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Review

Local food systems: Reviewing two decades of research

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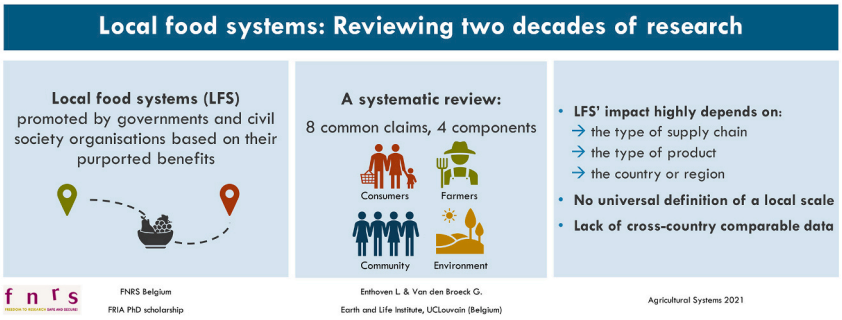
HIGHLIGHTS

- Governments and civil society organisations have actively promoted local food systems over the past decades.
- We systematically test eight common claims on local food systems against multi-disciplinary scientific evidence.
- Their impact on social, economic and environmental factors highly depends on the type of supply chain, product and country.
- There is no clear definition of a local food scale and a critical lack of cross-country comparable data.

GRAPHICAL ABSTRACT



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ABSTRACT

CONTEXT: Food systems worldwide are under enormous pressure. Over the past decades, local food systems have been promoted by governments and civil society organisations as a lever for change towards more inclusive, resilient and sustainable food systems based on the belief of their many purported benefits.
OBJECTIVE: The goal of this article is to test eight common beliefs on local food systems – from a consumer, farmer, community and environmental perspective – against scientific evidence, with a focus on North America and Europe.
METHODS: We conduct a systematic multi-disciplinary literature review and identify 123 peer-reviewed studies on local food systems.
RESULTS AND CONCLUSIONS: We find that the impact of local food systems on different social, economic and environmental factors highly depends on the type of supply chain under assessment, with important differences across product types and countries. Hence, our review refutes the idea that local food is inherently good. In addition, we highlight the confusion surrounding the definition of a local food scale and point out a critical lack of cross-country comparable data hindering the possibility of drawing generalisable conclusions on the benefits and drawbacks of local food systems.
SIGNIFICANCE: A comprehensive review of multi-disciplinary scientific evidence confirming (or refuting) claims on local food systems was missing, leading to possible counter-productive policies. Based on our findings, we suggest that policy-makers should invest in cross-country comparable data collection on local food systems (especially in Europe), which would allow the scientific community to perform robust causal analyses on their impacts on society.

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1. Introduction

Global population growth, rising income and increasing urbanisation are placing enormous pressure on food systems worldwide (Nyström et al., 2019). The need to transition towards more inclusive, resilient and sustainable food systems is clear. As set by the Sustainable Development Goals, this transition should ensure consumer access to safe, nutritious food, improved remuneration of farmers, preservation of natural resources and climate change mitigation (UN General Assembly, 2015).

The role that local food systems (LFS) may play in this transition is increasingly drawing the attention of the general public, policy-makers and researchers, especially in high-income countries (De Schutter, 2017). Particularly during global crises, such as the COVID-19 pandemic, LFS are often put forward as more resilient food systems (Stephens et al., 2020). Over the past decade, governments worldwide have actively promoted LFS, based on the belief in their purported benefits (Jones et al., 2004). For instance, in 2009, the USDA established the "Know Your Farmer, Know Your Food Initiative", and had invested over one billion US$ in local and regional food projects by 2014 (Ahearn et al., 2018). In Canada, the government recently created the "Local Food Infrastructure Fund", a five-year, CAN$50 million initiative ending in 2024 aiming at supporting "community-based organisations with a mission to reduce food insecurity by establishing and/or strengthening their local food system" (Government of Canada, 2019). The European Commission for its part has set the "Farm to Fork Strategy" in 2020, which mentions that "with a view to enhance resilience of regional and local food systems, the Commission in order to create shorter supply chains will support reducing dependence on long-haul transportation" (European Commission, 2020).

Eight claims surrounding LFS are often put forward by governments and civil society organisations. LFS are supposed to improve consumers' access to healthy food (claim 1), and consumers are believed to be willing to pay a higher price for local over non-local food (claim 2). It is said that participating in LFS provides farmers with a high sense of social recognition (claim 3), and that it benefits them economically (claim 4). Moreover, looking at the community as a whole, LFS would foster social ties (claim 5) and boost the local economy (claim 6). Finally, LFS are said to be beneficial for the environment due to the use of environmentally-friendly production practices (claim 7), and reduced impact on climate change (claim 8).

Although policy-makers continue to support LFS based on the assumption that "local" is inherently good, a review of the scientific evidence confirming (or refuting) their multiple benefits is missing, leading to possible counter-productive policies. Here we provide a systematic review of the scientific literature on LFS in high-income countries, with a focus on North America and Europe. This will allow for researchers in the field to visualise which specific gaps still need to be filled, and for policy-makers to make enlightened decisions without having to go through a large body of scientific literature. We first explain the various definitions associated with LFS and provide data on the importance of LFS. We then test the common beliefs on LFS against scientific evidence. We conclude by formulating policy recommendations and outlining a research agenda for the broader scientific community.

2. Background

2.1. Definition of local food systems

There is no universal definition of LFS, mainly because different interpretations of the "local" scale exist. In the political sphere, LFS are defined differently across the world. In the USA, the US 2008 Food, Conservation, and Energy Act defines a local food product as one that is marketed within an area that is "less than 400 miles (approx. 644 km) from the origin of the product, or in the State in which it is produced". In Canada, food recognised as local is "food produced in the province or territory in which it is sold, or food sold across provincial borders within 50 km of the originating province or territory" (Government of Canada, 2013). In the EU, Regulation (EU) No 807/2014 states that the definition of local markets eligible for support by the European Agricultural Fund for Rural Development (EAFRD) shall be specified in Member States' rural development programmes. Hence, the local food scale varies across EU countries. Still, the EU Joint Research Centre describes an LFS as "a food system in which foods are produced, processed and retailed within a defined geographical area (within a 20 to 100 km radius approximately)" (Kneafsey et al., 2013).

In the scientific literature, meanings of "local food" vary depending on the authors and context of the research. Local food systems may generally be related to three domains of proximity: geographical proximity (e.g. physical locality, distance between food production and consumption), relational proximity (e.g. close relationship between actors within the food system) and proximity in values (e.g. place of origin, traceability, freshness, quality). Still, geographical proximity constitutes the basis for defining LFS, while the other dimensions of proximity represent additional features (Eriksen, 2013).

Supply chains in LFS are organised in various ways, with different types of selling arrangements between producers and buyers, different forms of interaction between consumers and producers, and different levels of commitment from consumers (Table 1).[1] Most authors depict short food supply chains (SFSC) as the main form of distribution channels used in LFS, referring to a reduced number of intermediaries – generally maximum one – between producers and consumers. Yet, it is essential to distinguish between the concepts of LFS and SFSC, which are

Table 1
Local food distribution channels.

	Producer-buyer selling arrangement	Producer-consumer interaction	Consumer commitment
Direct-to-consumer SFSC			
Farmers' markets	Spot market; relational contract	Face-to-face	Low
On farm sales (pick-your-own, shop)	Spot market; relational contract	Face-to-face	Low
Food boxes (home delivery, pick-up point)	Relational contract; formal contract	Face-to-face; proximate	Low to high[a]
Community supported agriculture (CSA)	Formal contract	Face-to-face; proximate	High
Direct-to-retail SFSC			
Consumer-owned retail food cooperative	Relational contract; formal contract	Proximate	Low to high[b]
Local independent retailers	Relational contract; formal contract	Proximate	Low
Restaurants, caterers	Relational contract; formal contract	Proximate	Low
Institutions (schools, hospitals, prisons)	Formal contract	Proximate	Low
Conventional supply chains			
Supermarkets, large food retailers	Relational contract; formal contract	Proximate; spatially-extended	Low

[a] Some food box schemes require consumers to subscribe, others do not.
[b] Some consumer-owned retail cooperatives require consumers to subscribe or become a member of the cooperative, others do not.

[1] The types of selling arrangements are defined based on Leonardo et al. (2015) and Peterson (2001), and forms of interaction on Marsden et al. (2000) and Renting et al. (2003).

often wrongly used interchangeably as SFSC may not be local, while LFS may not involve SFSC. Direct-to-consumer (DTC) sales are one form of SFSC. In DTC channels, selling arrangements between producers and buyers can either be spot market based – one-off sales with immediate exchange at current prices, e.g. at a farmers' market or at an on-farm shop; involve a relational contract – immediate exchange at current prices but implying repetitive transactions between a particular producer and buyer, e.g. preferred producer at a selling venue or certain food boxes schemes; or a formal contract – agreement between producers and buyers on future repetitive sales with a predefined pricing scheme, e.g. in certain food boxes schemes or in Community Supported Agriculture (CSA).[2] DTC generally involve face-to-face interactions between producers and consumers, with low to high consumers' commitment, depending on the specific channel.[3]

Other forms of SFSC, called direct-to-retail (DTR) chains, are typically based on either relational or formal contracts between producers and buyers, and do not imply face-to-face interactions between producers and consumers. Rather, they imply proximate interactions which require food to be produced and sold in the same "location". DTR channels include sales through consumer-owned food retail cooperatives, local independent retailers (including online retailers), restaurants, caterers, and institutions such as schools and hospitals (Marsden et al., 2000; Renting et al., 2003; Schönhart et al., 2009). In these channels, consumers' commitment to particular producers is usually low, except in the case of consumer-owned cooperatives.

Yet, supermarkets and large retailers – considered to be conventional supply chains –are sourcing food locally as well (Abatekassa and Peterson, 2011; Jones et al., 2004; Low et al., 2015; Martinez et al., 2010; Zwart and Wertheim-Heck, 2021). Capitalising on the local food movement, international supermarket chains such as Aldi, Ahold Delhaize, Carrefour, Lidl and Tesco widely advertise their commitment to local growers. Conventional channels engaged in local sourcing generally involve a relational or formal contract with producers, with proximate or spatially-extended interactions between producers and consumers. Spatially-extended interactions mean that consumers purchase food that is not locally produced per se, but laden with information about the place of production and those producing it (through a regional label for example).

2.2. Importance of LFS in North-America and Europe

Even though over 80% of global food consumption is still supplied by domestic production (Geyik et al., 2021), national data on LFS that are collected in cross-country comparable ways are scarce. Data on DTR sales and local food sales through conventional supply chains are completely missing. Only seven countries across Northern America and Europe have easily accessible published statistics on farm DTC sales at national or regional level.

Fig. 1 shows the percentage of farms selling at least part of their production through DTC channels in 2016. The average for Austria, Belgium, France, the Netherlands and Switzerland (European countries) amounts to 15.8% of total farms in each country. This is similar to the findings from the Eurostat Farm Structure Survey (FSS) in 2007, which estimated that on average, 15% of EU farms were selling more than half of their production directly to consumers. While large differences remain between countries, this suggests that participation in DTC channels did not increase substantially between 2007 and 2016. The USA and Canada have a lower percentage of farms involved in DTC channels (5.6% and 12.7%, respectively).

Data on local food sales volume and value, as well as types of commodities, are largely missing. A main exception is the USA, where the United States Department of Agriculture (USDA) has collected extensive data on direct sales since the late 70s through Censuses of Agriculture and the Agricultural and Resource Management Survey (ARMS) (Ahearn et al., 2018). It is, to our knowledge, the only country that has been able to monitor trends on the importance of DTC sales over time, based on a stable five years' interval in data collection (except for 1987). Fig. 2 depicts that the percentage of US farms using DTC channels has slightly varied over time, but overall the difference between 1978 and 2015 seems insignificant (5.7% vs 5.6%). However, a substantial rise in DTC sales value is observed, in particular between 2012 and 2015 (150% increase). Even so, the percentage of DTC sales in all US farm sales remains very low (0.82%), which is likely due to the fact that farms engaged in DTC marketing tend to be small-scale enterprises (Aubert, 2015; Bauman et al., 2018; Detre et al., 2011; Kneafsey et al., 2013; Low et al., 2015; Monson et al., 2008; Plakias et al., 2019; Torres et al., 2017).

3. Literature review

Our multi-disciplinary literature review was conducted following a series of systematic steps, based on Koutsos et al. (2019) (PRISMA methodology adapted to agricultural sciences research). These include: 1) scoping, 2) planning, 3) identification or search, 4) screening, 5) eligibility assessment, 6) interpretation and presentation. During the scoping process, we identified eight common claims on LFS, based on an exploratory search for related grey-literature reports, media articles and NGO websites. To analyse the evidence on these claims in a systemic way, we purposefully grouped them under four components of the food system: consumers, farmers, the community as a whole, and the environment. Then, as part of the planning process, we defined the following search terms that were used separately or in combination: local, global food systems, short food supply chains, direct marketing, community supported agriculture, alternative food networks, consumers' willingness-to-pay, nutrition, health, farmers' welfare, rural development, environmental impact, biodiversity, energy, and climate change. During the identification phase, an extensive number of peer-reviewed articles were retrieved from searches in Scopus and Google scholar. Articles that were referenced in this first selection were also investigated and added when relevant. Zotero software was used to screen and classify the articles efficiently.

The following eligibility criteria were used to retain a study in our review: 1) the study was published in English between 2000 and 2020 (December)[4]; 2) the study location is in Europe or North America; 3) the study is experimental or observational (i.e. survey-based case study, participant observations, documentation review)[5]; and 4) the study explicitly investigates at least one of the following topics linked to LFS: consumers' health and nutrition, willingness-to-pay for local food, farmers' welfare and social recognition, community and local economic development, environmental resources degradation and climate change. A study was excluded if it did not meet any of the above-mentioned criteria, or if the methodology provided was insufficiently clear to assess research quality and potential biases.

Our final selection comprises 123 articles. In addition, 4 grey-literature reports were included based on their clear importance in the

[2] A CSA is a community-based organisation of growers and consumers, wherein consumers agree to provide direct, up-front support for the local growers who produce their food, and the growers agree to do their best to provide a sufficient quantity and quality of food to meet the needs and expectations of the consumers (Food and Agriculture Organization of the United Nations, 2016).

[3] Consumer commitment is considered low when consumers are not bound to a specific producer or producer group (through a subscription for example), and high otherwise.

[4] Hence, some relevant non-English literature may not be included in this review.

[5] Literature reviews and theoretical discussions were excluded from the selection.

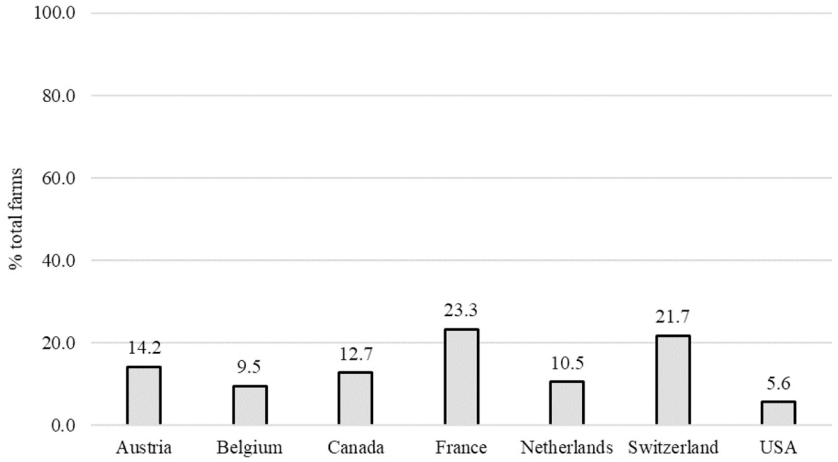

Fig. 1. Percentage of farms per country using DTC distribution channels in 2016 (USA: 2015; Netherlands 2017). Source: National Statistics.

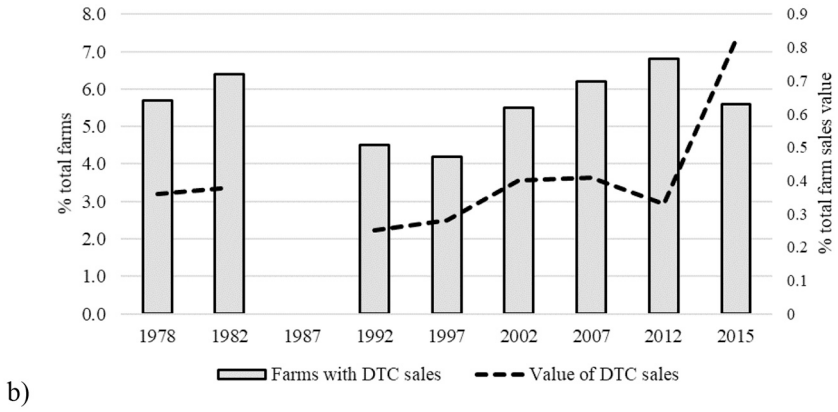

Fig. 2. Percentage of farms using DTC channels and of value of DTC sales in total farm sales in the USA over time Source: USDA.

literature on LFS and contribution to the surrounding political debate. The number of empirical studies addressing the eight claims has significantly increased between 2000 and 2020 (Fig. 3). Almost half of the studies investigate local food channels for fruit and vegetables (46%), about a third for meat, dairy or eggs (29%), 17% for processed food and beverages (e.g. jam, bread, beer, wine), 7% for grain and field crops, and 1% for other commodities (e.g. nuts). In terms of geographic coverage, about half of the studies focus on LFS in the USA – likely due to a higher data availability –, 3% in Canada, and the rest in Europe, with Italy, the UK, Spain, Germany and France as top five examined countries (Fig. 4). Section 4 presents the results of our analysis and discusses the generalisation of the conclusions made by authors.

4. Claims

4.1. LFS increase consumers' access to healthy food

Local food, in particular fruits, vegetables, meat and dairy products, is generally seen as fresh, not highly-processed food (i.e. no added sugars, excess sodium, and unhealthful fats), and therefore represents a healthy option. However, Edwards-Jones et al. (2008) argue that it is not valid to state that locally produced food will automatically be of higher nutritional quality than non-local food. Rather, food quality depends on time since harvest and the type of processing to which produce are exposed (Edwards-Jones et al., 2008; Harvard University, 2019). Thus, supply chain characteristics are likely more important in determining the quality of food than the distance between producer and consumer. In this sense, canned and frozen vegetables and fruit may even be as nutritious as fresh produce, and more cost-effective for meeting daily vegetable and fruit recommendations (Miller and Knudson, 2014; Rickman et al., 2007). In addition, imported agri-food products need to comply with stringent food safety and quality requirements, especially in the EU. Standards are less present in LFS (particularly in SFSC), where food safety and quality are rather based on trust between producers and consumers (Cerrada-Serra, 2018; Prigent-Simonin and Hérault-Fournier, 2005). Moreover, international food trade has the potential to provide a more nutritious and diverse food supply, especially in countries where agro-ecological conditions do not allow for year-round, food-diverse production (Kinnunen et al., 2020).

Regarding the empirical evidence, no causal studies addressing this claim were found. Results are based on observations and basic statistical tests with no counterfactual, all focussing on DTC channels. Mostly, evidence shows a positive correlation between local food outlets and consumers' health. Berning (2012), Bimbo et al. (2015) and Salois (2012) find that improved access to local food through different DTC channels is negatively associated with individual weight outcomes and obesity (based on self-reported BMIs in the USA and Italy). The effect of CSA is found to be significantly higher than that of farmers' markets (Berning, 2012). Allen et al., 2017 also find that CSA in the USA has a positive impact on members' dietary behaviours and health – including significant daily increases in vegetable consumption, fewer meals consumed away from home, and less intake of processed foods. These findings are in line with Ostrom (2007), who reports that out of 624 surveyed CSA members in the USA, around 90% stated that their household dietary habits had changed positively as a result of CSA membership. In low-income communities in the USA, Evans et al. (2012)

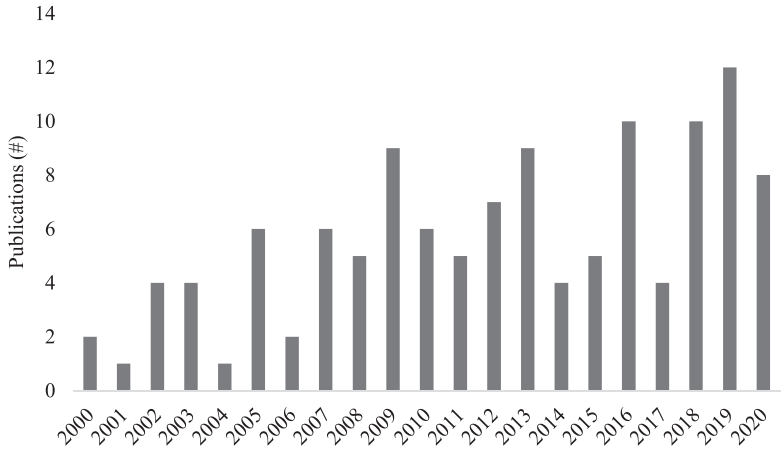

Fig. 3. Number of publications per year included in this review.

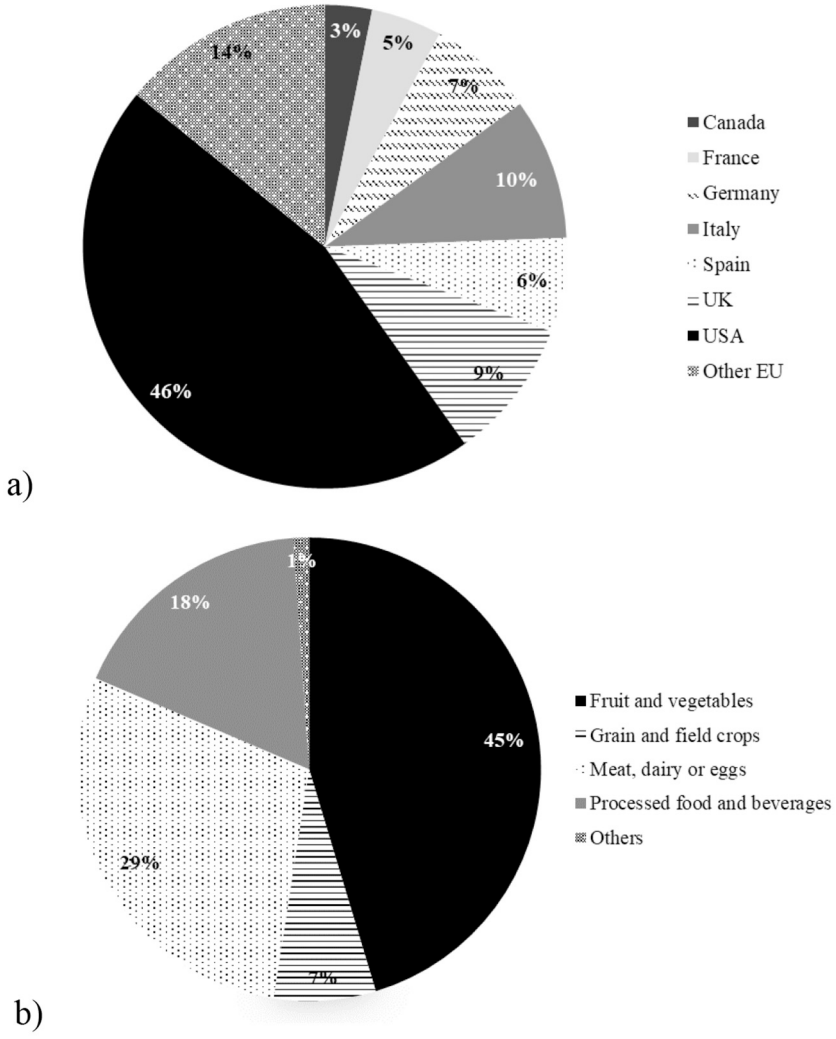

Fig. 4. Share of publications per study country (a) and product type (b) included in this review.

note significant increases in the consumption of fresh fruit and vegetables over 12 weeks with the establishment of two local farm stands. Similarly, Sadler (2016) investigates a farmers' market expansion and move in Michigan, bringing it closer to a bus station. As a consequence, mobility-constrained and low-income residents throughout the region have gained improved access to fresh food. Yet, counter to Evans et al. (2012), the study reports a higher percentage of customers purchasing prepared foods at the market after its move, and no increase in the share of fruit and vegetables consumed.

4.2. Consumers are willing to pay more for local over non-local food

As it is often claimed that consumers are willing to pay a premium for local over non-local food products, we review quantitative studies estimating consumers' willingness-to-pay (WTP) for local food. The studies generally use two methodological approaches: non-hypothetical experiments (in-store surveys, including auctions) or hypothetical choice experiments. In most studies, survey respondents are better educated and with higher income levels than the average local population (Brown, 2003; Carpio and Isengildina-Massa, 2009; Carroll et al., 2013; Giraud et al., 2005; Grebitus et al., 2013; Hasselbach and Roosen, 2015; James et al., 2009; Kiss et al., 2020; Loureiro and Hine, 2002; Nganje et al., 2011; Onken et al., 2011; Onozaka and McFadden, 2011; Schneider and Francis, 2005; Willis et al., 2016). Hence, WTP estimates are only valid for this type of respondents (i.e. not representative of the average population, especially not of individuals with low-income levels). This is mostly due to (1) self-selection bias when consumers respond to mailed surveys, (2) consumers being approached at a particular purchasing venue (such as a farmers' market or supermarket) frequented by a specific public. Still, if LFS are to take up a larger share of the food system, it is important to evaluate whether the general public is also willing to pay a premium for such food.

Generally, evidence shows that consumers are indeed willing to pay a premium for local over non-local food. In several cases, this premium is even higher than for organic food or other sustainability claims (Gracia, 2014; Gracia et al., 2013; Hempel and Hamm, 2016; Loureiro and Hine, 2002; Onozaka and McFadden, 2011; Printezis and Grebitus, 2018). Still, WTP is shown to vary with consumers' demographic characteristics, socio-economic situation, connection to farming and household location (rural vs urban, region, country). Most studies find that women, older, wealthier people, with ties to agriculture, and a supportive behaviour towards environmentally friendly practices (including organic production) are willing to pay the highest premium (Brown, 2003; Campbell et al., 2010; Carpio and Isengildina-Massa, 2009; Chang et al., 2013; De-Magistris and Gracia, 2016; Hempel and Hamm, 2016; Onozaka and McFadden, 2011; Vapa-Tankosić et al., 2020; Willis et al., 2016). Moreover, buying habits (e.g. experience with buying local or organic food), selling venues and the specific product and quantity bought influence consumers' WTP for local food (Adalja et al., 2017; Brown, 2003; Campbell et al., 2010; Carpio and Isengildina-Massa, 2009; Carroll et al., 2013; Chang et al., 2013; Fan et al., 2019; Giraud et al., 2005; Gracia et al., 2012; Grebitus et al., 2013; Hasselbach and Roosen, 2015; Hempel and Hamm, 2016; Hu et al., 2012; Kiss et al., 2020; Loureiro and Hine, 2002; Nganje et al., 2011; Onken et al., 2011; Printezis and Grebitus, 2018; Tempesta and Vecchiato, 2013; Umberger et al., 2009; Vapa-Tankosić et al., 2020; Willis et al., 2016; Yue and Tong, 2009). Printezis and Grebitus (2018) highlight differences in WTP for local food products based on the distribution channel used – on average, consumers in Phoenix and Detroit (USA) are willing to pay a premium for local food, but not when it is sold at farmers' markets or purchased directly from an urban farm (i.e. thus only at grocery stores). Giraud et al. (2005) show that WTP for local specialty products in New England (USA) varies with price levels (i.e. low-end vs high-end products), and across states. Finally, Tempesta and Vecchiato (2013) find an inverse relationship between the quantity consumed and the WTP for locally produced milk in Northern Italy.

It is worth noting that evidence on consumers' preferences for the origin of animal feed used in locally-produced food is scarce. Still, Profeta and Hamm (2019) and Wägeli et al. (2016) investigate consumers' WTP for products originating from animals fed on local feed in Germany – the first for conventional and organic products (eggs and pork), the latter for organic products only (milk, eggs and pork). Overall, they find that consumers do value the local origin of feed, and that the higher the local feed-share used in animal production, the higher the WTP.

4.3. Farmers have a great sense of social recognition in LFS

German philosopher Alex Honneth argues that by being able to contribute to a healthy society through work, individuals feel recognised, in turn contributing to their own well-being (Angella, 2016; Honneth, 2010). Based on Honneth's theory, there are two main ways in which LFS may lead to farmers' sense of recognition. First, through traceability (i.e. the ability to find out where and how a product was made), which is at the core of LFS, consumers may recognise the role and importance of farmers and other actors along the chain, including less visible actors, such as women. In turn, traceability may help consumers make informed food choices, thereby enabling them to participate more fully in the shaping of inclusive food systems (Coff et al., 2008). Second, consumers may show greater interest in production practices and constraints when purchasing food in LFS. This increased interest in agri-food systems may trigger wider behavioural changes, including the will to exchange skills and get involved in citizen mobilisation (Kneafsey et al., 2013; Mundler and Laughrea, 2016). By noticing such change, farmers may feel esteemed for their social contribution. However, when LFS do not involve a direct contact between producer and consumer, it limits the potential for reconnection between them, as mutual recognition is anchored in both psychological and physical interactions (Angella, 2016).

Measuring a sense of recognition can, by its very nature, only be realised based on perceptions. Hence, all studies providing insight into this claim focus on case studies with small sample sizes, as no large databases exist reporting such precise qualitative information (to the best of our knowledge). All studies found on this claim focus on SFSC (both DTC and DTR channels) and omit conventional local channels.

Generally, empirical evidence finds that farmers do indeed feel a great sense of social recognition and acknowledgement of their work in SFSC. In fact, this feeling is often part of the main motivations behind farmers' participation in SFSC. Farmers in Quebec cite the ability to interact with buyers as the key reason for selling through direct channels (Mundler and Jean-Gagnon, 2019). Similarly, Benedek et al. (2018) show that farmers' preference for farmers' market in Hungary is stronger with farmers who are specifically looking to directly interact with customers. This is in line with findings by Kirwan (2006), who reports that farmers selling at farmers' markets in the UK highly appreciate the sense of respect, attention and personal recognition that they receive from their customers. Charatsari et al. (2018) observe that farmers' perception of their acceptance by the local community increases their willingness to participate in SFSC channels in Greece. Mancini et al. (2019) investigate local Parmigiano Reggiano supply chains in Italy and report that producers value SFSC mainly to gain reputation and increase their level of self-esteem. Finally, Demartini et al. (2017) find that farmers selling through SFSC in northern Italy favour direct relationships with consumers to highlight the "real" value of their produce and increase consumer awareness about food production.

Regarding less visible actors, Park (2010) note that women farmers tend to sell a larger share of their produce through local channels than men (both through SFSC and conventional channels within 100 miles of the farm's location). Although this observation does not allow for the validation of the claim under assessment, nor for any causal interpretation, it points out that less visible farmers may use LFS to increase their social recognition. Still, Sage (2003) highlights that the "grant of regard

from a small band of loyal customers does not sustain livelihoods or ensure fulfilment, as the abandonment of smallholdings by disillusioned and 'burnt-out' producers testifies".

4.4. Participation in LFS economically benefits farmers

Three economic theories may explain why farmers may (or may not) economically gain from selling in LFS at individual level: principal-agent theory (applied to the concept of value-added distribution), transaction costs theory, and capability theory of the firm. First, while the final value of a product generally builds up through the joint input of different actors along the supply chain, the distribution of the value-added[6] among them depends on the internal governance structure and bargaining power relations. According to principal-agent theory, agents, or actors in the supply chain, can increase their bargaining power by reducing their dependence on others (Ruben et al., 2007). In LFS, farmers may do so in two different ways. One is by selling their produce directly to consumers – DTC sales may lead to a price premium over longer supply chains due to farmers' ability to set their own prices. The other is by combining several distribution channels, including those linked to niche markets for specialty produce (e.g. local label) (de Roest et al., 2018). This tactic also represents a diversification strategy that reduces the economic risk associated with the dependence on a single channel (de Roest et al., 2018; Inderhees and Theuvsen, 2009; Izumi et al., 2010).

Second, transaction cost theory assumes that each selling arrangement produces coordination costs of deciding, planning, and negotiating the terms of the sale (Rindfleisch, 2020; Williamson, 1979; Young, 2013). While transaction costs will likely be particularly high in DTC channels due to the many individual transactions required, they may be relatively low in DTR and conventional local channels due to economies of scale. Indeed, both retailers and institutions (such as schools and hospitals) tend to purchase larger volumes at once to decrease their own transaction costs (de Roest et al., 2018; Izumi et al., 2010).

Third, the literature on firm capabilities and learning suggests that developing the capability to engage in specific supply chain activities effectively may be highly difficult and time-consuming (Gereffi et al., 2005; Penrose, 1959; Prahalad and Hamel, 1990; Teece, 2019). For farmers selling through SFSC specifically, internalising processing and marketing activities may thus increase costs associated with skills' development and additional labour requirements (Cesaro et al., 2020).

Regarding the empirical evidence, it is important to note that all studies found on this claim focus on SFSC (DTC and DTR); with the notable exception of Park (2010) who also investigate local food sales through conventional channels. Most studies compare economic performance among farmers selling at least part of their production through SFSC, but not with those farmers who do not. Hence, it is difficult to establish whether a particular farmer would be better off not using SFSC at all. Moreover, disentangling the economic benefits of participating in LFS is challenging, as farmers often sell their produce through various local and global channels (Aubry and Kebir, 2013; Malak-Rawlikowska et al., 2019; Mundler and Jean-Gagnon, 2019). Doing so would require detailed data on the share of production sold through different channels at farm level, which is greatly lacking. This is likely why no study was found demonstrating a causal link between the degree of participation in LFS and farmers' economic performance.

The literature reports mixed effects of participation in SFSC on farmers' economic performance. While Chen et al. (2019) find the effect of SFSC participation on gross farm income in the USA to be insignificant, Park et al. (Park and Sene, 2018; Park and Wozniak, 2014) report that US farmers who participate in SFSC experience substantial declines in gross farm income compared to farmers who do not engage in any type of direct marketing. The two above mentioned studies use a binary variable to assign farmers' participation in SFSC channels. Yet, the effect of SFSC participation on farmers' performance may vary depending on the share of production sold through each channel by each farmer. In fact, Izumi et al. (2010), Malak-Rawlikowska et al. (2019), and Zwart and Mathijs (2020) find that even when a higher price is obtained in SFSC, the average small share of produce sold through these channels leads to no significant impact on overall economic performance. Hence, measuring the impact of SFSC participation on economic performance in terms of sales volume and value surely would be more insightful than sole participation.

Research also shows that the impact of participation in SFSC on farmers' performance greatly depends on farmers' characteristics (e.g. gender, age, education, experience, marketing skills, access to internet), type of farm (mainly scale, specialty and location), the precise marketing strategy (DTC, DTR, a combination of various channels), and the time-scale (short vs long-term effects). Bauman et al. (2019) and Mundler and Jean-Gagnon (2019) show that return on assets and gross farm income depend more on farmers' management practices and farm specialty (i.e. fruit and vegetables, livestock, dairy) than on the specific SFSC used. Still, Uematsu and Mishra (2011) find different types of SFSC to have differentiated impacts on gross farm income. Looking specifically at the link between organic farming and DTC sales, Detre et al. (2011) report that farmers who sell organic produce through DTC channels experience slightly higher gross farm income than organic farmers who do not. Yet, this contradicts findings by Park (2010), who show that a higher commitment to local sales (both through SFSC and conventional channels) leads to lower gross farm income for organic farmers. Ahearn et al. (2018) highlight that factors affecting farmers' economic performance in SFSC vary between a short- and a long-term measure. For instance, being a beginning farmer and selling through SFSC seems to negatively affect gross farm income – a measure of short-term performance - but to positively affect return on assets – a measure of long-term performance. Overall, Bauman et al. (2018), Mundler and Laughrea (2016) and Paul (2019) report strong variations in economic performance across farmers using SFSC to sell their produce, with low average performances.

Finally, several studies find high costs associated with SFSC, especially from additional skills and labour requirements (Bauman et al., 2019; Bauman et al., 2018; Hardesty and Leff, 2010; LeRoux et al., 2010; Mundler and Jean-Gagnon, 2019). Still, evidence shows that these additional labour costs may not per se hinder economic performance if they are managed strategically (Bauman et al., 2019; Bauman et al., 2018; Mundler and Jean-Gagnon, 2019). In fact, Feenstra et al. (2003) find that farmers in Iowa, New York, and California believe that selling at farmers' markets helps them improve their skills in customer relations, marketing, and product pricing, in turn boosting their business self-confidence. However, some authors report a tendency of farmers' self-exploitation in DTC channels in particular, due to their strong sense of commitment towards consumers (Galt, 2013; Mundler and Jean-Gagnon, 2019; Ostrom, 2007). In this respect, Opitz et al. (2019) highlight that farmers participating in DTC channels substitute their independence from the global market with a higher dependence on consumers' choices.

4.5. LFS increase local community ties

Economic sociology suggests that markets are socially constructed institutions, rooted in cultural norms and meanings. This idea is embodied in the concept of "social embeddedness". Contrary to neoclassical economic theory assuming rational economic behaviour purely based on self-interest, economic behaviour is considered embedded in a complex social fabric (Hinrichs, 2000). Food markets are particularly suited for tightening such social fabrics, since food not only represents a

[6] Value-added in a supply chain represents the difference between a produce's final selling price and the total cost of inputs used along the chain (including production, transformation and marketing costs) (Kogut, 1985; Ruben et al., 2007).

common necessity, but is also strongly rooted in culture (Christensen and Phillips, 2016). As food market actors are brought closer together in LFS, this proximity may create a context for even stronger social ties within local communities.

Yet, marketness and instrumentalism too are dictating economic behaviour (Block, 1990; Hinrichs, 2000). While the concept of marketness relates to the degree to which economic transactions are price-driven, the concept of instrumentalism refers to the degree to which self-interest places economic benefits ahead of friendship, family ties, or morality. In LFS, tensions between social embeddedness, marketness and instrumentalism may occur, potentially undermining social ties within local food communities (Hinrichs, 2000; Izumi et al., 2010). Sage (2003) further argues that the overlap between social and monetary motives for participating in LFS imposes certain obligations and responsibilities on transacting parties – producers commit to producing quality food, while consumers commit to buying from engaged producers or retailers – in turn leading to a sense of (undesired) "entanglement" between them.

Scholars mostly address this claim using qualitative methods, such as semi-structured interviews, focus groups, observations, and documentation review. Some, however, do perform quantitative surveys to evaluate local actors' motives for participating in LFS, including social factors. As for the other claims, most studies focus on SFSC.

Several studies investigate consumers' motivations behind purchasing locally produced food. Many of these studies report that consumers who buy products in LFS do so partly to support local farmers, build social relationships with producers (in the case of DTC channels), and foster the well-being of their own community (Aprile et al., 2016; Aubry and Kebir, 2013; Cerrada-Serra, 2018; Chiffoleau et al., 2019; De Bernardi et al., 2020; Hinrichs and Kremer, 2002; Hunt, 2007; Kirwan, 2006; Lombardi et al., 2015; Megicks et al., 2012; Toler et al., 2009; Winter, 2003). With a focus on the producers' perspective, Izumi et al. (2010) look into farm-to-school programmes in the USA. The authors report that farmers sell their produce to schools not only to diversify their marketing strategies, but also to contribute to social benefits – by improving children's dietary habits and supporting the local community. Investigating CSA schemes in Minnesota and Wisconsin, Ostrom (2007) too finds that farmers get involved to contribute to larger social benefits.

More broadly, drawing on a case study of a farmers' market in North Carolina, Andreatta and Wickliffe (2002) reveal the role played by the market as an "active contributor to the cultural dynamic within which those transactions take place". This is in line with Gillespie et al. (2007) who investigate three farmers' markets, in New York, Iowa, and California. The authors show that these farmers' markets represent socio-economic institutions anchored in their community. Finally, based on the investigation of a partnership between a cooperative and several CSA groups in Italy, Chiffoleau et al. (2019) highlight the willingness of participants to ensure the economic viability of the system while pursuing collective benefits.

However, Zwart and Mathijs (2020) report that consumers participating in local food purchasing groups in Belgium (i.e. CSA scheme) often do so to gain access to specific produce, rather than to boost social cohesion. In fact, Albrecht and Smithers (2018), Baldi et al. (2019), Kirwan (2006), and Tregear and Ness (2005) find that both producers and consumers only value reconnection as long as their own respective interests are fulfilled – profitability and control for producers, and access to healthy food at an affordable price for consumers. Hence, practical limitations to satisfying those interests (e.g. legislative barriers, missing infrastructure, inconvenience of food purchases) may hinder the stability of newly formed community ties.

Finally, issues pertaining to the inclusiveness and social equity within LFS have been raised. For instance, Zwart and Mathijs (2020) report that local food purchasing groups in Belgium only seem to reach a specific socio-economic profile, while it is harder for them to reach ethnic minorities or people with limited income. Likewise, Hinrichs and Kremer (2002) find that CSA members in the US Midwest are on average more advantaged in terms of income, occupation and education compared to local or regional reference populations. In Vermont, Macias (2008) shows that different DTC channels (CSA, organic farmers' markets) have differentiated impacts on local communities in terms of social inclusion and equitable access to healthy food. The author reports that the high entry costs and word-of-mouth recruitment strategies of CSA schemes tend to exclude individuals of low socio-economic status. Organic farmers' markets seem to reach a diverse population, but do not focus on community building projects. Evidence regarding the exclusion of less-advantaged consumers from conventional local chains (i.e. the accessibility and affordability of local food sold in conventional retail outlets) is essentially missing. Finally, in Vermont, Christensen and Phillips (2016) report conflicts between local "agripreneurs" (i.e. growth-oriented agricultural entrepreneurs) and the rest of the community, feeling left out of the development of a novel LFS.

4.6. LFS benefit the local economy

LFS could benefit local economies through different mechanisms. First, it is claimed that LFS induce the retention of local money. For instance, spill-over effects, such as farmers' markets attracting buyers into local areas they would not otherwise visit, may result in additional money spent in local businesses (Kneafsey et al., 2013; Martinez et al., 2010). Second, non-agricultural activities such as agritourism are often associated with LFS, contributing to the revitalisation of rural areas and additional revenues. As part of the LFS, value-added processing of regionally produced food too may boost local economic growth (Hughes and Isengildina-Massa, 2015). Third, LFS may lead to a multiplier effect for local employment. Still, certain jobs in conventional chains may be lost when producers assume additional roles in the supply chain (processing, packing and distributing). Furthermore, LFS may produce economic losses for communities if they are missing out on opportunities to benefit from competitive advantages over other regions in the food sector (Born and Purcell, 2006).

Most studies measuring the impact of LFS on local economies (in terms of changes in agri-food sales, income and employment) use input-output models, that allow for the analysis of interdependencies between different economic sectors of a country or region during a fixed period of time (Malagon-Zaldua et al., 2018). One notable exception is a study by Brown et al. (2014), who use economic growth models to investigate the link between LFS, total agricultural sales, and real income per capita at regional and national level. Strikingly, the selected impact studies rarely include opportunity costs, except for Hughes et al. (2008) and Hughes and Isengildina-Massa (2015). No causal study was found evaluating the economic effects of the development of new local food initiatives. Research mostly focusses on SFSC (particularly farmers' markets), at a regional level.

Using input-output models, Henneberry et al. (2009), Hodges et al. (2014), Hughes et al. (2008), and Hughes and Isengildina-Massa (2015) estimate the economic impact of either local food sales or farmers' markets at state level in Oklahoma, Florida, South Carolina, and West Virginia, respectively. The same approach is taken by Malagon-Zaldua et al. (2018) who evaluate the economic contribution of ten farmers' markets to the Basque Country's (Spain) local economy. All five studies estimate the number of jobs generated and total sales value in LFS. Although local economic impacts are found positive in most cases, they are not compared to the estimated contribution of the global food system to these specific local economies – for example, employment generated by farmers' markets compared to supermarkets in a particular region. Hence, the reported figures remain purely indicative. Furthermore, the different data collection methods used make it harder to compare across studies, as estimates of farmers' market sales based on consumers' self-reported expenditures are significantly higher compared to estimates based on farmers' self-reported sales (Malagon-Zaldua et al., 2018; Varner and Otto, 2008). Also, while Brown et al. (2014) find that DTC

sales and agritourism did not make significant contributions to total agricultural sales and personal income in the USA (at national level) between 2002 and 2007, the authors note that several counties did experience a significant change in associated farm sales per capita. Their findings highlight important differences in the impact of LFS on local economies depending on local specificities.

Looking at the interaction between different local channels, Varner and Otto (2008) warn that competition between nearby farmers' markets may decrease per farmer sales. Similarly, in the Lombardy region (Italy), Mazzocchi et al. (2020) find that the coexistence of small food stores and DTC channels may undermine participation of farmers and consumers in the latter type of channels, as both offer similar products and experiences.

Regarding LFS' impact on local employment, Mundler and Laughrea (2016) show a high contribution of farms participating in SFSC to local employment: farms selling mainly through SFSC generate on average 0.75 full-time equivalents per cultivated hectare, versus 0.19 for farms engaged primarily in conventional food channels. Yet, the authors highlight that this higher contribution is likely linked to a lower labour productivity on farms engaged in SFSC.

4.7. LFS foster environmentally-friendly production practices

Hedberg and Zimmerer (2020) introduce the concept of "socio-ecological embeddedness" as an extension of the above-mentioned concept of social embeddedness (claim 5). It is defined as "the entanglement of environmental practices with ongoing social relations". Socio-ecological embeddedness may explain how actors of LFS could affect farmers' production practices. For instance, consumers' demand – as a type of social relation in LFS – for healthy food may drive the introduction or maintenance of more sustainable farming practices. Hence, it is often believed that crops grown in LFS are more varied and locally adapted, as opposed to specialised monocultures for export, that lead to a narrowing of food crops' diversity (Khoury et al., 2014). Crop diversity is also said to have a positive effect on associated biodiversity.[7] Still, local production methods are not inherently more environmental-friendly than export-oriented production (Born and Purcell, 2006; Hole et al., 2005).

Studies on this claim use either large survey data, or a limited number of semi-structured interviews with local food actors to investigate the link between LFS and environmental-friendly practices, with a focus on SFSC.

Several studies look at the influence of consumers' demand in LFS, as reflected in the concept of socio-ecological embeddedness. In Sweden and Canada, respectively, Björklund et al. (2009) and Mundler and Laughrea (2016) find that farmers who directly interact with consumers are indeed encouraged to diversify their production in terms of the number of crop varieties grown. In the apple sector in the USA, Goland and Bauer (2004) report that sales in LFS incites farmers to diversify their production by growing old local varieties, whose appearances do not meet conventional channels' criteria. Similarly, Cerrada-Serra (2018) shows that local Alternative Food Networks in Spain and Belgium are promoting agro-ecological practices, including the use of polyculture techniques and the cultivation of traditional varieties of fruit and vegetables. Still, Hedberg and Zimmerer (2020) find that farmers at a farmers' market in the USA are not particularly influenced by consumers to switch to environmentally-friendly practices (e.g. pest, weed, disease, and soil fertility management).

Other studies focus on the link between farmers' participation in SFSC and organic farming. In the wine and arboriculture sectors in France, Aubert and Enjolras (2016) find that organic farmers are more likely to sell part of their production through SFSC than non-certified farmers, and conversely (i.e. farmers selling through SFSC are more likely to be organic certified). This is in line with Mundler and Laughrea (2016) who report a higher share of organic certified farmers participating in SFSC compared to other channels in Quebec. Yet, Chen et al. (2019) find that farmers adopting organic practices in the USA are less likely to use SFSC, while the opposite effect is insignificant (i.e. participation in SFSC does not influence farmers' decision to adopt organic production methods). These results may indicate differences across countries in the link between SFSC and organic farming.

More broadly, Schoolman (2019) reports that the increase in the number of farms and sales value in SFSC between 1997 and 2012 is negatively associated with spending on pesticides in the USA. However, the magnitude of the relationship declined over time; hence it is unclear whether current SFSC are pushing farmers to reduce their pesticide use. Also, based on a case study in France, Gilg and Battershill (2000) state that the difference in the adoption of environmentally-friendly practices (including the use of hedges, organic farming, traditional species grown, etc.) between farmers using SFSC and farmers who do not is insufficient to claim that SFSC are fostering more environmentally sustainable production systems.

Finally, three studies were found addressing the issue of associated biodiversity. The first study investigates the case of local beer value chains in Bavaria (Germany), based on regional malting barley cultivation. This regional variety is a rather extensive crop with a short growing period, which allows for the cultivation of cover crops, in turn leading to the preservation of associated biodiversity and cultural landscapes (Maier et al., 2020). The second study focuses on two natural parks in Spain and Italy and shows that associated local food initiatives – including a local food label – fosters biodiversity and landscape conservation at the regional level (Pinna, 2016). The third study highlights a high associated biodiversity maintained around diverse farms participating in SFSC in Sweden (Björklund et al., 2009). However, the results are neither causal, nor compared to farms who do not use SFSC.

4.8. LFS help mitigate climate change

LFS are claimed to help mitigate climate change based on the concept of food miles, which is a measure of how far food travels between the producer and final consumer (Weber and Matthews, 2008). Intuitively, it may be assumed that reducing food miles will decrease greenhouse gas (GHG) emissions associated with food transport, in turn diminishing the impact on climate change. There are two ways in which this claim can be considered: by looking at the relative contribution of food miles to global GHG emissions, and by investigating the difference between the amount of GHG generated by global and local food supply chains.

To begin with, it has been shown that food transport is not a major driver of climate change. Food systems contribute about 26% to global GHG emissions, and, within food systems, GHG emissions linked to transport merely represent 6%. Conversely, the farm stage represents 61% of food systems' GHG emissions (Poore and Nemecek, 2018). Here, it is important to note that these emissions vary greatly at the production stage, both between products and between production methods (Avetisyan et al., 2014). Generally, animal-based foods generate massively more GHG than plant-based foods at the farm stage – for instance, producing 1 kg of beef generates about 11 and 56 times more GHG as 1 kg of rice and 1 kg of peas, respectively (Poore and Nemecek, 2018; Ritchie, 2020). It is important to note that these emissions do not include those linked to feed production and feed transport, which represent 6% of total GHG emissions originating from food systems (i.e. as much as the share of food transport) (Poore and Nemecek, 2018). Thus, the production methods and origin of feed may play as important a role in food products' impact on climate change as food transport only (Bava et al., 2014; Eriksson et al., 2005; Guerci et al., 2013). Also, using energy-intensive methods to grow or store produce for several months (e.g. greenhouses, refrigeration for storage) increases GHG emissions

[7] Species and ecosystems that help to create and maintain suitable conditions for production, for example by pollinating crops, maintaining soil fertility, controlling pests or providing habitats.

substantially. Often, more efficient food production achieved abroad (i.e. in-season cultivation in favourable environmental conditions) offsets the impact of international transport required to import food that could be produced locally off-season (Brodt et al., 2013; Carlsson-Kanyama et al., 2003; Hospido et al., 2009). Hence, switching diets may have a significantly higher effect on climate change than reducing food miles (Pradhan et al., 2020; Stoessel et al., 2012; Weber and Matthews, 2008). Viewed in this way, increased interest in and knowledge of food systems through participation in LFS may help mitigate climate change by incentivising consumers to purchase low-impact food products (i.e. plant-based, locally adapted, seasonal foods) (Kneafsey et al., 2013; Svenfelt and Carlsson-Kanyama, 2010).

Evidence on the difference between GHG emitted by global and local food supply chains is mostly based on life cycle assessments (LCAs). Across the selected LCA studies, system boundaries (stages of the supply chain comprised in the assessment), functional units (e.g. 1 kg, 100 g of protein), data type (primary or secondary) and calculation methods differ substantially, making it difficult to compare results. The studies show that GHG emissions associated with food supply chains mostly depend on three factors (besides the product itself and production methods, as discussed above): supply chain coordination, the efficiency of the consumer's transport mode for food purchases, and the efficiency of the transport mode for imports (Mundler and Rumpus, 2012; Van Hauwermeiren et al., 2007). Based on these factors and on the LCA's methodology, studies find that LFS trigger more (Carlsson-Kanyama et al., 2003; Hospido et al., 2009; Loiseau, 2020; Majewski et al., 2020; Malak-Rawlikowska et al., 2019; Mancini et al., 2019; Schlich and Fleissner, 2005; Schwarz et al., 2016; Sundkvist et al., 2001), less (Blanke and Burdick, 2005; Carlsson-Kanyama et al., 2003; Hospido et al., 2009; Jones, 2002; Milà Canals et al., 2007; Sim et al., 2007), or equivalent amounts (Brodt et al., 2013; Hospido et al., 2009; Mundler and Rumpus, 2012; Van Hauwermeiren et al., 2007; Wallgren, 2006) of GHG emissions than global food systems. Therefore, it is not correct to state that LFS automatically generate less GHG than global food systems.

First, the efficiency of supply chain coordination results in differentiated impacts on GHG emissions. While products may travel fewer miles from producer to consumer in LFS, fuel efficiency per unit of product matters too, and is usually achieved with larger loads and logistical efficiencies in conventional chains and global food systems (Brunori et al., 2016; Coley et al., 2009; Loiseau, 2020; Mundler and Rumpus, 2012). Hence, LFS may lead to fewer GHG emissions if their transport and storage methods are optimised, and if the stored and traded quantities are substantial. This is referred to as the "ecology of scale" by Schlich and Fleissner (2005).

Second, the stage between the retail point and the consumer's home was found to represent a large share of total GHG emissions associated with food supply chains (Loiseau, 2020; Majewski et al., 2020; Pretty et al., 2005; Sundkvist et al., 2001). Coley et al. (2009) show that if a consumer drives a round-trip distance of over 6.7 km to purchase vegetables at a local farm shop, their GHG emissions will likely be greater than if they had used a conventional channel (including cold storage, packaging, transport to a regional hub, and home delivery). Similarly, other studies find that on-farm sales generate on average more GHG than off-farm sales due to consumers' individual purchasing trips (Loiseau, 2020; Majewski et al., 2020). Still, if consumers use low-energy transport modes to collect their food (e.g. by bike or on foot), this source of GHG emissions vanishes.

Third, the transport mode used for food imports may play a role in the difference between global and local supply chains' GHG emissions. Air freight has a massively higher environmental impact than other transport modes (e.g. truck, vessel, rail), but only represents 0.16% of global food miles (Poore and Nemecek, 2018; Van Hauwermeiren et al., 2007). Thus, this factor likely has a limited influence on the overall difference in GHG emissions originating from LFS and global food systems.

5. Conclusions

Over the past years, LFS have been put under the spotlight by policy-makers and researchers. Based on their many purported benefits, policy-makers have promoted them as a lever for change towards more inclusive, resilient and sustainable food systems. This study assessed the scientific evidence confirming or refuting these claims. It started by showing the confusion surrounding LFS, as there is no universal definition and LFS can be interpreted in various ways. Local food systems are often interchangeably used with SFSC, but these two concepts do not overlap entirely. Despite the active promotion of LFS in North America and Europe, this remains a niche market that has not substantially grown over the past years.

Overall, we found that the impact of LFS on different social, economic and environmental factors highly depends on the type of supply chain under assessment, with important differences across product types and countries. Our review refutes the idea that local food is inherently good. The evidence for the eight claims can be summarized as follows. First, consumers who participate in LFS have a better health status linked to an increased consumption of fresh, unprocessed food – mainly fruit and vegetables. However, a causal link cannot be drawn from existing studies. Second, consumers are willing to pay a premium for local over non-local food, although important variations in WTP exist depending on consumers' characteristics, buying habits and particular products. Third, farmers seem to feel recognised for their work in LFS, which is often the main reason for them to participate in local food channels. Fourth, while studies mostly find low farm economic performance associated with participation in LFS – partly due to high costs linked to additional skills and labour inputs –, the degree to which farmers do (or do not) benefit from this marketing choice depends on a multitude of factors and is highly case specific. Fifth, although evidence highlights consumers' and farmers' wish to foster the well-being of their community in LFS, it also reveals that their social bond only holds as long as their own respective interests are fulfilled (i.e. profitability and control for farmers, and access to healthy, affordable food for consumers). Moreover, several studies point out social inclusiveness issues, with socio-economically disadvantaged people sometimes excluded from certain local SFSC. Sixth, studies focusing on the impact of LFS on local economies provide limited insight into the validity of this claim due to a lack of consistency in methodological approaches. Seventh, LFS were shown to be associated with environmentally-friendly production practices (including organic farming) in most cases, but with differences across countries. Eight, the fact that LFS may help mitigate climate change through decreased food miles is not backed up by scientific evidence as food transport is not a major driver of climate change, and GHG emissions originating from food supply chains (local and global) differ substantially based on supply chain coordination, the efficiency of the consumer's transport mode for food purchases, and the efficiency of the transport mode for imports.

It is worth noting important shortcomings in the studies addressing claims on LFS. Researchers mostly use non-representative samples of consumers and farmers in surveys, with an over-representation of socio-economically advantaged consumers, and farmers already engaged in LFS. Moreover, there are very few causal studies (with a counterfactual), demonstrating the true impact of LFS on several factors. Also, most studies focus on the USA; hence, results cannot be generalised to all countries. In addition, there is a lot of emphasis on SFSC, while the contribution of conventional supply chains (e.g. through supermarkets) to LFS is almost entirely omitted. Finally, and perhaps most importantly, there is a lack of comprehensive cross-country comparable data on LFS (e.g. local sales volume and value at farm, regional and national level) limiting the possibility of drawing generalisable conclusions on their benefits and drawbacks.

Based on our findings, we suggest that policy-makers should invest in cross-country comparable data collection on LFS (especially in Europe), which would allow the scientific community to perform robust causal

analyses on their impacts on society. For instance, this can be achieved by adding questions on supply chain participation to the farm accountancy data network (FADN) surveys, the principal tool to monitor farms' income and business activities in the EU. Furthermore, if LFS are to contribute to the transition towards more sustainable food systems, the question of their up-scaling needs to be addressed. In this sense, the integration of local food products in local institutions' food programmes (e.g. schools, hospitals) – promoted by city councils – could represent valuable opportunities and should be investigated further by researchers. In addition, studying retailers' initiatives to source and actively promote local food in conventional supply chains might offer new insights on how LFS can be more inclusively shaped.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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