than those I had planned to meet already. The same participant mentioned a farmer who used oxen out of tradition. They always had used oxen and never transitioned to tractors. He himself had tried to reach this farmer and to exchange with him but had failed. It probably would have been very difficult for an external person (in that case me) to get in contact with them.

As a result, those participants, and their motivations to farm with DA are not included in the study.


Appendix C Non-representational investigation applied to Participant Observation


Table C.1 Complete table on the five primary subjects of non-representational investigation applied to participant observation based on Thrift, 2008, p. 236

<p>The Five primary subjects of non-representational investigation applied to participant observation</p> <p>From Thrift, 2008, p. 236</p> <p>I describe the activities I took part in (therefore “work in the farm” means that I participated in the work for instance)</p>	<p>Relations</p> <p>the entanglement of actors (human and non-human) which comprise the lifeworld where meaning is negotiated</p>	<p>Events</p> <p>The happenings (e.g., accidents, adventures, mishaps, crises and occasions) which reveal and alter expectations, raising the possibility of alternative perceptions and outcomes</p>	<p>Doings</p> <p>The practices and performances (physical and mental actions) which produce effects</p>	<p>Backgrounds</p> <p>the situated spatial contexts in which practices and events unfold</p>	<p>Affects</p> <p>a set of flows moving through bodies of humans and other beings – automatic, relational and unreasoned responses to places and events, including but not limited to emotions.</p>
<p>Walks along (visiting the farm and its surroundings)</p> <p>This activity took 45 min to 1h30.</p>	<p>We work with Iris and Matteo. When we put her back in her paddock, Matteo says that we should not make Lara, the other horse jealous, so he brings her out to work with her too. Afterwards, he takes care of the donkey, who had been requesting his attention all afternoon.</p>	 <p><i>Michele's field</i></p>	<p>Michele shows me all the hazelnuts trees that are being planted. In response, he is trying to grow other trees such as almond trees. He experiments with different species and will plant more of the most successful ones the year after.</p>	<p>Chiara and Luca show me the land they have not been able to buy yet due to administrative processes- therefore, they do not have a single space where they can store their tools, their animals, and live their too. It shows me that they are ready to put large investments in improving the farm organisation and show me that how the farm is organised impacts their daily lives to a great extent.</p>	<p>Luca takes me to one of his fields. From there, we can see the whole valley. He shows me an industry, that he finds ugly. That building could be built, despite it not fitting within the landscape, while he has not been allowed to build a stable for his animals, due to his village being attached administratively to a village in the valley, that is disconnected from the mountains' reality.</p>

		 <p><i>Michele's neighbour's field</i></p> <p>Michele works with his mule and donkeys on his field. While visiting the farm, he showed me that his neighbour's field was much more compacted, by rolling a ball of soil in his hand.</p>			
Sharing meals	Sharing meals is an important activity where everyone gathers around the table. No matter how busy the day was, farmers always took the time to sit down and share this moment with the full family. Sharing meals was also a way to access farmers beliefs and values, sometimes more easily than during an interview. For instance, Silvia prayed before	While visiting the farm, Silvia and Stefano were quite reserved. During the meal, we got into an insightful discussion in which Silvia mentioned that she would love to go to America to meet the Amish, as they farmed in a similar fashion than them. However, she was sure this would never happen. I did not dare then to ask why, but assumed it was because they worked all year round	Farmers often described the origin of the food we were eating and how they came to choose an ingredient over another. Giulia explained to me that they ate fish, but not salmon or tuna that are among the most overfished species.	In the two farms where I stayed the longest, we ate once or twice food that had been made by the farmer's mother. They came by, sometimes worked a bit on the farm and brought food by the same occasion.	Teo and his wife invited me for lunch. I interview him afterwards and he uses what we ate as a thread to develop how and why a product should be acknowledged for its qualities.

	eating and thanked that we could have food. Later during the meal, she again highlighted how privileged we were to have food on the table.	with vegetable growing and had many animals too.			
Cooking for the farmer and their family	The first evening I eat with Chiara, Luca and their daughters, I was not allowed to help, which does not surprise me at all, as I have already been in similar situation in other Italian families. After a few meals, I can gradually help more, and on the last night they let me cook a meal for them. I see our relationship has evolved, from being invited to witness the daily activities to being fully included in each activity.	Not relevant	In two farms I cooked for the farmers and their families to thank them. I made some dish that requires a bit of time. The farmers express how happy they were to eat what I prepared because they never have time to make food that takes a long time to prepare, since they work so much. This shows me to what extent farmers are busy.	Not relevant	I feel a lot of gratitude for the farmers who have spontaneously open their farms and homes to me, despite uncertain conditions- Covid-19 has drastically increasing in Italy during my stay. Nevertheless, they have welcomed me as if they knew me already. Therefore, I want to communicate my gratefulness through cooking for them. When I announce that I want to cook for them, they fully engage with it and make sure I have everything I needed to cook.

Working on the farm	<p>Teo explains to me how he relates to technology while we are giving water to the hens- <i>“if we had not taken the car up to give them water, it would have been a completely different type of tiredness”</i>. Therefore, you should use technology when it is good for you.</p>	<p>While I help Luca and Chiara, she complained about some back pain. I see her as very energetic, but she says that the pain has been pretty bad the last days. Luca tries to help her as much as possible, and to carry all the heavy things so she can rest her back. I see how much support they give to each other when one needs it. They expand later on this during the interview.</p>	<p>While we work on the farm, washing and packaging vegetables, farmers show me which ones to discard. Depending on the reasons they keep it for themselves or their friends (e.g., aesthetic reasons) or for the animals (e.g., insect damage)</p>	 <p><i>I help Luca cleaning the leek before a delivery</i></p> <p>The wash and packaging area can be a highly sociable place, where farmer’ families and friends come and help. The grandma always made sure to provide tea and homemade cake.</p>	<p>Chiara gently blames Luca for not washing the truck after we have worked. She has deliveries to do in town, and she cares that the truck looks good, so they show a good image of the farm.</p>
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Working with DA	<p>When Luca and Chiara start sowing a field with their horse, they switch to speaking dialect. I noticed it straight away, because they have been extremely careful to be inclusive and to always invite their friends to speak Italian and not dialect around me. After having spent time with them for a few days, I can advance that this shift is unintentional and emerges out of being fully focused on working with the horse. Therefore, this shows me that working with a DA requires to be present in every steps. Once they have worked a few rows and everything went well, they could have their attention on me as well and explain me what they are doing.</p>	<p>While we are transporting some wood, Alessandro showed me where to stand so I do not get in any risky situation. I could see he is constantly changing his position, based on the horse, the log and the slope's inclination, in order to always stay safe if anything would happen.</p>	 <p><i>Sowing wheat with Luca and one of his horses</i></p> <p>Luca and Chiara let me guide the horse, to sow wheat. Although I was surprised by how easy it is, Luca stayed focused the full time, and explained me from where danger could occur, e.g., when the horse feels spatially trapped (closer to the woods and has less visibility). Horses' strategy is to flee from danger, which could be dangerous when they have an implement and harness.</p>	<p>While Teo trains a horse, he shows be the environment in which the training takes place.</p> <p>Teo has been training his horses (both horses for ridings and draft horses) in an area that brings stress to the animals, due to its location, near a popular hike starting point and a forest. The horses lack vision and openness; therefore, horses do not see where they could potentially escape. This led him to develop a theory on how to train horses.</p>	<p>Matteo trains his two horses to show me how he works with them. Before working with the horses, he showed some signs of stress-speaking a lot, he got also annoyed when the donkey was not behaving well...after working with the horses, he took the time to groom the donkey for 10 min. Matteo was much more calm too, he looked much more relaxed, was speaking in a calmer and quieter manner, and he tells me he feels much more relaxed from working with the animals. While all the farmers told me they had little time to do all their chores, after working with the horses Matteo could take the time to care for the donkey and for himself.</p>
In the car	<p>Terraces, for the most part abandoned, are a sight while we are driving. Alessandro explains why the terraces have been built in certain locations, and how he</p>	<p>While I drive up to meet Luca, I get stuck in some snow patches. I call him and he arrives not long after. He explains which roads are used depending on the time of the year.</p>	<p>While we drive to Luca's field, I see his dexterity at driving in narrow roads with a tractor and a horse in the van.</p>	<p>Travelling by car is a perfect opportunity for farmers to explain more about the history and the geography of the area. Moreover, it is when traveling by car that they can show me the diversity of farming</p>	<p>Michele was giving me a detailed answer during an interview when he stopped talking and showed me admiratively the view of the Alps.</p>

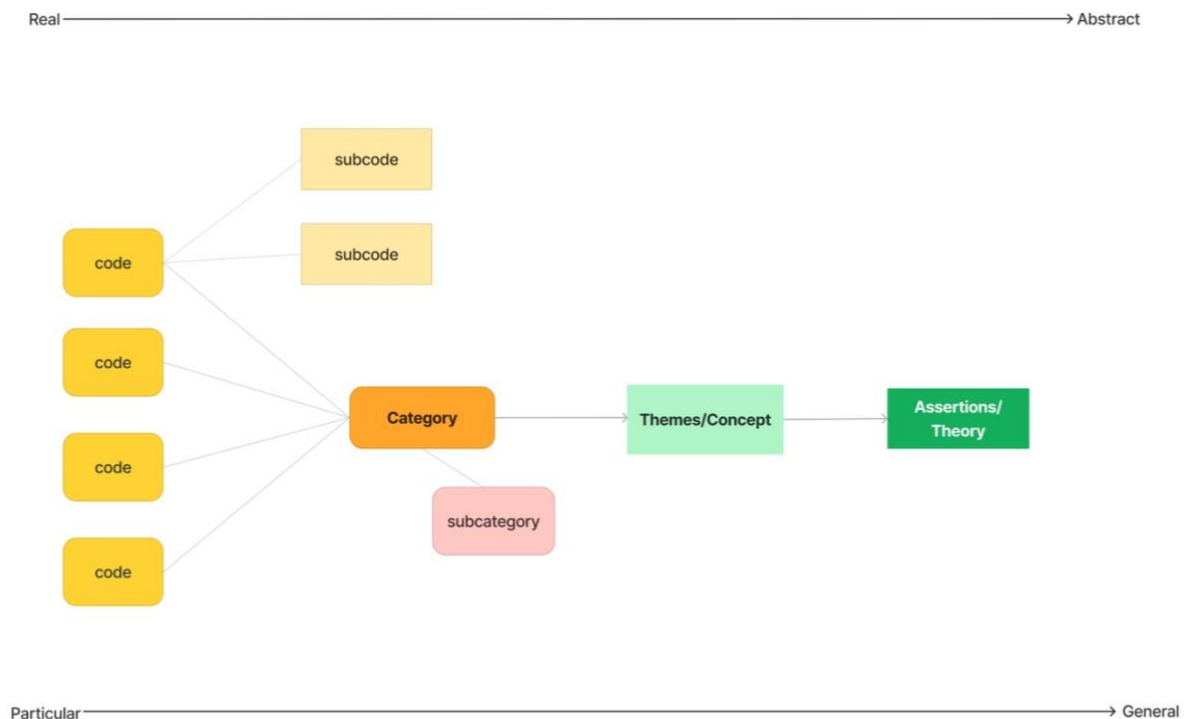
	relates to them: “ <i>We need innovation, but we also need traditions</i> ”.			in the region, as well as the system of land tenure.	
Spending time with family, friends, and workers	Matteo & Giulia have a contracted worker- while I am here, they have a disagreement with him regarding the extension of his contract- Matteo tells me afterward that it’s challenging to pay someone, rather than having people who develop their own projects on the farm.	Michele drove me to his friend Sara, who used to have a farm and some donkeys. They both asked me who I have been visiting and who else I planned to visit. When I told them about one farmer that was recommended to me for his social innovation regarding DA, they told me that I would not gain much going there. In their view, this farmer is only recycling already existing ideas, and is driven by the money he can make out of it. I end up following their advice and not going there. This also shows how much the field study is an unfolding process, in which participants can take a larger role than just being interviewed. They can also guide the research process, based on their experiences.	Spending time with family, friends and workers was extremely useful because they showed me around, adding some details that the farmers might have forgotten or have not found interesting to add. They have another perspective on the practices that take place, and therefore an insight in the local community’s opinions.	I realise how much protecting the mountain from certain external investments is important to Michele when he has a heated discussion with his son about nuclear plants. They do not come to an agreement regarding the topic but this shows me how much Michele wants to defend the mountain that he believes in.	Chiara’s mom and daughters walk me around the tranches, a few minutes only from their home. While we admire the panorama, Chiara’s mom shows me where she used to bring the cows to pasture and tells me “Everyone was poor, but everyone was equal and happy back then. It has changed now”.

Using visuals (personal photos & videos)	Speaking of some videos they made with other DA farmers, I saw how Michele is attached to some members of the community and holds good memory from this experience.	A pack of wolves visited the area- one farmer could film it and shared in on what's app. One of the participants then shared this event with me, by forwarding the video.	Alessandro sent me many videos of him working with his draft horse in the summertime, so I could see how he works since when I visited him it was snowing, and we could only move a few logs with his horse.	Farming in the mountains, especially when there are not many other parcels being cultivated, increases the risk of damage from wild animals. Alessandro tells me that he could show me many pictures of the damages that deers made in his fields.	Michele shows me various videos they created in partnership with other farmers to promote the use of DA. He then starts looking up other content, that he wants to share with me. The topic gets broader and broader- from DA in Italy to France. It's getting late and I am tired, but I am not sure when to stop him because I find the role, he takes very interesting-of a teacher, helping me to conduct my research as best as he can.
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Appendix D Analysis – Final inductive and deductive codes

Only codes that were used in the analysis (discussion) are included. Another important theme is production but went beyond the scope of the thesis. Most of the codes were inductive but could be associated with existing frameworks. In-vivo codes are codes using participants' own words. The in-vivo code “making a good work” could relate to “good yields” and “craftsmanship” in the peasant logic of farming (van der Ploeg, 2012, p. 118).

Deductive codes used in the final analysis	Literature source
Knowledge, labour object, farm activity, craftsmanship, skills, link past/present/future	van der Ploeg, 2012, p. 29, p. 118; van der Ploeg, 2013, p. 41
Emotions towards animals	Inspired from van Dam & Nizet, 2015, p. 137 (other codes from the typology of emotions were used but not incorporated in the final analysis)
Knowledge; care	Stewardship literature (Enqvist et al., 2018; West et al., 2018)



from Saldana, 2009, p. 13

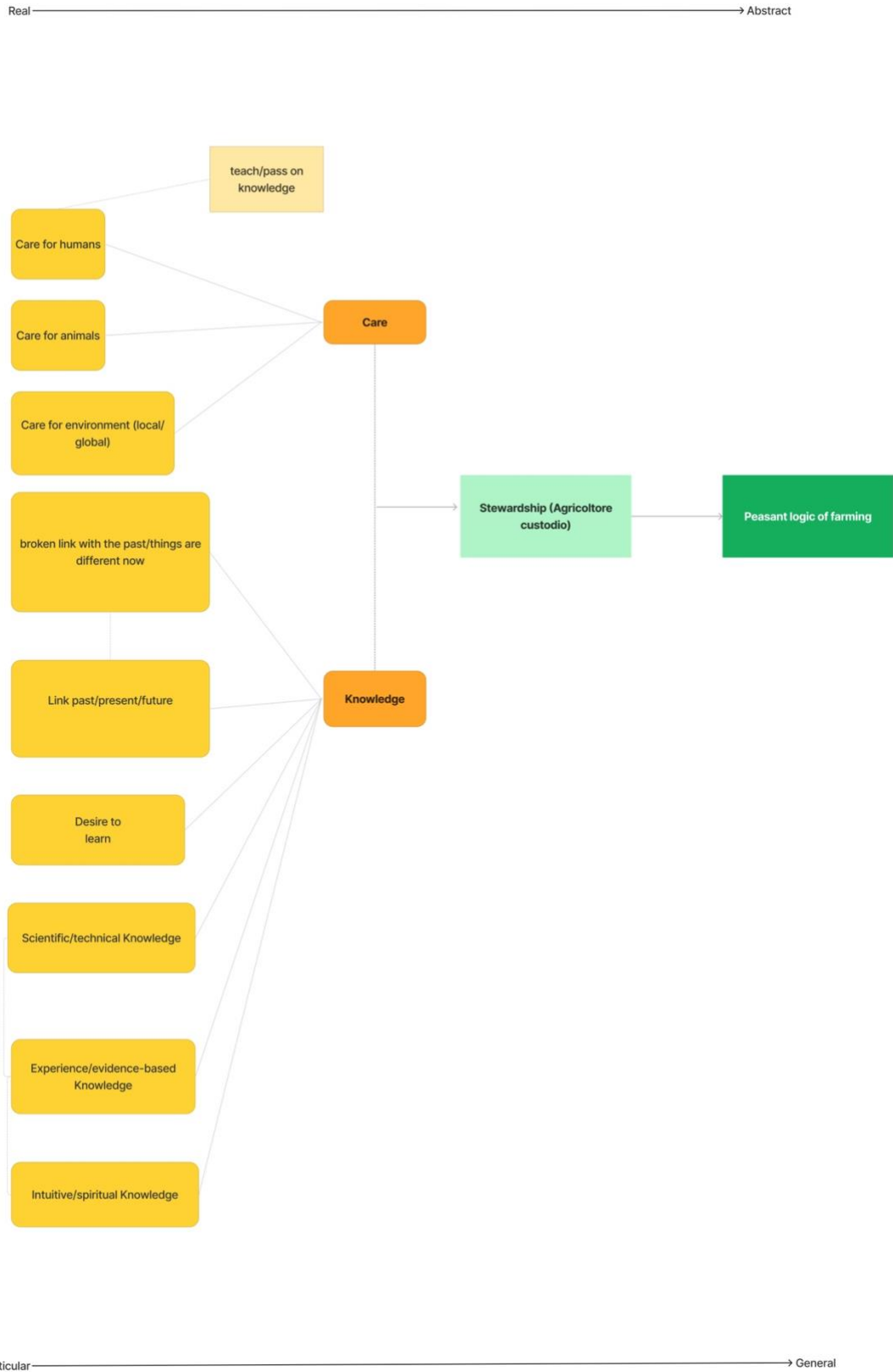


Figure D.1 Mind map of the final codes relatable to the stewardship's theme.

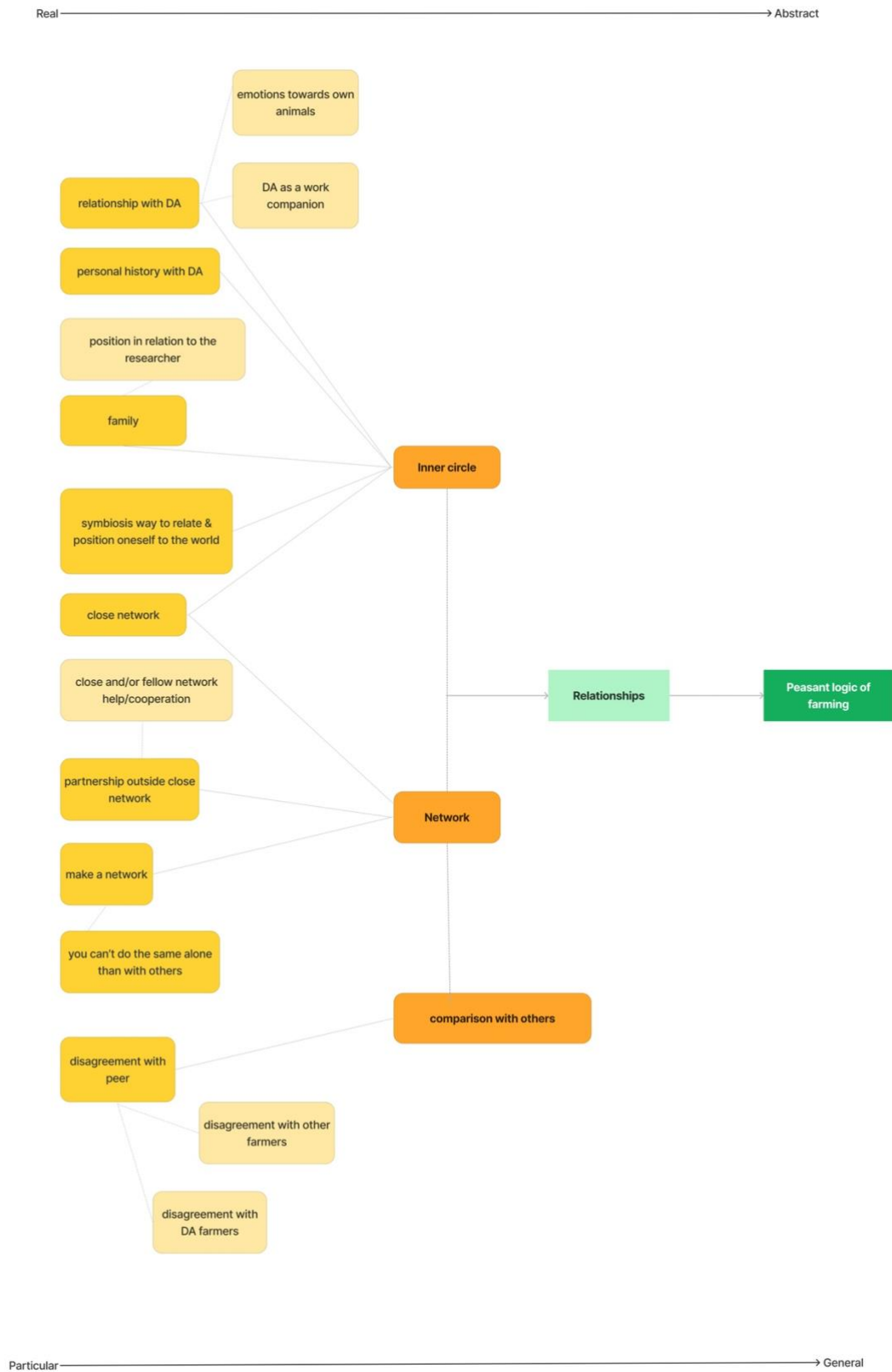


Figure D.2. Mind map of the final codes relatable to the relationships' theme.

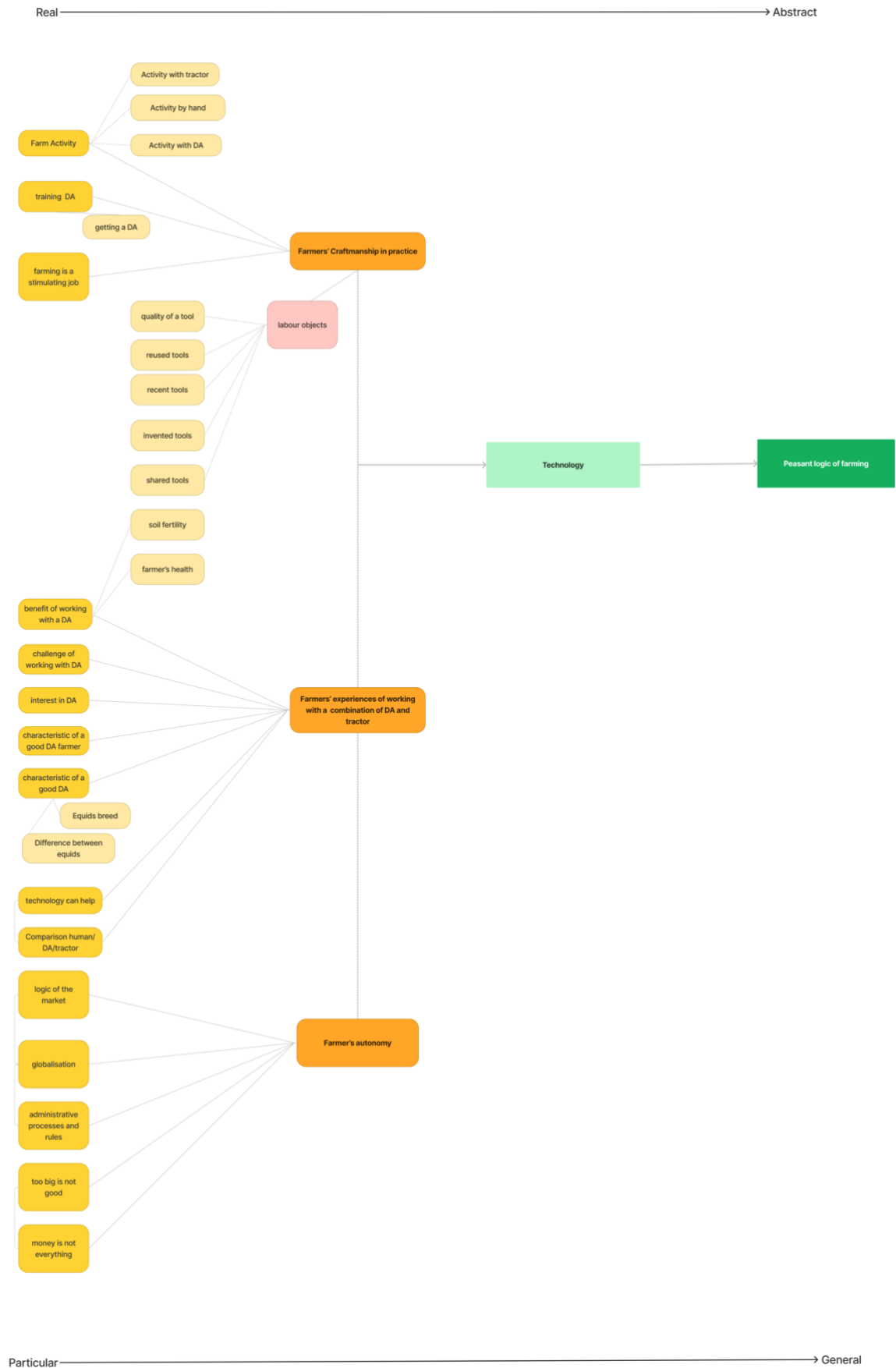


Figure D.3. Mind map of the final codes relatable to the technology's theme.

Literature cited not previously used within the main text

van Dam, D., & Nizet, J. (2015). The discovery of an object and the development of a method.
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Appendix E Results Characterizing DA' farmers

Table E. DA farmers' characteristics: farm organisation, external conditions, and farmers' aspirations.

Farmers	Production-commodity circuit ⁴ (Marketable output)	Production non-commodity circuit ⁵ (resources used in farm/personal consumption)	Farm & DA' history	Farm organisation (Who is working in the farm)	Technology	Skills	External conditions (network/market)	Aspirations & values	Geography
Matteo & Giulia	60 types of vegetables	wood, hay, wheat, eggs, horse manure	Family was originally farming but stopped.	Couple One person hired part-time One person part of social project Wwoofers in the summer Farm self-sufficient, with animals (quote Erica) Help from family and friends sometimes	2 horses (1 working, 1 in training) 1 small tractor	Train horse Work with DA Handyman (builder, work with iron, wood, invent & fix tools/horse equipment) Organic vegetable (+ crops & fruits) production Partner' compensating skills: accounting, marketing	Market: sell directly to local community Network: currently establishing networks-main goal is to develop various projects on farm, where everyone cares for farm	reproduce the former peasant model, with the various roles' peasants took, to create a community Powerful that your work contributes to feeding families	Valley-hills (Po Valley)
Chiara & Luca	15-20 type vegetables + fruits, transformed product	Meat, wood, hay, horse manure	Family was originally farming but stopped.	Couple Help from family and friends Knowledge exchange with Teo: taught him how to farm, and Teo	1 mule, 2 horses, shared with Teo Tractor Walking tractor	Work with DA Handyman (mason, builder, work with iron, wood, invent & fix tools/horse equipment) Organic vegetable (+ crops & fruits) production Hunter	Market: sell to wholesalers and organic stores. Sell directly at farmers' markets in the summer. Network: well-developed between local Wants to create a working group among young actives in the region	Motto: "Making the land fruitful without spoiling it" Affective bond with land, aware of past sacrifices to create terrasses. Farm in a sustainable way for future generations	Mountain (pre-Alps)

⁴ Production varies from one year to the next, depending on the weather, farmers' organisation, and market opportunity

⁵ Farmers also widely used food waste derived from cleaning vegetables to feed their animals, or for their own consumptions. This category shows that farmers produce much more than what they commercialise.

				taught him all about horses Learnt also from the first horse they acquired				Partner' complementary skills: accounting, marketing				
Michele	PDO goat cheese (80/day season)	Vegetables, wood, horse manure	No family background in farming	Learnt about donkeys and mules by takings classes in France, and by working with DA	Farm is a cooperative	a 1 mule + a few donkeys (varies) tractor	Working with DA Training donkeys Handyman Cheese production Vegetables & fruits production marketing	Market: Deliveries (private, restaurants, stores...) Network: important to not be too isolated geographically to have a support system- local community but also to maintain the state's services (schools...) Farming can survive only through developing a community around it and DA can help in that direction. part of informal DA network, and of a French draft organisation network	Food nourishes us, it musts be healthy Having a social and political reflection and express it in your work. Protect the local landscape	Mountain (Lower Piedmont)		
Stefano & Silvia	30 type vegetables transformed product	Meat, hay, eggs, horse manure	Family was originally farming but stopped.	Couple Help from family Help from friends to renovate farm		1 donkey, 1 horse + 1 riding horse to train as draft horse tractor	Organic vegetable production Partner's complementary skill: training DA (horse-riding teacher), crafting harness for donkey	Market: farmer's market, home deliveries and store on the farm Network: Support between small-scale farmers in the region	Farm for themselves first, then for others	Valley (Po Valley)	(Po Valley)	
Teo	Eggs (200 chickens) 15-20 Vegetables Meat	Hay, horse manure type	Uncle is a farmer, and they share a farm.	Teo and his uncle. Help from friends		1 mule, 2 horses, shared with Chiara & Luca Tractor Walking tractor	Organic vegetable production Hens Training horses (initial job, pursues it parallel of farming since 2008) Marketing Uncle complementary skills: Organic vegetable production	Market: farmer's market Network: Support between small-scale farmers in the region Try to develop a partnership with university regarding his method to train horses Challenging but would be key to create networks that value small-scale farming	Planet has limited resources; we all need to integrate this. Provide to family with good products- healthy, that created little pollution, gave work to someone, and helped creating a social network	Mountain (pre-Alps)		

Alessandro	Potatoes vegetables Honey	andHay, wood, meat, horse manure	Family was originally but farming stopped.	Hire someone during the summer Wife helped during the summertime but difficult with young children	2 horses, 1 working, 1 if needed Tractor	Organic vegetables production/honey/ Handyman Training horse Certified to work with DA in logging Partner's complementary skills: marketing	Market: Deliveries to restaurants and organic stores. Sell directly on farm during the summer Network: informal working group of farmers using DA Part of beekeeper's association	Farming needs innovation but also tradition Farming definition should be: producing quality products (and not just to produce)	Mountain (Cottian Alps)
Enrico	Implements for DA Transformed product	Vegetables, hay, horse manure	Inherited from father's conventional farm	Used to farm with friends. Has reduced the activity when they stopped. Help from friends	3 horses, youngest mostly used Tractors	Engineering (design and building) Organic/Biodynamic vegetables and fruits growing	Market: Implements: Italy but also Europe and South America Transformed product: orders one year ahead. Network: created the main NGO regarding DA in Italy. Close partnership with another European NGO. Used to farm with friends- when they stopped, he stopped biodynamic and continue with DA	Humans' goal is to grow awareness- defending the environment is not a fashion, it's a necessity, just like breathing is. Living in harmony with nature Interested in the spiritual aspect of producing food	Valley (Po Valley)

Appendix F Interview guide

The interview guide was translated and used by the researcher in Italian.

Underlined in yellow are the most important questions

INTRODUCTION

Hi and thank you so much for welcoming me to your farm and accepting to have this interview with me.

The study aims to understand why some small-scale farmers are still using draft horses and how they use them on the farms. I am also looking at farmers who are not working with draft horses to understand the differences between farming practices with and without horses.

The expected outcome of the study is to identify different styles of farming, which will allow to identify for whom horse-powered farming is most suited. This will help determine if horse-powered farming can be achieved only under very specific conditions or if it has a more general value and applicability to help small-scale farmers reduce their energy dependence and gain more financial autonomy (no monthly loans, lower costs of maintenance than tractors, etc).

Confidentiality is ensured, by following guidelines on how to conduct research.

(Even if I don't explain all about consent forms at the beginning, still mention their rights -free to not answer, to stop the interview whenever...). I would like to record this interview which will help me to avoid misinterpretations, etc. if that's fine for you,

And now let's begin, I will switch the audio recorder on:

Interview part I: visit of the farm

THEME 1: Farm layout, landscape & history

The layout of the farm

For the first couple of questions, I would like to ask you about your farm, your production and how you started here while visiting the farm if that's alright with you.

draw a map myself of the farm and check it with them so they can highlight what's important to them

What is the size of the land you use (hectares)? *(Try to differentiate for the different parcels, and ask if the parcels have any specific names) (especially in mountain areas, be sure to ask for the lay of the land; is it steep; hard to access, etc)*

Do you own the land yourself? Do you rent?

Follow up: When did you appropriate the land, and from whom? *(Perhaps everything was obtained in one go, or different parts were bought at different times; inherited from family, or bought from neighbours or others?)*

What sort of land do you have? *(e.g., forest, meadow, arable, etc. try to see if they can describe the land: dry or wet; fertile or not; etc.)*

How do you use the land? *(Try to differentiate for the different parcels, e.g. cropping, animals, but also consider other use like solar or wind energy production or nature conservation)*

Are there any particular wild (non-domesticated) species on or close to your farm that you care for? (both in the sense of 'like' and 'maintain')

Would you say that your farm is typical or different compared to other farms in this area? *(Why? e.g. Is there a difference between farms in the valleys compared to the mountains? are there mostly small or large farms?)*

Has farming in this area changed much since you have known it? What do you think of these changes? *(Farm abandonment; upscaling and intensification of farm products, etc.).* Have you experienced any changes in weather and seasons? And if so, can you adjust to that? (how)?

Theme 2 Inputs/Outputs

Outputs

What do you produce on the farm? (crops/milk/energy/animals/fruit/nuts/honey/etc)

Can you indicate how much milk or crops or animals or energy you produce? (Use relative indicator, e.g., litres milk/day or year?)

Have you always worked to produce x (crops/meat/fruit/etc)?

Do you keep animals on the farm? (How many; what breed; how do you decide which number is best for you? Why do you keep this particular breed?)

Do you feed animals with things produced on farms? If yes what, if no, why not?

If they have horses: same question, + do horses take part in growing their own food: help to cut hay and so on

What is your most important product economically (with what do you earn most)? Do you find you receive a fair price for what you produce?

And what product is most important to keep continuing the farm?

Is there produce that you use yourself for consumption, or as input on the farm? (Think of fodder for animals or seeds for cropping)

How do you maintain the fertility of your land and your animals (use of fertiliser/manure; use of chemicals for weeds)

Theme 3 Work on the farm

Technology

Can you show me the different machines you use?

Can you maintain and service these machines yourself?

Do you enjoy working and servicing machines?

How do you decide which machines you need to own yourself and which you don't need to own (but borrow or rent)?

Is there technology or machines you would like to use but which are too expensive or not available?

Do you rely on IT for farm work? (computers/phone/AI/satellite/robots)?
if yes, can you show me an example?

Working with horses:

Do you work with horses?

If Yes:

What sort of farm work do you do with horses? (examples)

Is there work on the farm for which you rely on horses?

How do you obtain the machinery and harness to work with your horse(s)?

When did you start to work with horses?

How did you learn to work with horses?

Do you buy your horses or breed and train them yourself?

Is there a specific breed you prefer? (Why?)

How do you make sure the horse is trained?

How do you know what the work capacity of your horse is?

What happens when your horse is too old to work? Did you ever have an incident with a horse?

Interview Part II after visiting the farm

Before the interview, try to recap as much as possible what has been said during the visit, to see what has already been answered or if sth important that should have been covered during the visit couldn't be covered and why

The history of the farm and its surroundings

Now I would like to know a little bit more about your history and how you got started here.

Do you have a picture of how the farm used to look like?

For how long have you been living on this farm?

Before you started was the farm owned by your family?

Do you have any siblings? And are they farmers too? *(See if you can ask why the current farmer is the one who has taken over the farm).*

Has the farm changed much from the time you started until now? *Can you mark these changes in the timeline? What were the biggest changes?*

With how many people do you live nowadays on the farm? *Do all of them also work on the farm? What do they do? Has this always been like this? (Timeline can be done if deemed interesting)*

Do you have other work besides your farm work? *(If so, where; is this work important?)*

Are you a member of any farmers' organisations, unions, breeding clubs, nature conservation associations, etc? Is any of these important for how you organise the farm and your work? *(Are you an active member?)*

Could you describe what in your opinion a good farmer in this area should look like? *(What does this farmer do and how)?*

During your time here has it become harder or easier for farmers in this region? What do you consider the biggest threats for farming in this region? *(why; examples)* How do you cope with these threats yourself? How do others in this region cope with this? Do farmers work together to face these threats?

What do you think the future of farming in this area looks like? (Positive or negative)

Do you know farmers around here who have quit farming? (Who and why?)

Did you ever consider quitting? (Why; when)

Do you have someone who will take over the farm when you stop?

Theme 2: Farm inputs and outputs

Outputs

To whom or where do you sell your produce? (is there one or more buyers? How do you decide where to sell your products, or to whom)

Do you know what happens with your products? (Where they end up and who consumes them).

Is your produce labelled as local or organic or any other type of quality label? (If so, when did you start with this and why?) (If not, have you ever considered this?)

Inputs

Do you borrow money to farm? (Perhaps people don't want to share, but you could ask how much or ask them if it is 'little' or 'much'; has this amount become during the years you farm here; from whom they borrow)

Do you receive subsidies for the work you do or the land you manage? (Which subsidies, and how much approximately) Are subsidies good or bad for farming?

Do you feel that decisions regarding the operation of your farm are largely left to you? (Are you the only one making decisions on the organisation of the farm work? And what about investments? etc)

Are there any forces or circumstances that compromise your independence in decision making and organising the farm work?

Is Italian and EU regulation influencing the way you farm? (How? positive negative? examples)

Can the Italian or EU government do anything to improve farming or to help farmers?

Theme 3: Work on the farm

Would you mind showing me any pictures of your work that you recently shared (when/with whom did you share; why did you share them)?

Seasonal calendar

To better understand what you do and how you manage your farm I would like to go through the seasons with you. List the activities that are done; which people are involved; what tools and machines are used (owned, borrowed, or rented?); how long does the activity take; when can it be performed (weather).

Mention also activities that are not connected to farming (tourism activities, snow ploughing, etc)

Mention if:

Besides your family, are there other people that help you on the farm? (neighbours/relatives) (do you help other people)?

Do you hire people to help you? (contract labour, e.g., with big jobs like sowing or harvesting) (agronomists or economic advisors or extension officers or veterinary) And do you work for others perhaps?

Can you tell me what work you do during:

Spring: What; when; where; who; how (tools and machines); why?

Summer: What; when; where; who; how (tools and machines); why?

Fall: What; when; where; who; how (tools and machines); why?

Winter: What; when; where; who; how (tools and machines); why?

Technology

From the discussion of the seasonal calendar, you already know quite a bit about the technology the farmer uses. List the machines and tools and check if there are items not included. Based on questions asked during the visit, see if need to make some follow up questions.

Is there any time of the year where you enjoy the work on the farm most? (why). And are there times that you don't like so much?

Values/Opinions:

Could you describe the last time you had a good day working on the farm?

When, in your view, do you find farming sustainable? Can farming have negative or positive effects on nature (or both)? (How?)

Is your work with the horses important for making the farm sustainable?

Working with horses

If yes:

What sort of farm work do you do with horses? (examples) RECAP to check we don't forget anything

When did you start to work with horses? How did you learn to work with horses?

recap these 2 questions asked during visit if feels needed:

Why do you work with horses?

What is or was your favourite horse that you worked with? (Do you have a picture?) (What was so nice or good about this horse?) What do you think are the qualities a good working horse should have?

What are the best things and worst things about working with horses? (Advantages and disadvantages) (examples)

When is a farmer suited to be working with horses? (can any farmer work with horses)?

Is farming with horses very different compared with farming with tractors? (How and why)

Are there any specific networks or organisations related to horses that you engage in? Why are you a member and/or involved in these initiatives?

If no:

Have you ever considered working with horses? (Why or why not)

Are you satisfied with your tractor and the different tools you use? When did you learn to drive a tractor? Has your tractor ever broken? What did you do then? Is the cost of maintenance high?

If both:

Are you satisfied using both tractors and horses? Would you want to rely more on the horses or more on the tractor? Why? What are the advantages and disadvantages of having both?

Is there anything more you would like to share?

CONCLUSION

Thank you so much for sharing all your knowledge regarding farming and your farm.

I have an information sheet with me that provides details on the study, how I will use the data and how I will guarantee confidentiality. I will go through the main points and if you have any questions don't hesitate!

PLS sum up:

What participation in the study involves?

How to learn about study results

Participation is voluntary

How your personal data will be processed

Do you want to keep a copy of this document?

Now that you know what the study entails, I'd like you to sign the consent form, if all is good for you,

Please, don't hesitate to contact me if you have any questions,

Thank you so much for your time!

Appendix G Plain language statement (PLS)

The plain language statement was translated and shared with the participants in Italian.

I introduced the aim of the study and its implications for participants verbally. I gave an outline of the PLS. I then asked participants if they wanted to keep a copy and if they needed some clarifications.

Information sheet regarding participation in the research project *Horse-Powered Farming, a retro-innovation in small-scale agriculture. A case study of Small-Scale Farming in Northern Italy.*

Information about the project and how research subjects are selected

I am a master student at the Stockholm Resilience Centre, affiliated to Stockholm University.

I want to ask you if you would be willing to participate in a study within a research project called *Horse-Powered Farming, a retro-innovation in small-scale agriculture. A case study of Mountainous Small-Scale Farming in Northern Italy.*

With this project I wish to understand decision-making in farming practices, more specifically understanding why people choose to farm with draft horses instead of, or in co-use of tractors.

The idea behind the project is that high cost/high tech technologies developed for large-scale farming do not always fit small-scale farmers needs and that alternative retro-innovation (that combines knowledge from the past with recent technologies) should be researched, to develop sustainable farming practices. Gaining the farmers' perspectives, their aspirations, capacities, socio-economic situation, etc will enable unique knowledge on the workable choice of using draft horses in small-scale farming. Therefore, I wish to interview farmers using either draft horses, tractors, or both to understand the differences between them that leads to different farming strategies.

The reason I ask you to participate is because you are a farmer, using either draft horses, tractors or both and I am interested in your experience and expertise.

We have reached you thanks to the help of [name of participant removed in final thesis to preserve confidentiality] and Paul Schmit, from the NGO Schaff mat Päerd. The research principal (forskningshuvudman) of the project is Stockholm University. The research principal is the organisation responsible for the project. The project is funded by Stockholm University as a master thesis.

What participation in the study involves?

If you agree to participate, this will mean that I will interview you for 2 hours, in your farm. In addition, if you agree I will visit your farm and spend between half a day and 4 days (based on oral agreement beforehand) in your farm, to assist you and observe you during your regular working day.

This will enable me to understand better the different farming strategies that take place in northern Italy. In addition, I will ask you if you can share pictures from your farm and your daily activities. The pictures may be on your phone, or in photograph album. In case I want to use these photographs in the study, I will ask for your written consent first. Since the project will be in-person, adjustments to fit the Covid-19 pandemic will be taken. To minimise spread of the virus, I will guaranty that:

The student (Anna Garre) is vaccinated against Covid-19

The student (Anna Garre) will respect the regulations established by the Italian government

The student (Anna Garre) will take any additional measures discussed prior to the interview that will make the interviewee feel safe- 2-meter distance, wearing masks, washing hands, auto-test before the interviews.

In addition, the student (Anna Garre) guaranty to not take any unnecessary risks.

If, nonetheless, participants do not feel safe for any reasons due to the covid-19 pandemic and that the mitigation measures offered are not sufficient, participants will be free to withdraw from the study at any time.

For your information, the study will take place in December 2021 and January 2022. If possible, I will come back between the 7th and 13th March 2022, to observe and assist farmers in their work. This will be decided after completion of the first field study.

How to learn about study results

I will send a physical copy of the finished master thesis to each participant, so you are able to have access the results of the study. In addition, I will see if it is possible to publish an article summarising the research results in a local/agricultural newspaper and on Schaff mat Päerd's webpage.

However, individual collected data (transcribed of the interviews) will not be made available to ensure as much anonymity as possible.

Participation is voluntary

Participation in the project is completely voluntary. At any time, you can choose to no longer participate, and you do not have to say why. If you choose to no longer participate, this will not affect your relationship with the NGO Schaff mat Päerd. If you no longer wish to participate, you must notify Anna Garre as soon as possible, see contact details below. You can do this at any time of the project, even after the interview, but note that after the 28th of March, the data will have been analysed and it will not be possible to withdraw your participation from the research project anymore.

How your personal data will be processed

If you choose to participate, the project will use some information about your farming activities and what guide them (education, personal interest, economic situation, etc). This information will be collected by interview, PO of daily activities and photography (if prior approval and signature of the related consent form). You will always have the option to not answer to a question during the interview, and during the PO you will not have to show all parts of your farm and of your activities if you do not wish to.

It will be possible to link this information / part of this information to you by:

Storing your contact detail and consent form to contact you to organise the field study and contact you to share results. Information that can be linked to you in this way is considered personal data in accordance with the EU General Data Protection Regulation 2016/679 (GDPR). The reason why the project needs to process such personal data is to organise the field study, contact you to share results and archive the consent form in accordance with GDPR.

The information you will provide during the interviews and that I will collect while visiting your farm. The interviews will be recorded.

During interviews, information that you share before or after the recording might be used. If so, consent will be asked from you. Similarly, if quotes are to be used in the final thesis, written consent will be sought. Names will be changed, and the location of the farm will be as less specific as possible. Information such as name of the draft horses, how long you have been farming, etc will also be modified to provide as much confidentiality as possible. However, complete anonymity cannot be fully guaranteed- your neighbours, fellow farmers or relatives might recognise you based on the data analysis during the study.

The reason why the project needs to process such personal data is to understand why farmers use draft horses in small-scale farming.

Stockholm University is the controller of this processing of personal data. The legal basis for the processing of personal data is that the processing is necessary for the performance of a task carried out in the public interest, Article 6.1e according to the EU General Data Protection Regulation, Article 6 (1).

The personal data will be kept within the European Union. To ensure this, personal data stored to contact participants will be stored in a password access document on a personal computer. Personal data gathered during the interviews, such as name of the farms, of the draft horses, indication of how long the farm has been own, in brief anything that can be traced back to the participants, will be stored on Sunet drive, which is provided by Stockholm University and that ensures compliance with GDPR.

For the project to be carried out, certain people will be given access to the personal data, namely the student and potentially her supervisors to assist her while she analyses the data. Unauthorised persons will not be able to access the data.

When the project is completed, data that have been collected and processed within the project will be saved for at least 10 years. Personal data that can be traced directly to participants, such as phone

numbers and addresses, consent forms will be stored in a password-accessed file on the student's personal hard drive. The transcripts from the interviews, notes from PO and photography will be archived since the data collected for this project is considered to be SU property according to the Swedish Research Council's guidelines. Therefore, the anonymised data will be stored on SU servers. It will include the transcribed audio recordings and notes from the PO (with identifiable information being removed). If pictures are taken, the only ones made available will be those that do not give away personal data (such as face, location, etc). The geotag information of the pictures will be removed too. The data will be archived with meta-data that will explain what terms of conditions I have agreed with the participants in terms of secondary use/future use of the data and confidentiality. If the material is judged to be of lasting value, it will be preserved for the future.

According to the EU General Data Protection Regulation (GDPR) and national supplementary legislation, you have the right to

- withdraw your consent at any time, without affecting the lawfulness of the processing that occurred in accordance with your consent before it was withdrawn [use this formulation only if the legal basis for the processing of personal data is consent]
- request access to your personal data
- have your personal data rectified
- have your personal data erased
- have the processing of your personal data restricted.

In certain circumstances, the EU General Data Protection Regulation and supplementary national legislation allow for derogations from these rights. For instance, the right to access your data may be restricted due to requirements for secrecy, and the right to have your data erased may be limited due to rules concerning archiving.

If you wish to invoke any of these rights, you should contact the researcher responsible for the project (Anna Garre) or the data protection officer at Stockholm University (dso@su.se).

If you are dissatisfied with the way your personal data are processed, you have the right to file a complaint with the Swedish Authority for Privacy Protection (Integritetsskyddsmyndigheten). Information about this can be found on its website (imy.se).

Ethics have been considered by SRC Research Ethics Subcommittee.

If participants have any concerns about the conduct of the research, they can contact the SRC Ethics subcommittee in the following email: src-ethics-review@su.se

Insurance and compensation

No remuneration will be given to participate in the project.

Contact information

Title	Name	Institution	Contact
Master student in charge of the project	Anna Garre	Stockholm Resilience Centre	anna.amella.garre@gmail.com
Supervisor	Wijnand Boonstra	Uppsala University	Wijnand.Boonstra@geo.uu.se
Co-supervisor	Simon West	Stockholm Resilience Centre	simon.west@su.se
Co-supervisor	Paul Schmit	Schaff mat Päerd	schaffmatpaerd@pt.lu
Expert reviewer	Jamila Haider	Stockholm Resilience Centre	jamila.haider@su.se
Data protection officer at Stockholm University	Björn Gustavsson	Stockholm University	Dso@su.se

Appendix H Consent form

The consent form was translated and shared with the participants in Italian.

Consent to participating in the research project Horse-Powered Farming, a retro-innovation in small-scale agriculture. A case study of Small-Scale Farming in Northern Italy.

I have been informed by the researcher on what participation in the study entails and how my data will be processed. I know that this information can be found in the document ‘Information sheet regarding the research project Horse-Powered Farming, a retro-innovation in small-scale agriculture. A case study of Small-Scale Farming in Northern Italy.’

I have been given the opportunity to ask questions and I have had them answered. I may keep the written information.

I also understand that participation is voluntary and that I am free to withdraw at any time.

To do so, or if I have any other query, I can contact the researcher of this study, Anna Garre (anna.amella.garre@gmail.com).

☐ I consent to participating in the study described in the document “Information sheet regarding participation in the research project *Horse-Powered Farming, a retro-innovation in small-scale agriculture. A case study of Small-Scale Farming in Northern Italy.*”

☐ I consent to the processing of my personal data as described in the document Information sheet regarding participation in the research project *Horse-Powered Farming, a retro-innovation in small-scale agriculture. A case study of Small-Scale Farming in Northern Italy.*”

Place and date

First Name, Last Name & Signature

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