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On the challenges of making a sustainable kitchen: experimenting with sustainable food principles for restaurants

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ABSTRACT: Concerns with the sustainability of food have moved from the margins of the gastronomy world to a much more central stage, mirroring a growing concern by citizens around food origins, carbon footprint and social practices in value chains. Evolving literature on food sustainability addresses many of these challenges, with macro and systemic approaches that have proved valuable in certain domains, such as food policy. However, professionals from the hospitality industry are still very under-informed on the methods adopted by researchers investigating food sustainability. This article tries to fill this gap by presenting an approach on how micro-level practices in restaurant kitchens can be informed by sustainable principles derived from the conceptual lens of food sustainability. It demonstrates the identification of principles and the definition of sustainable practices with two empirical cases: Hermann's restaurant in Berlin, and Mesa pra Doze gastronomic project, in Brasília. Comparing those two different experiences, similar and dissimilar challenges were found. Contrary to common thinking, the higher costs normally associated with sustainable sourcing were diluted by the higher margins and low weight of sustainable ingredients in the total operational costs. Access to these, in terms of time and availability, proved to be the real challenge, given their less developed distribution channels. Lastly, the high degree of freedom and meaningful deliberation which the kitchen team benefited from, in both cases opened the possibility to more coherent and comprehensive definitions of sustainable principles and practices.

KEYWORDS: food sustainability, food systems, sustainable kitchen, sustainable gastronomy

Introduction

There is a growing interest in the gastronomy world on issues related to sustainability. More and more chefs, sommeliers, gastronomes, restaurant owners, managers, food journalists, and many other professionals in the hospitality industry deal directly with themes such as food sourcing, food miles, fairness, energy and water conservation, and waste reduction, among others. These topics have moved from the margins of this industry to much more centre stage and the evidence of this is considerable. To name a few examples, one can notice world-leading restaurants became famous for their focus on certain aspects of food sustainability: Noma and the New Nordic Cuisine movement certainly may come to mind for many readers; a growing number of lists and awards to business and professionals that take the lead in this area, such as the Sustainable Restaurant Award of the World's 50 Best List; and sustainability featuring prominently in the agenda of many food festivals, symposiums, and seminars — from MAD in Copenhagen, to Madrid Fusión in Madrid, and Mistura, in Lima.

The interest in sustainability in gastronomy mirrors evolving dynamics in society with its relationship with food. Citizens are also more and more concerned about food origins, carbon footprint, social practices in the value chain and integrity of their food (Krystallis, Grunert, de Barcellos, Perrea, & Verbeke,

2012; Micheletti & Stolle, 2012). How far these concerns will change the various unsustainable practices that still prevail in the global food industry is an open question (Vermeir & Verbeke, 2006; Van den Berg, 2016). Still, to anyone in the food industry, sustainability cannot be ignored anymore.

Unquestionably, food sustainability is not being ignored by researchers, considering the growing scientific literature on the subject approaching the very same previously mentioned issues. A great part of this research adopts systemic lenses to investigate the sustainability of the food industry (Ericksen, 2008; Colonna, Fournier, & Touzard, 2013). That is, borrowing the concept of food systems, certain authors investigate how the different parts of this system perform better or worse when it comes to certain sustainability criteria (Ericksen et al., 2010; Marsden & Morley, 2014).

This macro and systemic approach adopted by researchers has proved valuable in certain domains. Food policy, for example, must necessarily generate wide impacts on food production and consumption practices to be successful, thus the systemic approach is vital. To be informed by good research adopting this perspective is potentially very useful for policymakers.

On the other hand, chefs, managers and other professionals in the restaurant industry tend to carry a much more micro-level focus in their business practices. For them, the systemic overview might be useful for contextualisation, but it is of little practical

use when making decisions on how to operate their kitchens or how to adopt more sustainable procedures in their operations. In other words, professionals from this industry are being informed by diverse sources of knowledge — from exchange among peers, to events and specialised media — but very little by the macro and systemic approach adopted by researchers investigating food sustainability (Cavagnaro, 2013). This is worsened by the scarcity of approaches linking the macro-lenses of food system sustainability with the micro-practices of operating kitchens, in particular by how assessments so far show a very limited comprehensive understanding of sustainability (Higgins-Desbiolles, Moskwa, & Wijesinghe, 2019).

Hindley (2015) shows how the rise of this term in gastronomy was marked by stylised and stereotypical conceptions that do not do justice to the increasing conceptual complexities surrounding sustainability. There have been efforts to address these intricacies through the development of better-informed definitions and practical principles, such as approaches used by green certification schemes (Barneby & Mills, 2015), and research-led assessments of sustainable performance of restaurants (Rimington, Carlton Smith, & Hawkins, 2006; Legrand, Sloan, Simons-Kaufmann, & Fleischer, 2010; Schulp, 2015). Still, the lack of unified methods and the complexity of this challenge calls for simpler blueprints that are sufficiently manageable at the level of individual restaurants. In other words, methods that facilitate self-construction of simple guidelines, so these can be rightly informed by sound science and able to capture the environmental, social and economic dimensions of sustainability (Cavagnaro, 2015).

This article tries to fill the gap already identified in the literature (Jacobs & Klosse, 2016) by presenting and discussing evidence from two empirical cases where this link between macro- and micro-levels of food sustainability were explored. The first case takes place in a major global cosmopolitan city — Berlin, Germany — where a new restaurant experimented with an internal exercise of adopting ten self-constructed sustainable food principles. I was the first head chef of this restaurant. I tried to organise kitchen procedures based on these ten principles, drawing strongly from the literature on food sustainability. The second case takes place in Brasília, the regional centre and capital of Brazil. Inspired by the challenges found in Berlin, in Brasília I operated a smaller 12-seat twice-a-week pop-up restaurant, where similar sustainable food principles strongly shaped the menus and the restaurant operations.

Comparing those two different experiences, similar and dissimilar challenges were found, which are worth documenting and discussing within the wider scientific and gastronomic communities. Thus, this article aims to provide a double contribution. Firstly, one to the research community of food science and gastronomy, by demonstrating an empirical way in which the macro-level of food systems can be analytically linked with the more micro-level of restaurant operations through the development of sustainable food principles and practices at the micro (restaurant) level. Secondly, to the professionals of the restaurant industry, by discussing practical challenges that might be faced when pursuing similar goals in their operations.

Almost completely based on self-experience, my positionality in this article is clear. It is not my intention to provide comprehensive overviews of how food sustainability in restaurants can or should be achieved. It is rather the results of self-reflection and discussions with peers — mostly social

scientists and chefs — on how to bridge the two worlds, by chance, two worlds that pertain simultaneously to my career. Moreover, all sources of data are based on my non-consecutive participatory self-observation over the past three years. More specifically in two situations: i) when I led the kitchen of Hermann's Eatery Berlin¹ as the first executive chef (May 2017 to February 2018); and ii) when I headed the pop-up diner restaurant Mesa pra Doze² (November 2018 to December 2019). Numerous exchanges with kitchen peers, managers and recurrent clients of these two business complement the sources of data. This approach of relying on observation and self-reflection as sources of data is very much in line with anthropological autoethnographic studies (Jones, Adams, & Ellis, 2016; Spry, 2018) as well as transdisciplinary studies (Hadorn et al., 2008; Lang et al., 2012) which try to limit or even eliminate the distance between subject and object. In transdisciplinarity, more specifically, authors suggest that better research is achieved when researchers clearly declare their positionality and desist from seeking impartial knowledge (Rosendahl, Zanella, Rist, & Weigelt, 2015).

The article is structured as follows: after this introduction, the next section reviews the debate on food system sustainability. This step is useful for approaching the current status of literature on the subject, and for contextualising the schools of thought that influenced the approach for adopting principles of food sustainability. These principles are presented in the following section, which links the thinking on food sustainability at the macro-systemic level to kitchen operations, briefly describing their scientific basis. The results and discussion section presents the main challenges found when these principles were put into practice when opening Hermann's Berlin and Mesa pra Doze in Brasília. The focus of this section is to highlight similar challenges that might be faced by others in trying similar approaches in cosmopolitan cities. Finally, the conclusion discusses some of the implications for chefs, professionals in the food industry, and researchers.

Reviewing the debate: What does food system sustainability mean?

Food system sustainability is an emerging concept that links the main ideas of *sustainability* with the concept of *food systems*. Food systems, in turn, are in line with the evolution of yet another relevant and always evolving concept: *food security*.

The use of the term food security, while initially conceptualised as mostly a single dimension of food supply, gradually evolved to reflect policy thinking throughout the twentieth century by incorporating other dimensions and concerns (Maletta, 2014). This evolution culminated in the widely used definition consolidated by the 1996 World Food Summit: "Food security exists when all people, at all times, have physical, and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life" (Food and Agriculture Organisation of the United Nations — FAO, 2006). Thus, by the beginning of the current century, it became commonly accepted to apply the term when considering four dimensions: availability, access, utilisation and stability. Reflecting growing analytical complexity, the four dimensions of food security do justice to the many aspects relevant to policy. It also relates directly to many traditional disciplines addressing

food: from agronomy to economics, nutrition and health, to environmental studies.

More recent literature has explored the connection between the concept of food security with system perspectives (Ericksen et al., 2010; Colonna, Fournier, & Touzard, 2013). System studies investigate the interdependence between levels and scales, for example, the effect of the global phenomena of food price volatility coupled with a local-scale problem of monopolistic behaviour of food distributors in a certain area. It also addresses short and long terms, for instance, the trend of growing urban population — long term — interacting with a local economic recession. And it can also point to cross-sectoral trade-offs — for example, the frequently mentioned trade-off of immediate food production increase versus long-term decreasing natural capacity of the environment in delivering ecosystem services (Misselhorn et al., 2012).

Studies that applied systemic thinking to food security analysis were particularly concerned with understanding how food security outcomes are produced by the interaction of the different parts of systems. Therefore, the term *food system* began to be applied in reference to the different actors, processes and institutions that interacted and shaped how food is grown, produced, processed, transported, and consumed. Under this analysis, special concern is given to how certain effects (internal or exogenous to the system) influence actors' interactions and generate outcomes. Additionally, one of the main implications of understanding food security as outcomes of food system interactions is the increasing complexity and non-linearity of outcomes (International Panel of Experts on Sustainable Food Systems — IPES FOOD, 2015). In other words, when one assumes that food security derives from an uncountable number of multiple interactions between actors operating at different levels and scales, outcomes become too complex to be foreseen, modelled and/or analysed (Foran et al., 2014).

In terms of empirical studies, authors propose different categorisations when describing food systems. Colonna, Fournier, and Touzard (2013) suggest the *co-existence* of diverse food systems, which can be classified according to certain typologies: "local", "regional", "agri-industrial", or "differentiated quality", for example. The main contribution of this approach is to recognise overlaps between different food systems. Using an example from the restaurant industry, a certain actor — a restaurant — might acquire part of its inputs from a global/industrialised food system, while other inputs might be bought from a local/artisanal one. Interactions between these different food systems might generate complex outcomes in terms of income generation, distribution, social and environmental impacts, among others (International Fund for Agriculture Development — IFAD, 2013).

Analysis of food system outcomes have not been limited to the descriptive performance of systems, but frequently have been linked to political economy approaches. Normative rules provided by right-to-food approaches (Golay, 2010) or analysis on inequality and poverty impacts (Swinnen, 2007) can assist us in analysing food system outcomes. The debate on food system performance has also been linked to concepts such as environmental integrity and socio-ecological resilience (FAO, 2013; Tendall et al., 2015). Finally, food system *governance* has been another addition to this canon (Marsden, 2011; Candel, 2014), presenting evidence on how decision-making processes in

food systems shape its outcomes, contributing to ongoing food debates such as those around food sovereignty (Sage, 2014) and food democracy (Renting, Schermer, & Rossi, 2012).

The integration of all these different approaches into the analysis of food system outcomes has been calling for an umbrella concept that: i) encompasses the complexities of systems; and ii) adopts normative principles to which food system outcomes can be measured and the overall performance of food systems can be compared. This is where the frontier of *food sustainability* is currently found. Several initiatives have been exploring approaches that contribute to the building up of the food sustainability concept. These efforts to conceptualise food sustainability show one important similarity: the definition and adoption of principles as normative rules to which food systems can be compared in terms of sustainability performance. Some useful examples are presented in Table 1.

As can be easily noticed, these different approaches carry some similarities and overlaps. They are not necessarily analogous and comparable, considering that they mark a departure from different epistemic origins and are organised for different purposes. Still, some dimensions of food sustainability are noticeably equally presented in all mentioned examples.

One of the most important differences of these approaches is their level of analysis, that is, how far they can be rendered applicable to specific cases, such as one particular food system. When operationalising food sustainability at this level, Jacobi et al. (2018) derive indicators to assess specific dimensions of the concept of resilience, therefore demonstrating how a more general and macro concept can be rendered applicable at a territorial level. The operationalisation of food sustainability principles into measurable indicators and composed indexes is also one approach tested by food system researchers (Allen, Proserpi, Cogill, Padilla, & Peri, 2019; Augstburger, Käser, & Rist, 2019). These efforts suggest that general food sustainability principles must be deconstructed into more specific elements in order to be applicable.

This leads us to the question initially asked by this article: how can one render useful principles of food sustainability constructed at the macro-level to the micro-level of day-to-day kitchen practices? The next section investigates the challenge of linking those two levels by suggesting one approach that adopts principles and derives practices that can be assessed by restaurant managers, owners or employees.

From systems to kitchens: principles for a sustainable kitchen

The previous section reviewed the emergence of food sustainability concepts and how this currently influences research and policy endeavours that seek to contrast and compare the performance of different food systems. Inspired by this theoretical background, this section presents one approach that links the macro-level of systems with the micro-level of a single restaurant. The main intention behind this exercise is to build up a tool that: i) is theoretically grounded in the literature about food sustainability; ii) is applicable at the restaurant level; and iii) allows the identification of restaurants' own contribution to more sustainable food systems. Through this exercise, it is expected that professionals from the hospitality industry can rely on a comprehensive set of principles that are coherently and theoretically connected, reducing the risks associated with fragmented and intuitional knowledge.

TABLE 1: Examples of food sustainability conceptualisation

Source	Principles	Used as
Research programme "Towards Food Sustainability" – Centre for Development and Environment, University of Bern (CDE, 2015)	i) food security ii) the right to food and other related human rights iii) reduction of poverty and inequality iv) environmental integrity v) socio-ecological resilience	A method to comprehensively compare the performance of co-existing food systems across different regions and scales
Chaudhary, Gustafson, & Mathys (2018)	i) food nutrient adequacy ii) ecosystem stability iii) affordability and availability iv) sociocultural well-being v) resilience vi) food safety vii) waste and loss reduction	Principles for assessing global food systems performance
Research programme "Urban-Driven Innovations for Sustainable Food Systems" (URBAL, 2017)	i) food security ii) nutrition iii) governance iv) economic v) environmental vi) social	A participatory methodology for practitioners and policymakers in the identification of innovation pathways and their evolution towards sustainable food systems
Global Alliance for the Future of Food (2019)	i) renewability (integrity of natural and social resources) ii) diversity iii) healthfulness (health and well-being of people, society and nature) iv) resilience (adaptive capacity) v) equity (sustainable and just livelihoods) vi) interconnectedness (interdependence while in transition) vii) inclusiveness (in decision-making and governance)	Principles reflecting values shared by members of the Alliance, which shape the work of the organisation

The approach consists mainly of two simple procedures: i) the identification of sustainable food principles that could normatively guide re-orientation and innovation of food practices at restaurant level — thus adopting principles in a similar fashion to those presented in the second section, but at a more applicable scale and contextualisation for restaurants; and ii) the choice of sustainable kitchen practices that organise the principles into actions, also at a restaurant level.

Sustainable kitchens: Ten principles

To arrive at a final list of principles and the choice of practices, an iterative and informal process was developed, drawing strongly from participatory approaches. Initially, I worked on a draft, which was subsequently complemented and adjusted after several consultations, interactions and informal discussions with the wider restaurant team. The goal was to use the available scientific literature as a guide for discussion and to jointly construct a "target knowledge", that is a commonly agreed understanding of the "need for change, desired goals and better practices" (Pohl & Hadorn, 2007, p. 9). In that sense, the final list of principles represents both information and values that are informed by literature, as well as a jointly constructed vision shared by the team in a particular kitchen.

This approach was implemented in more detail in the first case — Hermann's Eatery Berlin — as this business had a more standardised restaurant structure and a much larger staff. The second case was slightly simpler. Departing from the accumulated experience at Hermann's, I, as chef and owner of Mesa pra Doze, adapted the principles and practices designed at Hermann's to the specificities of the new business in Brasília. The differences between those two cases in terms of challenges

while using the principles and practices in motion is explored in the discussion section of this article.

Even though these principles and practices are the result of a participatory and iterative process and are grounded in literature, limitations to this approach must be highlighted. First, the principles are not complete nor comprehensive answers to how to achieve sustainability in kitchen operations. They focus on certain aspects of kitchen operations, such as sourcing, and therefore might overlook other relevant dimensions (e.g. labour issues, residue treatments, and other issues which the team was less familiar with). Moreover, they are solely focused on the operations part of the regular domain of a kitchen chef, therefore anything related to service (front-of-house) and administration is out of the scope of this exercise. One must note, however, that it was not the intention of all involved in this exercise to design a comprehensive list of principles that would deal with every single aspect of food sustainability and kitchens. Other restaurants and teams might have a different view on the issues and would certainly adopt different principles if a similar exercise were to be conducted.

Against this background, the ten principles for food sustainability are:

- Embrace **diversity and seasonality** as the basis for food sustainability;
- Cook **real food**: minimal processing, and prioritising wholesome, fresh and nutritious products;
- Prioritise **local**, but do not close borders;
- Prefer **organic** and/or agro-ecological food; labels are important, but what really matters is how food is produced;
- Adopt a **vegetable-oriented diet**, but keep in mind that many food systems require animals for achieving sustainability;

- Favour **small producers**: their personal efforts pay off in quality, while income stays in the local economy and the benefits will be more fairly shared across the food system;
- Reduce **waste** to a minimum: reduce, reuse, recycle. Be efficient and adopt a nose-to-tail approach to cooking;
- Be **innovative**, but do not always reinvent the wheel; in many situations, being innovative means returning to our roots and **traditions**;
- Consider that the food industry needs **fixing**, but we are addicted to it. Radical solutions inspire but do not always lead us to a needed gradual transformative change; and
- Change recipes, techniques, ingredients: never sacrifice **taste**.

To demonstrate that the principles presented above are grounded in theoretical and/or empirical evidence found in the food systems' literature and practice, Table 2 briefly outlines some of the factual bases that underpin each principle.

From principles to practices

Going further with this exercise of identifying principles that are applicable by restaurants, kitchen practices are also identified. In many cases, kitchens are organised around certain procedures, protocols, and practices. While some of these refer closely to day-to-day routines that chefs follow, others can provide a certain frame of reference to the employees in which directions and ranges they can make their decisions; for example, decisions on which ingredients to buy, quantities, and from whom. In the case of this exercise, these practices represent more pragmatic operational choices which translate the previously mentioned principles in kitchen operations. Table 3 presents those.

The identification of principles and practices is just one initial step for shaping kitchen organisation and procedures towards sustainability. It is expected that many challenges will be found whenever these are put into action. The next section discusses some of the challenges I found when these principles and practices were tested in the two cases under discussion: Hermann's Eatery in Berlin, and Mesa pra Doze in Brasília.

Results and discussion: challenges found when implementing principles and practices

Before presenting the main challenges, it is necessary to provide context for the two empirical cases explored in this article, as the business format brings important implications in terms of facilitating or challenging the choice and execution of certain sustainable practices.

Hermann's Eatery in Berlin

Hermann's Berlin is a daytime café and restaurant located in Rosenthaler Platz, a central and hip district in ultra-cosmopolitan Berlin. The place is generally open from morning to afternoon (approximately 09:00 to 17:00), serving items that are normally offered in cafés (sandwiches, soups, salads, cakes, etc.), but also offering lunch specials and brunches during the weekends. Hermann's can sit 70 customers — which can be considered a medium-size restaurant (or a large café) for Berlin standards — even though many clients consume mostly coffee items or use the space as a work area.

To define the type of food served at Hermann's was very challenging in the beginning — when I was invited to lead the kitchen — so, to present the origins of the restaurant might be useful for contextualisation.

Hermann's was opened in early 2017 as an initiative supported by the family-owned German multinational giant Bahlsen. For a long time, the company had been exploring new business areas where potential was envisioned, as a long-term strategy of diversification from the core business of cookies, sweets and pastries. Bahlsen therefore decided to create Hermann's as an exploratory laboratory to test new ideas, ingredients and processes with Berlin clients. The business was organised into two parts: i) a support B2B consultancy (called Platform) that linked small innovative start-ups with the big players of the food industry; and ii) the restaurant, where clients could be received, recipes could be tested, and events could be held. Thus, both the Platform and the restaurant were set up as a unique, independent, self-managed subsidiary of the Bahlsen Group. With the motto "looking for the future of food", Hermann's was established with the mission of being innovative, bold, exploratory and risky, with a well-funded budget and a very comfortable timeline to create positive operational returns.

Though this part of the concept was indeed clear, imprecise guidance on how exactly the vision would translate into food offerings created several challenges in forging a clear concept and menu. On one hand, there was substantial freedom to test and suggest many diverse recipes, but on the other hand clients (and even the team) had difficulties in understanding what the restaurant really offered in terms of cuisine.

This imprecision is linked with the design of the ten principles presented in the previous section. Hired as the head chef and facing this imprecise definition, I took the initiative to start discussing with peers some guidance for the kitchen team. Thus, I started drafting and discussing principles that should guide the "future of food", drawing strongly on the understanding that the future of food is sustainable food.

In line with the general manager — who was responsible for all other aspects of the business, from the front-of-house management to budget and human resources — and with the experimental character of the firm, a great level of freedom was offered to the chef. Nevertheless, it was also made clear from the beginning that no expectations should be created in terms of using the principles for communicating with clients, nor that the principles would influence the Platform part of the business. In other words, everything directly related to kitchen organisation was under my influence — and therefore could be guided by the principles — but those should be considered as internal orientations only and not really part of the business concept.

Over time and through more internal discussions, Hermann's food concept slowly started to take shape. Today, the restaurant uses the following to describe its food concept to clients.

In our mission to make food not only delicious but also truly nourishing, we draw inspiration from cultures around the world, and strive to deepen our knowledge with every bite.

Our food is free from refined sugars and flours and full of goodness. We bake, cook, smoke, cure and ferment all of our ingredients in-house.

Whether local or global, we only work with suppliers that share our vision and values in shaping a good future of food.

We are proud to support them in the food we serve. We're exploring gut health, prebiotics and probiotics, fermentation and fibre to restore our inner ecosystem. We want to see a food system that is more circular with

TABLE 2: Principles of food sustainability applicable to sustainable kitchens and their factual bases

Principle	Basis
1. Diversity and seasonality	<p>Diversity is the main factor driving resilience. Diverse food systems react better to shocks and adapt to long-term changes. Non-diverse food systems and their inability to withstand shocks were reasons for many famines (Fraser, Mabee, & Figge, 2005).</p> <p>Seasonal produce means using the existing natural base/landscape and not going against them. Seasonal products tend to use less inputs (e.g., energy, greenhouse gases) (Van Hauwermeiren, Coene, Engelen, & Mathijs, 2007) and taste better.</p>
2. Real food	<p>High consumption of ultra-processed foodstuffs (refined sugars, refined wheat, etc.) are indicated as one of the main reasons for malnutrition or obesity (under consumption of micronutrients and overconsumption of calories) worldwide (rich and emergent countries) (Monteiro, Moubarac, Cannon, Ng, & Popkin, 2013; Canella et al., 2014)</p> <p>Besides being more tasty (or naturally tasty, in opposition to food with added chemical flavour components), real food (minimal processing and/or home-processed, fresh) retains more vitamins and minerals present in the food that we need for a healthy life, thus it is more nutritious.</p>
3. Local food	<p>Local production is strongly linked with seasonality and quality. Many local foodstuffs are produced by small farmers who trade in alternative/preferential markets, with a higher share of profits for producers across the different actors of the value chain (Van der Ploeg, Jingzhong, & Schneider, 2012).</p> <p>Local production can have smaller CO₂ footprints, although this is very much dependent on how food is transported (dry goods transported in bulk [cargo ships], for example). One option would be to exclude goods transported by aeroplane, which has a much higher carbon footprint (Mundler & Rumpus, 2012).</p> <p>Also, many smaller and poorer farmers elsewhere depend on international markets for their livelihoods (e.g., coffee, cocoa, tropical fruits, etc.), one more reason for not closing borders (Burnett & Murphy, 2014).</p>
4. Organic	<p>There are hundreds of reasons why organic products are better for our planet and for our bodies. As organic products become more established in the food market and the mainstream, less effort is needed to communicate their advantages (Crinnion, 2010).</p> <p>Agro-ecological food is a more general term that does not require third-part certification (label) as a proof of bio-production. Certification is costly and it can be a major barrier for farmers in developing nations. Besides focusing on the reduction of input use, agro-ecological food focuses on the diversity of crops, ancient varieties, and traditional vegetables and breeds, thus helping to sustain our planet's biodiversity (Gliessman, 2014).</p>
5. Vegetable-oriented diet	<p>Less consumption of meat is strongly linked to both reduced environmental pressure (planet) and better nutrition (health) (Godfray et al., 2018).</p> <p>Complete absence of meat (vegetarianism) or animal protein in the diet (veganism) is a personal option by many, but there is less evidence and more controversy for its environmental and nutritional benefits (Baroni, Cenci, Tettamanti, & Berati, 2007; Hallström, Carlsson-Kanyama, & Börjesson, 2015; Rosi et al., 2017).</p> <p>Many sustainable agricultural systems require animals for nutrient recycling (e.g., compost substituting industrial fertilisers in integrated production systems), for controlling wild stocks (e.g., sustainable fisheries), or for increasing production efficiency (e.g., natural grazing in large areas) (Wanapat, Cherdthong, Phesatcha, & Kang, 2015).</p>
6. Small producers	<p>In the quest for scale and efficiency, many food systems gradually evolve to exclude small farmers as sources of food. Small family farmers might have lower economics of scale, but they have higher economies of scope, implying that they tend to focus more on details that lead to high-quality produce. Besides, small family farmers tend to have more diverse and seasonal production systems (Principle 1) (Nayak, 2018).</p> <p>Favouring small production also keeps more income in the local economy, and it allows family farmers to capture a higher share of profits that are distributed across the value chain, thus it is an ethical decision to support them (Hebinck, Schneider, & van der Ploeg, 2014).</p>
7. Waste	<p>Approximately US\$ 1 trillion is lost per year due to food waste. Food waste is an economic, ethical and environmental issue (Gustavsson, Cederberg, Sonesson, & Van Otterdijk, 2011).</p> <p>Reduce, reuse and recycle are three mantras for any kitchen aiming to increase its sustainability performance. This is also linked to developing recipes that use produce in its totality – a nose-to-tail approach (e.g., less fancy cuts of meat, use of bones and carcasses for stock, vegetable skins for broth, re-use of oils for dressing, etc.).</p>
8. Innovations and traditions	<p>For transforming our food systems, we will need to constantly innovate. But there is more and more evidence that many of the solutions we need will be found in the notebooks of our grandmothers and in our traditions, rather than in fancy laboratories.</p> <p>As in times of less abundance, families used to follow pretty closely the principles that we are setting for our kitchen (diversity, seasonality, local, waste reduction, etc.) (Altieri, 2004).</p>
9. Fixing food systems	<p>To say that the food industry is broken is no longer a radical statement, but many critics of the food industry do not accept that our post-modern urban society is addicted to the vast benefits that food industrialisation brought us (convenience, abundance – to name just two things that our society is unlikely to renounce).</p> <p>Like any addiction, simply cutting its intake from one evening to the next morning will likely fail. Additionally, a large number of people do not accept that our societies are addicted to the food industry, which calls for gradual transformations.</p> <p>Alternative radical options are inspiring examples but have proved successful only on a small and marginal scale. There are many examples of "small revolutions" in the food system: food hubs, community-supported agriculture (CSA), agro-ecological transitions, progressive food policy, among others (Baker, Gemmill-Herren, & Leippert, 2019).</p>
10. Taste	<p>Never sacrifice taste, because first and foremost, food must be delicious.</p>

TABLE 3: Practices of food sustainability applicable to sustainable kitchens

Principle	Practices
1. Diversity and seasonality	1.1 Design the menu first by considering the best ingredients available in that particular season in that area, and later thinking of specific recipes
2. Real food	2.1 Avoid buying processed ingredients. Strongly avoid buying ultra-processed ingredients 2.2 Make your own flavour bases (stocks, sauces, preserved vegetables, jams, etc.) 2.3 Whenever possible, opt for wholesome flours, sugars, and unrefined ingredients
3. Local food	3.1 Buy first from local and personally known producers, second from distributors, and only third from major retailers 3.2 When buying from retailers, communicate with them about your buy-local policy
4. Organic	4.1 Buy first from local and personally known organic producers 4.2 Only buy non-organic when organic produce is unavailable or significantly more expensive (more than a certain rate or price, for example) 4.3 Only require labelling if buying from distributors and retailers
5. Vegetable-based diet	5.1 Use animal protein mostly to season vegetables 5.2 When serving animal protein as a main dish, serve smaller portions and larger vegetable garnishes 5.3 Culture, cure and ferment animal protein to increase its nutritional availability, and its flavour potential (thus contributing as a seasoning agent, rather than a sole ingredient) 5.4 Do not adopt a fully vegetarian or vegan diet without reflection, as those can be as unsustainable as a regular diet if not complemented by other sourcing principles
6. Small producers	6.1 Buy first from local and personally known small producers 6.2 When buying from retailers, communicate with them about your policy of buying from small producers
7. Waste	7.1 Seek a "zero-waste" policy when using vegetables and animals. Be creative and look for recipes for using skins, bones, leftovers, etc. 7.2 Before throwing anything out, consider dehydrating, fermenting, preserving, etc. 7.3 Monitor waste production, water disposal, and energy consumption 7.4 Always give preference to "leftover" over "prime" cuts, "non-conventional cuts and animals" to "highly valued animals"
8. Innovation and traditions	8.1 Use traditional cookbooks as main sources of information and recipes 8.2 First research cooking traditions when using preserving techniques 8.3 Critically reflect on the "newest trend" before adopting it
9. Fixing food systems	9.1 Do not be ideological, since flexibility is important, and change is gradual 9.2 Listen to your clients needs and wishes before posing an argument
10. Taste	10.1 If a recipe follows all other nine principles, but does not taste good, do not add it to the menu

reintegrated by-products and rediscovered ancient ingredients.

We believe this will lead us to more diversity, less waste and higher nutritional profiles. We believe that to be truly sustainable you must also be accessible, approachable and affordable, but without forgetting the true value of food (Hermann's, 2020).

Challenges when implementing sustainable food principles at Hermann's

Diverse challenges, achievements and limitations were found when implementing the ten sustainable food principles at Hermann's. The discussion below reflects some of those in the period I headed the kitchen (May 2017 to February 2018).

Principle (1) — diversity and seasonality, practically a mantra of good food accepted by most chefs — was achieved well, but not without certain pitfalls along the way. While the practices associated with this principle call for designing the menu by first thinking of the best ingredients available during a particular season, there was resistance both in management and from certain clientele not to include ingredients and preparations that are easier to sell, while definitely not seasonal. For example, tomatoes, aubergines, zucchinis, strawberries, cherries and other summer fruits and vegetables are grown in greenhouses in the Netherlands or Spain during the harsh northern European winter. This was even more challenging considering the focus on healthy soups and salads, as part of the food offering. The way to address this challenge was to increase focus on winter vegetables and

preserving techniques, such as fermentation, pickling, and dried and canned preparations. In the end, this was made relatively easy due to the growing interest in Berlin for local and seasonal food and the consequent effort of major retailers in finding local winter vegetables to distribute to restaurants in the city.

Principle (2) — real food — calls for avoiding processed ingredients, practically banning ultra-processed foods, and a focus on self-made flavour bases and wholesome flours, sugars, and unrefined ingredients. This was achieved well at Hermann's. Not only was this identified as one of the goals of the restaurant and the food concept right from the start of the business, but there was also a clear alignment between the chef's willingness to experiment and the vision that the leadership had for the restaurant. Thus, ultra-processed foods were very rarely part of any preparations, and processed foods were used with caution. The kitchen even experimented with completely banning refined sugar and flours, which in turn required a lot of adaptation and turned into a long, but worthwhile learning curve. One word of caution: to prepare our own flavour bases was only possible because the company had resources for covering the additional labour costs involved in making things in-house. For most food preparations, these costs were significantly higher than using ready-made products, in some cases doubling or more the total operational costs for a dish. Certainly, not all restaurants are in the same favourable position to implement this.

Principles (3), (4) and (6) — preferably buy local food, organic and from small producers — were very challenging to implement, and in the end, were only partially achieved. In

terms of organic sourcing, gradually the proportion of organic produce was increased when more commercial contacts were formed with producers and distributors. Thus, at the beginning of the operation, standard retailers offering organics were preferred. This was not necessarily due to price differences. In fact, the price of these quality-differential ingredients was rarely more than 20% higher than standard ones. Since the cost of ingredients was between 15–18% of the total operating costs of the restaurant, the margins were more than sufficient to pay more for local, organic ingredients from small producers.

The main problems therefore were not pricing, but inconsistent availability and distribution difficulties. Standard retailers had an important competitive advantage in terms of order timing and delivery. They could guarantee to deliver 90% of their portfolio at restaurant doors by 09:00 at the latest, even if one placed the order at 23:59 the previous day. Retailers working with local and organic products were far from being able to offer that. And since the team was small and opening hours were during the daytime, it was virtually impossible to dedicate someone from the kitchen team as responsible for direct purchasing (a strategy that many restaurants follow), as labour was needed in the kitchen from the early hours. In a city where labour is costly, very few hours could be dedicated by the kitchen team to purchasing.

The solution to partially achieve these principles was the following: Specific recurrent ingredients such as flours, dry goods and dairy were purchased directly from producers or small retailers. Other non-recurrent ingredients were purchased from major retailers, but clearly informed and communicated around the restaurant's preferences. Eventually, we noticed that they increased their own portfolio of these goods, as they could also monetise on the higher margins offered by these ingredients. After implementing these solutions, 80–90% of all dry goods and 40–60% of fresh produce purchased were either organic, local and/or from small producers.

Principle (5) — vegetable-based diet — refers to reduced use of animal protein, mostly in smaller portions or as flavour agents to vegetables, and to a reflective adoption of full vegetarian and/or vegan diets. This principle was very well achieved, as it had been one of the key elements of the food concept and menus since the restaurant opened. It was decided early on that the food offering should be composed of diverse vegetarian, vegan and restrictive diets (low gluten, no lactose, no fructose, etc.), even though the restaurant should not follow one or other diet restrictively. The team achieved several successful experiments with light dishes where animal protein was not the star, but rather acted as a flavouring ingredient for vegetables.

Initially, the main concern was that the clientele would not be able to understand the concept, but this quickly proved to be unfounded. Traditional German cuisine is very much centred in the triad of meat-carbohydrate-vegetable and to twist this was well understood and supported by consumers. This was obviously easier in the cosmopolitan atmosphere of Berlin and the restaurant's location, where classical cooking has a reduced presence in favour of more internationally oriented restaurants.

Principle (7) — seek zero-waste — suggested creative uses of leftovers, including experimenting with dehydration, fermentation and preservations, as well as a monitored and controlled production of waste. There was little achievement in terms of this principle, despite the efforts by the kitchen team to tackle this challenge. Comparable to other more conventional

restaurants where I have worked before, the waste produced was relatively small. However, it was still a long way from a zero-waste policy because, irrespective of the many different strategies tried, many kinds of waste were still being generated.

There was very little waste in terms of prepared food. Due to good kitchen management, much of the food left was consumed by the team as staff meals. We also experimented with many different techniques to re-use parts that would normally go in the bin. Thus, the organic waste generated was also reasonably small and conditioned in adequate organic marked bins that converted them into compost — also due to the very good German policy on waste treatment.

Nevertheless, there was an impressive amount of recyclable and non-recyclable non-organic waste, from boxes, plastic, cartons and the like. With time, the team gradually managed to reduce part of this waste, either changing brands, increasing recyclable separation or buying more in bulk and discussing other options with suppliers. Still, the restaurant was far from achieving minimal waste generation.

With an effort to achieve this principle, I even studied restaurants that claimed to have achieved zero-waste.³ They tend to share certain characteristics, such as a rotating menu structure, direct purchases with producers and more thoughtful recycling strategies. This somehow assisted in some solutions. One final comment on the issue is that the move to increase organic ingredients in the offerings did not improve waste generation, as many organic brands contained the same packing policy as standard ones.

Principles (8) innovation and traditions, (9) fixing food systems, and (10) do not sacrifice taste — represent values and approaches to how food system change can occur. Principle 8 calls for efforts in researching cooking traditions as a source of information and recipes, as well as a critical reflection on "newest trends" before adopting them. This principle was not achieved. Right from the start, there was a clear misalignment of expectations between the kitchen team and the general business strategy of the company. Hermann's was a family-owned multinational willing to follow the newest trend to be well-positioned in the food market. It was not in their interest therefore or they did not want to use their resources on critically assessing these trends vis-à-vis the other sustainability principles. The different motivations created noise, but very little interest in researching cooking traditions, and early on I realised that to push for this principle without support from the upper levels would not be fruitful.

Principle (9) calls for flexibility and listening to client's needs and wishes, before posing catechism arguments. This was very well achieved. It was shared by both the team and management levels that the food system transformation would be gradual and would accumulate from a growing network of small, specific changes and that this critical mass is created by interactions. This reflected more gradual improvements on many sustainability aspects of the kitchen, as demonstrated in the previous paragraphs. This benefited greatly from suggestions given by the team, clients and partners. Additionally, regular events were organised with a wider community of people interested in the subject in Berlin, which brought new insights that were frequently tested at Hermann's.

Finally, the last Principle (10) called for keeping taste as a pillar for food to achieve its many social roles. It is an indirect response to many food industry strategies that sacrifice

taste and general food quality for longer shelf-life, and lower production and distribution costs, etc. This principle was relatively well achieved. It was one of the main ideas agreed in the food concept — to be proud of what was offered — as well as one of the main plans for establishing a regular clientele. On some occasions, the internal pressure of constantly changing the menu as a commercial strategy and the need to use fancy innovative ingredients that represented the latest food trends challenged the kitchen in delivering this principle. But high ratings and reviews on food items and a growing clientele proved that this challenge was achieved.

Mesa pra Doze pop-up restaurant in Brasília

As in the previous section, before moving into the discussion of challenges, the case of Mesa pra Doze is contextualised. Mesa pra Doze is a twice-a-week pop-up restaurant in the Asa Norte neighbourhood of central Brasília. It differs from a normal restaurant that has its own premises, and the project works through a collaboration between the chef and a café called Antonieta, which opens daily from 09:00 to 21:00, from Monday to Saturday. On Fridays and Saturdays, the café closes its operations earlier, at 19:00, and the team of Mesa pra Doze set up their stations and re-open the space at 20:00 to run dinner under this brand.

The dinners are composed of between five to seven course, fixed tasting menus and offered to a maximum of 12 to 13 seats only (thus the name Doze, 12 in Portuguese). I set up this business after some years of experience and training in fine dining restaurants around Europe and Latin America. Inspired by other places where seasonal, local and organic food is offered in tasting menus for a limited number of people, I decided to organise a small, mobile gastronomic project where complete freedom of expression was possible. The project size was also kept very small number due to the limited investment available. Additionally, one of the main goals of Mesa pra Doze has always been to experiment with how far sustainable principles could inform the kitchen operation and menu offerings. Thus, it was supposed that this would be more easily achievable at a small scale first.

At the time that the project was being conceptualised (the second half of 2018), I had already worked with the ten principles for a sustainable kitchen at Hermann's. Therefore, one of the initial tasks when designing Mesa pra Doze's food concept

was to adapt those principles into three main issues: i) the context, narratives and terminologies of Brasília in terms of food sustainability; ii) the scale of a 12-seat pop-up restaurant; and iii) a language that would be easy to communicate and could be used in marketing pieces. When adapting those to this context, Mesa pra Doze adopted seven principles for a sustainable kitchen (Table 4).

As can be easily noticed when comparing these with the ten principles at Hermann's, some aspects were merged, while others were adapted to the context. As previously mentioned, the formulation of the principles and practices at Mesa pra Doze was less a group exercise and more a self-reflection on how to adapt the principles to a much smaller-scale pop-up restaurant in a different regional context. On the one hand, the degree of freedom to select principles and practices was higher, favouring higher levels of coherence, a better fit to the local context of the city, and bolder, more straightforward ideas. On the other hand, as there was no direct consultation or a dialogue with peers for their adaptation, it is even more difficult to assess how far these principles could be adapted and applicable in other kitchens. With these in mind, the next section reflects on the challenges found when putting these seven principles into action.

Challenges when implementing sustainable food principles at Mesa pra Doze

Principle (1) — zero waste — calls for adopting a nose-to-tail and root-to-leaves approach, where by-products of cooking are valued and re-used, and prime cuts and leftovers are innovatively explored. As in the case of Hermann's, the issue of waste management was one of the most challenging and difficult to achieve. A lot of effort was put into making this principle operational at the scale of Mesa pra Doze, and yet, it was only partially achieved.

On the one hand, a nose-to-tail/root-to-leaves approach informed much of the cooking style adopted in the project in fact. Bones, skins, fat, roots, etc. were consistently used in recipes. Complete freedom to create and experiment facilitated this process, as I could adapt and change recipes accordingly. This process was also supported by the blind menu structure of Mesa pra Doze, where the use of by-products could be experimented with, with almost no limitations due to potential client refusal. Thus, I had the opportunity to test and use techniques to re-use by-products in a way that gave Mesa pra

TABLE 4: Principles of food sustainability adopted by Mesa pra Doze

Principle	Description
1. Zero waste	Adopt a nose-to-tail/root-to-leaves approach Value and re-use by-products produced when cooking
2. Non-conventional food plants	Use native, foraged plants and non-conventional food substantially Rescue traditions and regional cuisines
3. Agro-ecology	Cook and serve food without poison (agrochemicals) Prefer organics, bio-dynamics and agroforestry produce
4. Seasonality	Respect the time of nature Source key seasonal produce
5. Farm-to-table	Forge relationships with family farmers, cooperatives and associations Search local suppliers and distributors, from the city and surroundings
6. Brazilian socio-biodiversity	Use ingredients from the local biome, that is, <i>Cerrado</i> (Brazilian savannah) substantially Showcase typical ingredients from Brazilian socio-biodiversity
7. Sustainable diets	Offer a vegetable-oriented cuisine, where animal protein is used mostly to season and not as main ingredients on a plate Only cook real food

Doze a growing reputation in certain gastronomy circles in Brasília. I was invited to organise workshops and events focusing exclusively on these techniques. Additionally, it was a project where the exact number of portions was known in advance (24–28 pax/week), and so, with time and experience, the team managed to produce almost exact quantities for serving with virtually no food left over.

Still, even with all this effort, it was not possible to achieve a zero-waste status. Firstly, some organic waste will always be generated. Restaurants that are experimenting with a zero-waste policy normally compost this waste in bins that can process a certain amount of prepared waste in 24 to 48 hours. Others sign partnerships with companies dealing with compost, as is the case with many restaurants in Brasília. The fact that Mesa pra Doze was relatively small in this case, worked against this principle, as it was not possible to find a company that would receive such a minimal amount of organic waste.

Nevertheless, the really key challenge was that there was still a lot of non-organic waste being produced. With such a small project, I made efforts to handle fresh produce directly from farmers without disposable plastics or cartons. However, all dry goods (flours, grains, spices) were bought in small portions, usually in packages of 1kg, half-kilo, 2kg, etc. and recycling these materials was very limited. There are disposal areas where garbage is selected and treated by cooperatives, but this required me to transport this garbage independently with my own car, using time and storage space that was not available in most situations.

Principles (2), (3), (4) and (5) — non-conventional food plants, agro-ecology, seasonality, and farm-to-table — were successfully achieved. These principles suggest using native and foraging food plants substantially, as well as rescuing traditions and regional cuisines. They also call for buying seasonal, organic, biodynamic and agroforestry produce, which is more easily achieved when relationships with family farmers and cooperatives are forged. Two main reasons contributed to achieving these principles: i) the principles fit very accurately with the format of Mesa pra Doze; and ii) there is dynamic growth in seasonal and agro-ecological supply in Brasília.

In terms of format, to open only twice a week provided enough time for me to dedicate to sourcing, researching and selection of high-quality ingredients, at prices that in many cases were not more costly than those found at retailers and supermarkets. I was the one responsible for purchasing and for designing the constantly changing menu, so it was simple to adapt according to seasons and to what was available at the time. Discussion with other chef colleagues in Brasília revealed an agreement that this model is very difficult to reproduce on a large scale, due to the unreliable availability of ingredients and the standard structure of fixed menus.

Concerning the growth in supply, it is evident by the mushrooming number of small farmers' markets focused on organic produce in the city. These are connected with a dynamic network of community-supported agriculture (CSA) projects and similar initiatives, supported by the high GDP per capita of Brasília, which is well above the national average. Since 2015, once a week, the largest wholesale marketplace — the public-owned CEASA — has held a family farmers-only market in one of its warehouses, alongside a standard farmers' market that is visited by thousands of people. Facilitated by this supportive environment, Mesa pra Doze gradually cultivated very good

relationships with certain family farmers, which resulted in a supportive synergy between the project and these networks.

Principle (6) — Brazilian socio-biodiversity — calls for substantially using typical ingredients from national biomes, in the case of Brasília, the *Cerrado* [a tropical savanna/dry-forest habitat that covers most of central Brazil], while also acquiring ingredients from other biomes produced by traditional communities with sustainable extraction regimes. This principle was well achieved, but certainly not without considerable effort. In terms of demand, there is a growing interest for these products, clearly noted in discussions with several clients. City dwellers are increasingly curious about foraging, with many linking these typical ingredients with past memories of home, as these ingredients became scarcer to find due to the industrialisation and homogenisation of food systems.

In terms of costs, the price of these ingredients is fair, as it fits the concepts of Mesa pra Doze and, when acquired through organised fair-trade-like cooperatives, the money spent on acquiring them goes directly to those populations that depend on sustainably harvesting these resources.

The major challenges are availability and regularity of supply. With notable exceptions, the value chain for Brazilian socio-biodiversity products is extremely disorganised, with large-scale informality, dubious intermediaries, and severe logistical problems in terms of correct conditioning, transport and processing. Some family farmers and traditional populations' cooperatives have been working for many years at organising this value chain, in many situations very successfully. But this is still more the exception than the norm for these products, and it was surprising how the enormous gastronomic potential of Brazilian socio-biodiversity is still vastly unexplored. Mesa pra Doze used these as much as possible, but still suffered from difficulties in planning.

The final principle (7) — sustainable diets — suggests a vegetable-oriented cuisine, where animal protein is used mostly to season and rarely as main ingredients in a dish, besides the concern in cooking only real food, minimally processed food and nothing ultra-processed. This principle was very well achieved. As in the case of Hermann's, the initial concern was whether clients would take the chance of moving out of their comfort zone — considering that this approach is substantially different from the usual carnivorous offerings of Brasília's food scene.

In fact, the vegetable-oriented menus of Mesa pra Doze were very well received by the clientele. There is a notable growing trend in health and conscious eating that is also linked with the networks of family market fairs and CSA. For years, Brasília's centre has had several restaurants serving "natural food" — a category that generally denotes more healthy options and food rich in leafy greens, fibres and light animal protein. This category is even noted in many of the city's food guides. Nevertheless, these restaurants tend to focus on lunch service only. Mesa pra Doze was the first to focus on a complete dining experience that targeted this specific niche, being completely flexible to accommodate any dietary requirements and preferences.

Conclusion: What are the implications for chefs and food researchers?

How can restaurants assess their practices in terms of achieving sustainability inside their kitchens? This article explored one analytical possibility by using principles informed by the evolving

literature on sustainable food systems. Two cases discussed the challenges of putting these principles into practice: the restaurant-café Hermann's in Berlin, and the Mesa pra Doze gastronomic project in Brasília.

The cases have shown that some principles were much more easily achieved than others and that these differed from one case to the other, according to the specificities of the business and the area it is located. For example, at Hermann's, challenges were found in ensuring a complete seasonal menu, and in sourcing ingredients directly from small suppliers. At Mesa pra Doze, on the other hand, this was much more easily achieved, due to both its scale and the format of a business that offered much more available time for researching and sourcing ingredients. In both cases, to achieve zero waste was extremely challenging, in particular due to packaging.

By showing one approach to assess sustainable practices conducted by restaurants, this article provided a double contribution. For the research community of food science and gastronomy, it demonstrated an empirical way of linking the levels of food system analysis (macro) with the more micro-level of restaurants or businesses in general. The design of principles can provide guidance to kitchen teams to follow certain practices aligned with the concept of food sustainability. The key point here is not to suggest that studies necessarily use the same principles adopted in this article, as they certainly have to be adapted to the context. Instead, it shows that the principles chosen must be grounded in the scientific literature of food sustainability, reducing the risk of choosing incoherent principles by chance or ones that only fit marketing purposes. In the future, similar exercises could demonstrate more clearly how one single action adopted by a restaurant contributes to a wider societal goal of food system change.

The second contribution relates to professionals in the hospitality industry, by discussing challenges that might be faced when pursuing similar goals in their operations. The experience of Hermann's and Mesa pra Doze provided some useful lessons. The challenge of scale was evident in how it was easier for Mesa pra Doze to achieve more coherent sourcing, by buying sustainable produce directly from suppliers and producers. It was also apparent in both cases that the higher costs associated with sustainable produce are not necessarily a challenge per se. In many cases, organic/small-scale and local ingredients were not more expensive than standard ones. And in the cases that they were, the higher margins and low weight of these ingredients in the total operational costs diluted their costs. The greatest challenge was in the time required to access those ingredients, since their distribution channels are underdeveloped compared to more conventional food chains. For actors working to support sustainable food systems, this carries an important implication: how to pay a fair price to agricultural producers while improving the accessibility of their products with more efficient distribution channels?

Finally, the cases suggest that the relatively high degree of freedom the kitchen team had opened the possibility for more coherent and comprehensive definitions of principles and practices. In other words, a meaningful discussion on how to achieve sustainability in restaurants was not only made possible, but supported by a great deal of deliberation by Hermann's management while the restaurant was defining its food concept. In the case of Mesa pra Doze, I enjoyed complete autonomy in defining the menu. Freedom from constraints — be it financial,

conceptual or marketing-related, for example — in a context where kitchen staff are committed and enjoy space for free and authentic deliberation favours higher levels of sustainability. Aligned with recent studies on the frontiers of food democracy (Behringer & Feindt, 2019; Bornemann & Weiland, 2019), authentic deliberation and emancipation can assist our food systems in their transformation towards sustainability.

Notes

1. www.hermanns.com/hermanns-eatery/
2. www.mesapradoze.com
3. The most famous being Silo, now based in London, UK

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