

Salers Cheese: The Diversity and Paradox of Local Agricultural Knowledge¹

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Abstract

Our case study of Salers cheese production in south-central France highlights how place-specific 'localized' agricultural knowledge grounds the various, inter-related networks that have shaped the rise of geographical indications (GI) in food production and marketing. In 1961, Salers cheese producers elected to create a 'Protected Designation of Origin' (PDO). To preserve the distinctive character of their product, they opted to require use of the *gerle*, a traditional wooden vat, and an on-farm cheese making process. The *gerle*, however, came under scrutiny from French governmental hygiene regulation enforcement, and the subsequent public controversy jeopardized the entire supply chain and destabilized Salers cheese-making methods. Prevailing in their efforts to protect Salers, producers established the *gerle* as mandatory and have since set up a governance board to ensure PDO brand integrity. Addressing this case, our analysis suggests that the diversity of technical choices and associated knowledge in Salers cheese production has paradoxically been both its strength and weakness. Local agricultural know-how forges links between and among participants in Salers networks, connecting cheese producers and consumers, to cattle, microbes, landscapes, wooden tools, and the cheeses themselves. Yet, the intrinsic diversity of local expertise creates a tension among producers who must collaborate to achieve and protect unified standards within a PDO while resisting homogeneity. We aim for this paper to contribute to the larger conversation underway on PDO governance: a forum to share, compare, and *unite* local knowledge is critical for GI, and thus for facilitating economically and ecologically sustainable agricultural systems in general.

Salers; geographical indication; local knowledge; French dairy farming systems; cheese supply chain.

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Introduction

A geographical indication (GI) is an umbrella term referring to product names that link an agricultural product to the place where it is grown, produced or processed. The premise of GI is that by defining characteristics of certain quality foods or beverages that are directly tied to that product's particular geographical origins, a GI may protect an agricultural product's quality and reputation and stave off mass-produced industrialized knock-offs of renowned foods and drinks. The two main pillars of the GI initiative are the *identification* of the geographical area that is entitled to use a particular name and the *specification* of production methods – those particular bodies of knowledge and skills that establish a definitive link with geographical origin (Bérard and Marchenay 2004 and 2008a). Yet, the establishment of the specific rules of production – known as 'specifications' – raises questions that this research seeks to address. The choice of techniques covered by specifications, and the way those specifications are applied and used by the different players in question, express local balances of power. Subsequent misunderstandings and misappropriations may be seen as production defects by the authors of those specifications, yet such divergent opinions and techniques also express the dynamism, vitality, and even resistance of a local community facing homogenizing forces from the highly concentrated agribusiness industry.

Historically, countries in Europe utilized their own geographic origin labels: AOC (*appellation d'origine contrôlée*) and the Italian and Spanish DO (*denominazione di origine* in Italy; *denominacion de origen* in Spain). In 1992, the EU created a continental PDO label. To qualify for PDO status, farmers must prove definitively that the properties and characteristics of their product are particular to its place of origin. Accordingly, it must be produced, processed, and prepared entirely and exclusively within that region to merit the proposed PDO name. The certification process begins locally, with producers applying to their national government for an official designation, and if approved, the respective government applies to the EU, which ultimately grants (or not) the PDO. In this manner, the building of a PDO brand implies a pooling of skills and collective action in defense of a shared asset. Situations vary considerably from one PDO to another. As this paper demonstrates, it is both the strength and weakness of GI legislation that it leaves considerable room for local discretion.

Salers PDO Cheese

Salers cheese is a prime example of the difficulties faced by producers in asserting a unified code of production. As one of the five “flagship” cheeses of the Auvergne region in south-central France, Salers epitomizes the artisanal quality that GIs attempt to support. The Auvergne region boasts fertile soil atop volcanic mountain hillsides covered in native wildflowers and wild grasses. Farmers and herders of the area have kept alive ancient dairy farming techniques, specific to this landscape. Cheese exemplifies this agrarian artisanal heritage. Formerly part of the broader Cantal PDO, in 1961 Salers producers established a PDO in a bid to protect and preserve a system relying on Salers-specific traditional skills. The entire Salers production process—from the free-range grazing and feeding of locally adapted and culturally significant heritage cattle breeds to processing, ripening, and aging—takes place within the geographical PDO zone, ensuring jobs at every level of the production sector, sustaining local biodiversity and fostering sustainable agro-eco-tourism in the region (called the “Cheese Route”).²

One of Salers cheese's most original features is that the raw milk must be curdled in a wooden tub, known as a *gerle*, which plays a key role in the local cheese culture (Didienne *et al.*, 2008) and is thus an essential part of the Salers PDO specifications. Recently, the *gerle* was at the center of serious debate triggered by the actions of a minority of Salers producers

² This research is part of a larger intellectual project to study and foster localized agri-food systems (SYAL, the acronym in French), or “an organization of producers and services linked by their characteristics and their function in a specific territory that includes the environment, the product, the individuals, the *savoir faire*, the institutions, and the consumers as well as their food and culture (SYAL, 2007).”

who – seeking the greater production efficient of stainless steel containers – made use of French food safety rules to challenge the alleged hygienic safety of the wooden tubs. Modern food safety regulation rejects this traditional form of production, and dispensations for hygiene are difficult to acquire Bérard and Marchenay, 2008b. As Latour astutely describes in *Pasteurisation of France*, food safety officials follow and perpetuate a particular discourse of sanitation, and work to inscribe it as scientifically incontestable (Latour 1988).³ The history of the pasteurization of milk parallels the fixation on sanitation in cheese production: “Wherever the microbe may find itself, an authorized agent must be there to chase it away. If militant hygiene achieved this aim, it had created a new source of power, a power unthinkable a few decades earlier and one that was rapidly becoming irreversible” (Latour 1988: 58).⁴ In short, the traditional Salers-making wooden vats came under attack as unsanitary. The resulting divisions within the Salers sector between those for and against the *gerle* left the entire sector seriously weakened at a time when practitioners had to unite to confront and resolve many of the internal contradictions within it.

Salers Actor-Networks

The concept of actor-networks can help scholars and farmers to re-conceptualize the role of traditional agricultural knowledge in GI food production. According to actor-network theory (ANT), “entities take their form and acquire their attributes as a result of their relations with other entities” (Law 1999: 3), such that social, economic, political, and technical factors do not provide the background for activity and interactions between actors—they are themselves built into the networks. “Network” here refers to the active process of forming and being formed by other actants, “a series of *transformations*—translations, transductions—which could not be captured by any of the traditional terms of social theory” (Latour 1999:14). ANT deliberately includes non-human entities as actants: “an innovation is but a syntagmatic line (i.e., a line connecting programs to further programs) containing human and non-human actants that were recruited to counter the anti-programs” (Czarniawski and Hernes 2005: 8).⁵

Actor network theory (ANT) offers a useful perspective for us to examine how local knowledge and know-how form the core that binds all elements in a socio-technical network – humans, objects, and discourses (Callon 2004). From this perspective, the code of practice for Salers PDO cheese is seen as a technical object, including its social dimensions. ANT helps us appreciate the multiple ways in which sharing competencies among all actants in the network represents a critical means of support for the future of PDO and the continuing existence of Salers cheese. There is a fundamental tension between the importance of diversity within agricultural systems, and the need for collective unity among those producers who must defend the system, particularly when, as in this case, it has been codified in the form of a PDO. As we discuss below, the diversity of local agricultural knowledge among the Salers farmers is paradoxical, serving as both a source of strength and weakness to the initiative.

Methodologically, we use a multidisciplinary approach that incorporates the tools and perspectives from research in anthropology, cognitive science, microbiology, and livestock science. Coordinated by INRA (the French National Institute for Agricultural Research), ENITAC (the Clermont School of Agricultural Engineering) and the CNRS (the French National Centre for Scientific Research), our methods included videos made and discussed

³ In this regard, microbial politics echoes long-standing observations about the politics of scientific authority (Foucault 1980; Haraway 1988; Dove 1996; Knorr-Cetina 1999; Fischer 2000).

⁴ Sanitation conflicts are not unique to France. Localized, small-scale raw-milk cheese-makers in the United States have also been undermined by simplistic food safety regulations that ignore the long-term food safety dangers of industrialized agriculture (Neuman 2011).

⁵ Though ANT helps explain the dynamic, inter-active, networking role of local agricultural knowledge in Salers PDO production, it does present an interesting ontological tension regarding essentialism. ANT is valued as “one of the many anti-essentialist movements that seems to characterize the end of the century” (Latour 1999: 20), yet GI and PDO are predicated on recognizing, fostering, valuing, and evaluating the essentiality of an agricultural product. More needs to be written on this paradox and its implications, particularly regarding recent critiques of patrimony (Barham, XXXX).

with producers; importance of their activities, socio-economic and agronomic analyses, a study of livestock practices, and microbiological evaluations. We pooled our methods throughout the 2006 and 2007 seasons in order to analyze the Salers supply chain and understand its main trends. Interviews were conducted with seventeen producers, four cheese ripeners, two technicians, one *gerle* maker, and officials from the CIF (*Comité Interprofessionnel des Fromages du Cantal*) and the regional INAO center. We focused on the local, individual and collective skills of cheese-makers, their development, and their transmission. We video-recorded the cheese production process and used these videos as the basis for soliciting observations and comments about the processes from producers, technicians, and trainers. Finally, we discussed our findings with the Salers cheese makers, representatives from the inter-professional group (CIF) and the regional INAO office. The objective was to offer recommendations to producers and help them write their *cahier de charge* and address the major issues surrounding the development of this code, as well explore opportunities for strengthening authentic Salers cheese production.

The Salers PDO: A Paradoxical Trajectory

To understand the paradoxes that surround the survival of Salers Cheese, it is instructive to contrast it with the industrialization of traditional Cantal-type cheese, a cheese that shares both the geographic territory and similar contested history as Salers. In the late 1960s, intensified production based on newly introduced technologies led to improved output in the milk-producing area of France's Massif Central. This created a sharp increase in Cantal cheese production, but also effectively marginalized many local producers whose processing methods were incompatible with new high-yield technologies. These producers initiated an independent Salers PDO (see Map). Some of the principal issues raised during the negotiations to create this PDO continue to be relevant (Delfosse 1992). The already-established Cantal PDO producers could have allowed for a separate rule that accommodated the free-range Salers production conditions. Instead the Salers producers decided to create a new Salers PDO. Salers cheese specifications are very exacting. They stipulate seasonal free-range production of raw milk from a single dairy herd of Salers cattle, and processed in a *gerle* twice a day following each milking. The cattle must be pasture-fed, and each herder is required by law to identify the specific period of pasturing. By regulation, only cheese made exclusively from the milk of the Salers cattle breed can be labeled "Tradition Salers."

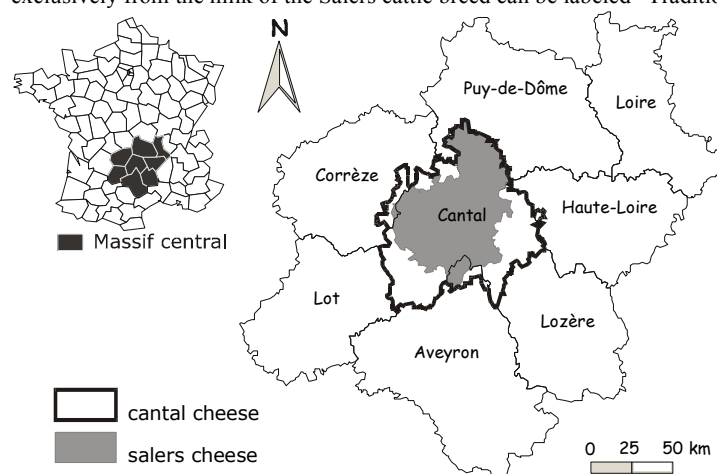


Fig 1.]: Map of Cantal and Salers PDO areas (source: Brunschwig *et al.* 2000)

The Cantal PDO zone includes all communes in the Cantal department, plus some twenty in the Puy-de-Dôme department, as well as some in the departments of Aveyron, Corrèze, and the Haute-Loire. The Salers PDO zone covers 4,250 km², centered on the Cantal volcanic

massif. Natural conditions here are relatively homogenous, and it wholly enclosed within the 7,200 km² of the Cantal PDO zone. The Salers production sector covers about one hundred producers who engage in a wide range of farming practices. This diversity must be seen in relation to the region's economic history, which is closely linked to that of the Cantal PDO. A late 1960s decline in demand for free-range cheese had gradually led producers to concentrate on milk production quantity over quality, and saw the development of both cooperatives and industrial cheese plants. Some herders remained faithful to the Salers breed but most turned to more productive, less demanding breeds such as Holstein and Montbéliarde cattle (Ricard 1994; Delfosse 1992). Two decades later, "cheese making" came back into fashion and Salers cheese was once again a profitable business, helped as well by milk quota restrictions, falling milk prices, and growing consumer interest. With support from *Credit Agricole* loans, many young herders started to make cheese.⁶

Traditional Salers production is a complex process. Renneted milk is left to curdle in the *gerle* at a temperature of 30-34°C. The curds are then sliced, re-formed, and sliced again, before being pressed several times in a special cheese press. This is left to acidify and mature for 8-12 hours before grinding, salting, and stirring by hand. After a second, shorter ripening stage, the ground and salted *tomme* is hand-fed into cylindrical moulds where it is pressed for 48 hours and turned several times. This twice-a-day production involves substantial work, and the longer, second ripening state continues for at least three months, with the cheese turned and wiped at regular intervals. Third-party ripeners, like the producers themselves form a diverse group, are almost always given responsibility for managing ripening.⁷

Throughout their 40-year co-existence, the two groups of cheese producers have diverged: Salers sector producers maintain traditions that their Cantal neighbors have discarded. Cantal production became industrialized while Salers production remained more or less unchanged. This led to striking differences between the two: Cantal producers pursue productivity-based, large-volume output and low milk pricing, while Salers producers rely on low-volume, small-scale production linked to an image of authenticity and specific character. Until the late 1990s, Salers cheese illustrated how far Cantal production departed from local traditions. More recently, the differences have become less clear. In response to very low mass-market cheese prices that in turn depressed the price of local milk to below the national average, the Cantal PDO board started to give careful consideration to quality objectives by modifying production rules and raising the perceived status of its cheese by improving the quality. The producers accepted higher quality standards and these have helped to re-energize the entire sector.

With respect to Salers, its supply chain based on traditional, free-range practices, raw milk, and wooden tools, particularly when compared to the 'modernized' Cantal cheese industry, has been subject to popular, and to a degree official, suspicions regarding its hygienic quality. As of 2007, 86 producers produced 1,574 tons of Salers cheese. By contrast, production of Cantal cheese was 17,900 tons, of which 98% was produced by 14 dairy plants representing more than 2,000 producers (*Agreste*, Office for Agricultural Statistics and Studies; and *DRAAF Auvergne*, the French Regional Authority for Foods, Agriculture, and Forestry in Auvergne).

The Great *Gerle* Controversy of 2004

The *gerle* is the key to the development of the specific character of Salers cheese, because of the role played by the microbial flora present in the wood (Devoyod et al. 1987; Mariani et al. 2007) that help to ripen cheese made from raw milk (Michel et al. 2008) For this reason, the *gerle* is integral to Salers PDO production specifications and is used in the first stage of production when the curds are formed. The 2000 decree enforced compulsory use of the *gerle*, with a dispensation until 2003 for producers using stainless-steel tanks.

⁶ Ironically, sometimes these loans conditional on abandoning the Salers breed!

⁷ An increasing number of these ripeners also produce Cantal cheese and so have some influence on Salers cheese making.

However, as the 2003 deadline for switching to the *gerle* approached, a major conflict erupted over its use: faithfulness to this tradition was eroding the solidarity of Salers producers. Suddenly their collective future hung in the balance after a group of Salers producers challenged the use of the *gerle* on the grounds of sanitary regulations. Despite the lack of evidence of food poisoning from PDO Salers cheese, this dissident group alerted the French Health Ministry to the potential risks from this form of production. This alert led the Cantal Veterinary Service (*DSV, Direction de Service Veterinaire*) to assess the microbial safety of the cheese in terms of EC regulation (Directive 92) on the grounds that more than one-half of the cheeses produced did not comply with the bacterial standard (presence of *Listeria monocytogenes* and high level of *Staphylococcus aureus*). After an audit of every PDO Salers cheese producer, the CIF (*Comité Interprofessionnel des Fromages du Cantal*) professional body defined food safety standards based on individual producer assessments of microbial levels consistent with the EC regulation. In order to oversee this plan in place, an oversight committee was formed under the supervision of the CIF (Inter-Professional Committee), and reporting to the national Food Agency, the DGAL (*Direction Générale de l'Alimentation* in the Ministry of Agriculture), INAO (The National Institute of Origin and Quality, *Institut National de l'Origine et de la Qualité*), and the DSV.

After this committee was established, the DSV announced its decision to require all producers to assure cheese safety by keeping milk in a stainless tank prior to being introduced into the wooden *gerle*. This decision disregarded the *gerle*'s microbial function and its capacity to provide its own fermentation, and that disallowed both the specificity of the producer practices and their skills. In order to resolve this conflict, at least in the short-term, the local of INAO representative agreed to rule temporarily in favor of the use of the *gerle*.

The Food (DGAL), Health (DGS, *Direction Générale de la Santé*) and the agency for the Competition, Consumption and Fraud Repression (DGCCRF, *Direction Générale de la Concurrence, de la Consommation et de la Répression des Fraudes*) in the Ministry of Economy, Finance and Industry sought scientific advice from AFSSA, Agency for Food Safety, (*Agence Française de Sécurité Sanitaire des Aliments*), about the sanitary situation and risks. AFSSA concluded that the *S. aureus* risk was not linked to the use of the *gerle*, but to the sanitary conditions of the herds. Despite AFSSA's positive conclusions, and the adoption of means to improve the safety and quality of the cheese, in 2005 the same dissident, anti-*gerle* group alleged that the sanitary risks continued and created problems of compliance with EC regulations. Their aim was to have the INAO revise its decree and authorize the option to use either the wooden *gerle* or stainless-steel vats for Salers cheese. At the same time, a pro-*gerle* group of producers argued that the wooden vat was necessary for the cheese's sensorial qualities, cultural heritage, leveraging of local know-how, and product image. At the end of 2005, a "commission of inquiry", composed of professionals and scientists nominated by INAO after consultation with all players in the supply chain, rendered a favorable opinion of the *gerle*. The controversy then died down, thanks to the local producers and local research and training centers involved in studying the role of wood (Callon *et al.* 2004, Didienne *et al.* 2007). Based on this controversy, every Salers producer who submits a proficiency statement is required to pass a series of product safety tests prior to authorization.

Differences Over the *Gerle*

As the focus of controversy, the *gerle* embodied a more general difficulty that underlies most PDOs: difficulties in building the sense of collectivity necessary to maintain a coherent PDO in the face of difficult-to-reconcile, co-existing differences such as, the use of competing Salers and Holstein breeds of cattle, *gerle* capacities ranging from 400 to 1,000 liters, and cheeses made from herds grazed variously in lush summer pastures or on pastures at lower elevations. In short, the wide variety of farming methods and the co-existence of different, sometimes conflicting models that are all subject to strict controls have combined to exert a disruptive influence on the Salers cheese supply chain as a whole.

The difficulty in reconciling these differences may explain some measure of the fiercely felt antagonisms between the pro- and anti-*gerle* camps. Simply put, these feelings are grounded in the cultural pride of using the *gerle*. In fact, it is more difficult to curdle raw milk in a wooden container than in stainless steel. Cheese makers must learn how to use it, and in doing so, they contribute to assuring that its use remains a part of collective local know-how. Many new producers have learned to make Salers cheese in stainless steel vats because they refuse to take the sanitary risk of using a local tool that doesn't make any sense to them. Asl one maker told us, "What I do not understand is the *gerle*. They are such incoherent things: we are subject to strict hygiene rules, and yet we must take the risk!" At the other end of the chain are the more experienced producers for whom the *gerle* represents everything: "If the *gerle* had been lost, we would have stopped."⁸

The controversy over the use of the *gerle* dramatically illustrates the difficulties in reconciling current food safety standards with traditional practices. It also reveals the local tensions when tradition is practiced different ways by different actors in the same sector. The minority opposed to the use of the *gerle* discount the particularity of this container and treat it as a stainless tank. For the others, the *gerle* "works" if it used correctly.

At the same time, the alleged health issue has raised doubts, created considerable confusion and forced a detailed exploration of questionable value into the management of the *gerle*'s microbial ecosystems. *Gerle* maintenance - rinsing with whey, scrubbing after use, priming at the start of the season - is an example. How should the condition of the *gerle* and the qualities of the raw milk be handled? Is the aim to implant the beneficial microbial biofilm on the surface of the wooden vat? Is it necessary to maintain a balanced microbial population (lactic acid bacteria and non-lactic acid bacteria separated into Gram positive and Gram negative yeasts and moulds) that work together for the development of the product's flavor? Or, is it simply necessary to eliminate all pathogenic bacteria in full compliance with EC regulation (Hulin *et al*, 2007; Didienné *et al*, 2008)?

Producers find it difficult to justify many of these new "hygiene" practices and are often unable to offer the "scientific" explanation for the safety of their traditional practices. In response, some producers did try to avoid the risk of sanctions by adapting their working methods. In addition, some of the new hygiene rules appeared that make no sense to the producers, especially those requiring excessive cleaning of the *gerle* (with boiling water and detergent) and the often needless addition of fermenting agents. Such sanitation requirements are often suggested and sometimes enforced by *ripeners*, who, as a result of the substantially reduced microbial potency of the *gerle* from this cleaning, acquire more influence over the creation of the finished product.⁹

Distinquising Practices: Forging the Salers Collectivity

Salers specifications did not originally include the compulsory use of the *gerle*, and as a result, some new producers, particularly in regions such as the Aurillac Basin and the Cézallier plateau where the cheese was less culturally rooted, started to use stainless steel tanks. The most recent decree that made the *gerle* compulsory represented a major victory for those in favor of more traditional methods.¹⁰

⁸ Producers in the heart of the production zone are more attached to the *gerle* than those in the border areas.

⁹ Producers reflect varying degrees of self-confidence and perseverance with respect to exploring the difficult fields of microbes and microbial politics. Indeed, the size of the *gerle* itself, which is not regulated, is another very disturbing element in the (in)coherence of practices.

¹⁰ Despite the favorable outcome regarding the use of the *gerle*, the INAO still expects producers to do more to improve milk quality and the hygiene of the tools and premises. In a move to support Salers producers, the INAO also recommended tightening the specifications of the *gerle* in terms of capacity, shape, type of wood, etc.

In addition, several other factors pose continuing issues for creating an overall “coherence” in the “Salers sector,” thereby creating numerous challenges for the producers to form a cohesive collective (Casabianca *et al.* 1993). Salers cheese producers are not organized around, nor do they agree upon, many practices such as the breed to be used, the type of pasture or the season for putting the cows out to pasture, herd size, the size of the *gerle*, among others. The great *gerle* controversy brought these differences to fore and demonstrated the difficulties of establishing a collective of dissimilar producers under a single PDO.

A broader and underlying challenge to creating the type of coherence among producers that is needed to unite them under a PDO stems from the business affinities the largest Salers producers and industrial Cantal cheese makers. Both share the goal of production maximization, and the large Salers producers account for a significant part of the Salers cheese. In addition, the cheese made by these larger Salers producers – who are often advised by the larger Cantal dairy firms – is very similar to Cantal: it uses the same fermenting agents and the oversized *gerles* that serve no purpose (in terms of imparting Salers qualities) beyond that of increased production capacity. In fact, these larger producers even advocated “wrapping” the stainless steel tanks in wood so they looked like the “traditional” *gerle*! Advocates of the traditional wooden *gerle* were outraged by this purely cosmetic suggestion. Salers cheese represents a valuable business niche, and large-scale producers would profit by altering production methods – even purely cosmetic ones – to suit volume-oriented techniques. However, as our research indicates, this type of influence challenges and undermines the identity of Salers cheese and fosters significant animosities among producers.

Despite these challenges, it is possible to argue that existing *gerle* specifications could offer common ground around which Salers producers could cultivate a sense of “PDO unity”. For “authentic,” “opportunistic,” and “new” producers alike (although they are all, in a sense, “newcomers”), important opportunities exist for a strong and sustainable sense of Salers PDO collectivity, even in the face of the continuing disruptive microbial politics surrounding the *gerle*.

The Salers cattle breed offers one such opportunity. While the breed has become marginal, a small handful of producers remain passionate about the lifestyles associated with the breed and seek to preserve the powerful image of the Salers cow heritage – from its touchingly maternal behavior to its distinctive milk. Furthermore, there continues to be a large annual festival in Allanches to mark the herd’s movement to summer pasture, even though the Salers breed now only plays a marginal role in the production of Salers cheese. The image of the *buron*, a little cheese house traditionally used during the mountain season raises a similar question for PDO. When the Salers PDO was created, these *burons* were numerous and widely used. But as they fall from use, should the producers allow this foundational icon to perish with the last *buron*? In short, those involved in Salers PDO debates have a responsibility to address questions of heritage.

Most producers recognize that the weight of tradition symbolized by the Salers breed – summer milking and cheese making in a *buron* – creates a great mental and psychological burden to carry. The newly established Salers section provides the conditions for producers to identify and agree upon pragmatic solutions. For example, the Cantal PDO added techniques that are more efficient or more frequently utilized to their *cahier de charges*, or the code of practices for all producers. At issue is the way in which such an approach could be adapted to the Salers process that is defined by its allegiance to traditional, labor-intensive, knowledge-intensive cattle breeds and methods of production.

The microbial politics of the *gerle* controversy underscore a larger and more consequential tension: the paradox of PDO regulations. On one hand, a premise of GIs in general and the Salers PDO in particular is to resist the homogenizing forces of industrialized agribusiness

dairy production. The place-based local knowledge that make-up Salers cheese heritage is intrinsically diverse, varying with each independent farmer. This heterogeneity is the cause of Salers' unique flavors and high quality, but also complicates efforts to solidify the PDO brand name, which in turn safeguards the reputation of the fine cheese and insures ongoing demand. Agricultural diversity on all scales provides ecological as well as economic resiliency (IAASTD 2009; Brush 2005). Local agricultural knowledge is critical to agricultural diversity and sustainability (Davis and Wagner 2003; Escobar 1998). But on the other hand, heterogeneity may undermine the integrity of a PDO label, since the lack of clarity in the specifications makes it difficult for producers and regulators to guard against low quality knock-offs. Locating the line between positive and negative diversity is difficult but critical for the long-term viability of the PDO endeavor.

Policy Implications and Conclusions

To facilitate knowledge exchange and PDO dialogue - and perhaps cooperation, we reported our results directly to the new Salers section, as material for internal debate. We suggested that not all differences between producers deserved the same approach: some differences add strengths, while others weaken collective practices. The results of our research suggest that internal debate should focus on the product itself, on the way it is perceived, and on local skills and knowledge supported in the process, in order to bring together farm processors and ripeners. After spending so much time and energy addressing sanitary regulations, we argued that it was time to pay attention to the quality and typicality of the product, selecting between: (1) what must absolutely be maintained in as a necessary diversity in production modalities, or (2) what should be regarded as a forms of heterogeneity that, although valid, overly disrupt the bases for collective action and shared identity.

The Salers section could consider a range of approaches for strengthening the cheese as a PDO. But each needs to be addressed from a collective perspective, and not merely as a individual choice. The producers could consider establishing multiple categories within the PDO (e.g., Cantal PDO includes three types) based on the type of milk, or the age of the cheese, etc. Such an approach may provide a basis for trust necessary to confront the regulatory process, both in terms of health and quality specifications. Obviously, some technologies are more easily substituted than others, such as the choice of *gerle* wood, capacity, and fermenting agents – each crucial to the effectiveness of the microbial ecosystem. Others, particularly those affecting the production system such as size of herd and the choice of breed, require a transition period in order to allow producers to comply with the new rules.

In sum, our research suggests that the *gerle* provides the single most important 'rallying point' in efforts to build sufficient unity to sustain a PDO. What seems to bind these different players together is their passion, sometimes a passion for the Salers breed, but mainly a shared passion for making cheese. Time and again we were told that, "you have to love this job." In terms of local dynamics, the key aspect of local knowledge was, to recall the insights of ANT scholarship, its role in reinforcing relationship among producers and cementing cooperative relationships across the sector.

The conceptual framework offered by ANT acknowledges the fact that agrarian know-how is dynamic and interactive, and that it forms the relationships between farmers and their cattle, between ripeners and the *gerle*, even between food safety officials, producers and the microbes themselves. ANT takes power to be the effect or result, not the cause, of dynamics and interactions among actants. For instance, as we have shown for the *gerle*, its sheen of microbial action can assist small producers, or, hindered by harsh cleaning agents, shift power to ripeners and larger manufacturers. This managed diversity – the discontinuous, interlinked, and often contradictory local knowledge – is the source of the renowned high quality of the Salers cheese product and a source of power for smaller artisanal producers, yet it also has

hindered development of the label as a regulatory instrument, and for somewhat different reasons, the cooperative relations among sector members. As ANT suggests, this knowledge-diversity nexus can become the basis for an empowered agrarian sector (Scott 1988), and raises important questions with respect to how the loss of even marginal practices might affect knowledge, power, and quality, if differences can be sufficiently overcome to permit the collaborative efforts necessary to solidify the specifications and manage the PDO.

Our decision to research local skills proved fruitful, providing opportunities to assess the consistency of the different systems used by the producers interviewed. A real actor network can be seen among a variety of Salers dairy farmers, ripeners, regulators, and consumers - as well as among cattle, microbes, wooden tools, and cheeses. Any analysis of the history, geography, or future of Salers PDO cheese, and the competencies that each represents, would need to attend to the extensive local agricultural knowledge that connects and drives the various networks at work in this phenomenon. In terms of local dynamics, we think it essential to define local knowledge as the resource that reinforces the relationship among producers and promises to cement the entire sector.

Local practices are considered here for what they represent to those who use them and for the particular qualities that they create. This perspective is essential to understanding the relation between practices that must be reinforced and rules that must be tightened. The newly created Salers PDO section may provide a forum for discussion, debate, and development of collective rules, with the range of knowledge and know-how serving as a link between producers. In particular, we hope that the distinction between diversity as strength and heterogeneity as weakness might reinforce the collective voice, enhance internal democracy, and encourage the collaborative selection of those features that best facilitate convergence among producers.

In this context, the now-compulsory status of the *gerle* may be seen as a decisive victory for the future of Salers cheese and those who make it: a well-earned reward for the effort expended on obtaining approvals and surviving despite the precarious proximity of the mighty Cantal industry. The introduction of new hygiene rules led to some serious soul-searching at every level, forcing administrators and veterinary services alike to justify the criteria on which they granted or refused approvals. Seen in this light, the *gerle* outcome is an example for all special production systems that, like the Salers sector, find themselves in conflict with hygiene restrictions that challenge traditional practices.

By chance, the Salers sector was the beneficiary of strong support from INAO, CIF, and microbiologists with expertise on fermented foods. But, as demonstrated by this crisis in sanitary regulation, when great heterogeneity (affecting methods and technical choices that are not easily altered) is associated with a strict hygiene restriction, the whole production system may become destabilized and even completely undone. And despite the successful navigation of this regulatory storm, nothing is definitively insured for the long term unless production heterogeneity is reduced and the producer technical convergence increased. One condition for achieving this objective is that traditional methods must make sense for most of the producers, thereby fostering consensus on how to nurture and protect knowledge that is held in common. The future of such artisanal cheese sectors hinges on these paradoxes of local agricultural knowledge — the task at hand is to work together to distinguish divisive heterogeneity from sustainable diversity, and work toward cultivating the latter.

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