

Raising rivals' costs strategy: test on two LAFS in Europe

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Abstract - Some Localised Agro-Food Systems (LAFS) are traditionally qualified as success stories (Comté PDO in France, Gruyere PDO in Switzerland, Parmigiano Reggiano PDO in Italy), whilst other PDOs (as for example the Cantal PDO from France) pay the same price for the milk as standard milk. The price difference may reach between 10 and 25% over a long period.

To explain this difference, we assume that the agents who make up the LAFS developed a collective action to protect their localized cheese production system against unfair competition and to promote their product outside its region of origin. The aim of this communication is to shed light on levers which the agents activate to assure their uniqueness is irrevocable, and uphold the benefits of their LAFS.

We propose to discuss the idea that the search for market power based on the strategy of raising rivals' costs may be used even outside a situation of vertical integration or a situation in which pressure is applied to suppliers to challenge competitors. We assume that some companies within the LAFS have sufficient control on the rules governing the organization of the traditional system to benefit from it. They also succeed in protecting a kind of relationship between business companies. The Raising Rivals' Costs theory helps to analyze the economic consequences of the legal set-up implementation and of its control by some companies.

Indeed, we show that the collective control of the rules which are set up in the PDO legal framework explain the difficulties met by rivals to stand out through an alternative and independent production system based on the costs leadership strategy. The collective set up of institutions and rules help the agents to achieve a collective competitive advantage in which every agent benefits individually. This is the strategy developed in Europe and particularly for two PDO Localised Agro-cheese Systems: Comté PDO for France and Gruyère PDO for Switzerland.

Keywords— PDO, localised agro-food system, Raising rivals' costs, regulation

I. INTRODUCTION

With the Common Agricultural Policy's shift (abandonment of the milk quota system and redefinition of the CAP) the future of dairy production in mountain regions raises numerous questions for private and public stakeholders. Dairy farmers in mountain regions tend to turn toward cheese production with distinctive product quality schemes based on localised agro-food systems (LAFS). These initiatives show variable success with regard to milk production price. Some are considered as success stories (PDO Comté in France, PDO Gruyère in Switzerland, PDO Parmigiano Reggiano in Italy) [1], others (for instance PDO Cantal) do not show benefit while showing some of the lowest prices for raw milk at farm gate [2].

The objective of this paper is to explain the price differences while analysing the regulatory mechanisms of the concerned LAFS. It leads to the discussion on market power at the different levels of the supply chain (producers, processors, etc.) and on the way they organise themselves collectively for setting and controlling production requirements which impact price mechanisms. Our thesis states that production systems or organizations, in order to increase their competitive advantage, seek to control three levers: the creation of economic value, how this value gets distributed among the stakeholders, and how the cost level control helps to preserve this collective strategy. PDO supply chains exemplify LAFS as the production and processing must, by legal definition, take place in a specific territory. With regard to PDO cheese supply chains, the collective regulation relies on the collective governance mode (territory or sectoral) based on the use of the three levers in the system:

- Added value creation depends on the mechanisms set to control volumes of production, and to indicate product differentiation [3];

- Cost control as a lasting competitive advantage does not necessarily aim at reducing but depends on the production requirements and the collective organisation's ability to have them applied by all agents. The collective ruling and control of the code of practices can be understood as a strategy to raise competitor's costs and therefore prevent them from imposing another production system mostly based on cost leadership [4];
- The distribution of value along the supply chain depends on the presence of an institutionalised guidance mechanism of upstream prices according to downstream product quality [5].

This analytical framework highlights the diversity of the states' role when delegating its ruling power for economic affairs to collective organisations which can control legal regulation mechanisms (for instance: contracts, code of practices, production planning and control).

We can demonstrate while focusing on the collective strategies and coordination mechanisms, how the three regulation levers result in preventing the entry to rivals who would not apply the rules. PDO supply chains entail small enterprises competing with much bigger sized companies including multinationals, which as well restrain competition while setting other types of barriers to entry (branding, contracting on quantities with retail industry, creating a competitive environment between suppliers of different regions, relocation in search of cheap labour, etc.). The competitive pressure on the PDO enterprises may even threaten the existence of the whole supply chain. The implementation of the collective strategy can explain the noticed gap in the milk price even though other factors intervene like the official recognition and therefore protection of the PDO name, consumers' preference, consumption trends, the strength of competition and substitution products, etc. [6].

We have tested this analytical model on two European PDO supply chains that present similar characteristics in the production technology and the organisation, though with different institutional frameworks.

We will first present the analytical framework for the regulatory modes of the PDO supply chains based

on the three dimensions (II), and then expose the empirical results (III). We will then discuss the relevance of our analytical framework to explain the diversity of regulatory modes used in PDO cheese supply chains and their linkage with the price level at farm gate (IV), before concluding (V).

II. ANALYTICAL FRAMEWORK FOR THE REGULATORY MODES

Our analytical framework has to be considered in the vast domain of laws and economics based on the observation of "law in action" using direct legal sources. This discipline aims at analysing and understanding the economical consequences of operating legal mechanisms [7]. The legal elements form the relevant dimensions for the stakeholders for setting and implementing an economical strategy while seeking to influence their institutional environment and the relations between the economic stakeholders.

We propose to use two different analytical grids to explain the performance of the two supply chains expressed as raw milk price to remunerate dairy farmers.

- On one side, an analytical grid of the production system will include three key elements: the creation of added value, the distribution between the stakeholders along the value chain from agricultural production to the end product, and its protection with a cost control mechanism.

- On the other side, an analytical grid of the governance modes (sectoral vs. territorial) of the supply chain [8] [9]. It sheds light on the relations between the stakeholders, in particular on the delegation of power to an institutionalised and administrated authority (supply chain organisation, product organisation) that plays an essential role for the collective management of the product.

A. Analytical grid of the production system and its regulation

We postulate that each organisation or each production system (i) seeks to create value (ii) in order to remunerate the production factors (iii) while seeking to create a lasting competitive advantage.

(i) Creating value

The first dimension is about value creation within the system. Two elements will play a role on the level of created value:

The first element involves the stakeholders' capacity to take advantage of the specific resources on their territory to feed into the differentiation strategy [10]. We refer to local know-how which creates product's uniqueness (cattle feed, local practices, seasonal dimension ...). Know-how originates from a long lasting analysis and interpretation made by the agents in a collective manner. It is challenging to identify the relation «*terroir-product*» and to communicate it to the intermediate customers or end consumers. To acknowledge specificity, the practices will be officially registered in the PDO protocols and will be communicated in the media campaign of product promotion (individual or collective).

The second element is about production control and monitoring. Indeed, the supply system should not go through over- or underproduction periods in order to balance supply with demand, restrain price volatility, and optimise the quality and sales of the product. Several supply management modalities can be identified thanks to the case studies. One can manage scarcity, as well as restrain lower quality products. In theory, there are multiple ways for managing cheese supply. It may include (non-exhaustive list): the quota system (allocation of annual rights to produce cheese); the control of market opening (campaign planning); the control of the territory where production takes place including the reduction of the zone; the financing of redirecting milk overproduction to standardized markets; as well as the implementation of export support measures. Quality management through cheese selection and downgrading is an effective and profitable tool when the cheese reprocessing industry can take advantage of the downgraded quantities. The practicalities for managing supply are set in a code of practices or through other means (campaign planning which have to be approved by the state in France; decisions of the supply chain organisations which have mandatory nature in Switzerland).

(ii) Distributing value

The second dimension concerns the distribution of added value through the different levels of the supply chain. Outsourcing indeed affects the remuneration of production factors. The extent of the distribution of the value between the levels of the supply chain can be measured by analysing milk and cheese price settings. In theory, the bilateral price setting mechanism between stakeholders can be institutionally guided by the PDO supply chain organisation. Several options can be considered. Price policy sets the terms for bilateral transactions.

For instance, upstream price setting can be based on the real cheese value obtained on the market. Price calculation may result out of market data which are made publicly available (cheese price depending on quality and weighed by volume). This mechanism might be formalised with a standard contract approved by the stakeholders of the supply chain.

In other instances, the milk price at farm gate may be set without relation to the selling price of cheese originating from each individual delivery point. Price negotiation may then refer to more general data on national or European market prices for dairies (CNIEL grid in France).

Negotiation may as well happen through mutual agreement based on market leader's price level, rather than considering the real performance of the milk buying company. Further measures (quality based price following a grid set up by the supply chain interprofessional organisation, equalisation fund, direct payment) can be put in place to support the price setting mechanism.

(iii) Create the product's competitive advantage to fight against some competitors

As many other economic sectors, the European milk and dairy sectors are marked by the rising power of big industrial groups creating a situation of quasi-oligopoly. Their position is mostly based on large economies of scale. These economies of scale also depend on the way the value chain is organized, allowing to reach low cost levels while reaching broadening markets. The value chain refers to the whole group of products and producers contributing to the market supply. According to Porter [11], the value chain analysis allows to find the contribution of each

activity to obtain a competitive advantage. It also allows assessing the costs generated by the different activities. In order to lower their costs, big industrial groups continuously arbitrate between in-house production and outsourcing, as well as spatial integration or splitting. In the case of dairy production, they have to take into account its strong territorial linkage. The implementation of these strategies constitutes massive competition attacks that result in eliminating competitors that do not succeed in developing alternative strategies. Big groups therefore aim as well at reducing competitive pressure at medium and long term. For them, the current tendency in organising production leads to the fragmentation of the production process [12]. Large industrial dairy groups mostly set up their processing plants within the major milk producing regions. Some companies remotely guide their whole supply chain while seeking a competitive advantage through cost leadership strategy. They define the production's location, the processing and the product (type, volume) in order to optimise the value chain. Vertical integration of suppliers (and horizontal integration of competitors) is a result of large groups' strategy for reducing production costs [13].

By this mean, economies of scale are achieved as fix costs get distributed on bigger production batch. Following the line of Coase [14], Williamson [15] developed the idea that vertical integration depends on the potential achievement of economies of information resulting from the integration of economical relations. Companies tend to integrate their suppliers based on their asset's specificities and the transactions' frequency (contract's specificity), in other words, on the potential reduction of transaction cost that companies can expect.

In the case studies, another organisation of the production appears without matching with a small and medium-sized enterprises' (SME) network of local subcontractors supplying big groups. It is actually a group of stages organised by the different stakeholders with the goal of reaching a competitive advantage [16].

Our approach is in that sense original as it suggests that the seeking for market power can be founded on a strategy of raising competitors' costs without necessarily cutting ones own production costs. The

Raising Rivals' Costs theory [17] [18] allows us to analyse the behaviour of searching market power. It states that suppliers' integration or exclusive contracting with suppliers enables the specific stakeholder to impose, at supply level, higher costs to competitors while weakening their position. The "predatory" company seeks to take control of suppliers that are indispensable for the competitors, and induce higher prices for the intermediary goods or services compared to the cost the company bear. Competitors face an induced market power and see their profit being reduced by the cost increase and the pressure put by the predatory firm on the selling price of the end products. Focusing on the factors leading to vertical integration, this approach reverses the analysis as it suggests that suppliers' integration does not allow lowering the production and/or transaction costs but instead imposing higher costs to weaken competition while integrating or taking control of their suppliers.

We propose at this point that the *Raising Rivals' Costs Theory* can be efficiently applied outside of its classical field (vertical integration or pressure put on suppliers to impose production costs on competitors). In the present paper, we propose that the collective and territorial control on the production requirements legally set in PDO code of practice is based on a collective strategy meant to raise competitors' cost. This strategy is led and implemented by the PDO supply chains associations acting collectively like a firm while limiting its own ability to impose an alternative model based on cost leadership [19].

We focus more specifically on cooperation processes within a territory where the agents organise themselves collectively around the production of a product with geographical and historical relevance. The collective organisation includes traditional mostly small-scale production structures that develop together a commercial differentiation strategy distinguished from the cost leadership strategy. To that purpose, the stakeholders set common rules of which implementation is supported by public regulation mechanisms. Thus they develop a collective and lasting competitive advantage from which each individual stakeholder can benefit [20]. Within this framework, firms do not only have to adapt but can play an active role while using their voice to influence

the institutional environment and the organisation of the relations between agents.

B. The topic of the supply chain governance

Promoting an original way to manage businesses, the governance of the supply chain (in this case PDO supply chains) results from the capacity of the different agents [21] (who have decision power) to collectively set the goals, the means and the actions' rules. Thus we suppose that the existence of PDO supply chains depends on the capacity of the parties involved in the governance to collectively and formally define power relationships as well as formal and informal regulation mechanisms between agents.

Some researches in industrial economy focus on the relations between firms' strategy and their link to the "terroir", not understood as a geographically limited zone but as a social construction by the agents involved within an innovation process. As territorial governance, we hold the proposed definition by Perrier-Cornet and Sylvander [22]: « *the effect of cooperation between stakeholders within a localised production network* ». It opposes against a sectoral governance « *which originates from cooperating within a specific field of activity with its own standards, rules, as well as competition and coordination regulations and mechanisms, and without referring to any kind of spatial dimension* ».

In order to highlight the heterogeneity of the PDO supply chains with regard to their linkage to the territory, some authors [23] [24] draw the distinction between territorial and sectoral governance while using three criteria: (1) standardisation mechanisms, (2) relationship between companies and competition's type, and (3) relationship between farmers and processors. We propose an analytical grid (cf. table 1.) inspired by this analysis of territorial versus sectoral governance and crossed with our grid of the regulation of cheese production systems (cf. infra).

Sectoral governance is understood as business management by a group of firms defending their interests in the name of their sector. Over time, these companies mostly merge with their competitors over time. As a result, the power relations between the economic agents of the sector mainly consist in negotiations between dairy farmers and the industrial

level in the framework of an authority that is, in France, supported by the government.

Territorial governance by managing organisations is a business management mode for collective matters that can be set off by the state. This organisation mode can take the form of a supply chain interprofessional organisation. Its ruling is based on the principles of decisions' validation through majority, and of representativeness of the professional branches involved in the production system. In France, the supply chain interprofessional organisation is recognized by inter-ministerial bylaw and is subject to financial and economical control by the state. Whereas in the territorial governance, the organisation's mission is to represent and defend the production system's interests (the products and its agents). The supply chain organisation enables the agents to coordinate the regulations and the actions between them and which will take the form of inter-professional agreements containing the code of practices, the collective marketing of the products, the definition of the production zone, and the setting of the dues for the organisation. The organisation relies on this policy for acting. The power relations between the stages are set up within the organisation creating an institutionalised place for consultation.

Table 1 : Characterisation of sectoral and territorial logic based on the criteria for analysing the regulation of cheese production systems (possible options, non systematic)

	Sectoral Governance	Territorial Governance
Value Creation	Differentiation based on technology Internal supply control by each individual company (on several products and several locations) Common supply control (storage, intervention)	Take advantage of specific local resources Supply control through managing scarcity : definition of the production zone, quota system, exclusion of low quality cheese and segmentation by quality grading
Value Distribution	Negotiation through mutual agreements between producers and the industry National price grid No relation between the selling price of the end product and the milk payment	Institutional mechanism for setting price based on quality Standard contract Price transparency (monitoring, cheese exchange) Equalisation fund
Preservation of the competitive advantage	Cost leadership strategy Individual branding strategy Vertical integration of suppliers Horizontal integration of competitors Geographical disintegration	Differentiation strategy based on product-terroir linkage Barriers of entry for competitors by controlling the code of practices Impose costs to competitors (raising rivals' costs strategy)
Regulation of the production system	Production system is controlled by market leaders (oligopoly)	Power relation set up within an organisation dedicated to managing and protecting the product The state gives power of attorney to the organisation.

C. Method

To discuss this framework, we have analysed two PDO cheese supply chains (Comté in France and Gruyère in Switzerland) at the different stages (dairy farmers, cheese-makers, and cheese-ripeners) using three major sources:

(i) One source for characterising the dynamic of each cheese supply chain over a long period of time. The characteristics and the evolution of the productive structures at the different stages were analysed in order to recreate the agents' paths. To obtain the data, we conducted a survey among the stakeholders and also used documentary sources (literature, articles, reports) [25] [26] [27]; (ii) One source for characterising the protection strategy of the production systems based on the analysis of the legal documents of each PDO. These documents sets the content of the PDO's codes of practices and throw light on the production's organisation and the constraints put on competitors ; (iii) One source for analysing the value creation and the mechanism for its distribution among the different stages of the supply chain. We identified the specific resources used, the productive structures of the supply chains (technical an social division of

labour between stakeholders), the mechanisms for managing supply, as well as the fundamental inter-professional agreements that set the payment modalities for cheese (standard contracts, etc.).

III. RESULTS: PDO COMTÉ AND PDO GRUYÈRE: TWO SIMILAR STRATEGIES FOR PROTECTING PRODUCTION SYSTEMS BASED ON TRADITION AND *TERROIR*

We have chosen to discuss our analytical framework aiming at explaining the milk price differences in two similar contexts (PDO Comté and PDO Gruyère). For each supply chain, we present the productive and structural characteristics and the governance mode, so that to come up with explanations for a higher price level compared to substitute products.

A. The Comté supply chain: dairy farmers, cheese-makers and cheese-ripeners standing together within the largest French PDO cheese supply chain

A traditional and dynamic cheese supply chain

Agriculture in the Jura mountains is mainly dedicated to milk production that feeds into cheese supply chains benefiting from a legal recognition through an official quality label (several PDOs: Comté, Morbier, Mont d'Or, Bleu de Gex). These products originate from the Doubs and Jura Departments, grouping, in 2008, 3'420 dairy farmers producing more than 760 millions litres of milk. Among them, 3'000 farmers produced 52'000 tons of Comté. Since 1990, the Comté production significantly increased by more than 15'000 tons. From a historical perspective, the PDO Comté was the most important vector to the organisational development of the cheese production system in the Jura, based on specific technical and social division of labour [28]. The dairy farmers, on one side, organised in collective cheese-making units (150 cheese-making cooperatives in 2005) control the processing from milk to fresh cheese (not ripened) and do not have market access. The cheese-ripeners (around 10 units in 2005), on the other side, have the quasi-exclusive access to market without being involved in the first processing stage. This labour division is still very present and generates a long-lasting collective value which is safeguarded by the successful setting of the Protected Denomination of Origin Comté.

A powerful interprofessional organisation for guiding the supply chain

Comté production is an original form of economical cooperation, whose safeguard was established through a three steps construction process for the protected denomination of origin:

(i) The initial first phase aimed at obtaining the territorial exclusivity for the product. The Comté indeed benefits from a PDO's protection with a ruling of the Magistrates' Court of Dijon in 1952. Almost 50 years later, the PDO's zone was scaled down (1998), matching with its effective production's territory and preventing the late and opportunistic development of the production in the Haute-Saône Department which

borders the historical production zone (Doubs and Jura Departments);

(ii) The second step consisted in collectively setting the production standards defining the production system. The agents together fixed the requirements for the dairy farmers of the land zone who were included in the initial PDO zone. The code of practices successively evolved towards excluding intensive agriculture practices like corn silage feed for the Prim'Holstein breed. A thorough reflection on the product quality and its linkage to the *terroir* led then to a precise definition of the best agriculture practices, to be fulfilled in order to reach high gustatory quality for Comté cheese. Raw milk and feed based on grass and hay are crucial requirements that were highlighted in numerous research studies [29]. The code of practices match with the production conditions prevailing for Montbéliard cattle breeders located in the mountainous area. The implementation of the code of practices (prohibition of feeding silage to the whole herd, GMOs' prohibition, mandatory use of local breeds as Montbéliard or Simmental, milking robot banned, land load limitation ratio of one hectare fodder per milking cow, maximum milk-land productivity ratio of 4'600 litre milk per hectare, cows' grazing mandatory) impact on the production costs and exclude, from the production system, cattle breeders using more intensive agricultural practices like silage feeding. The production zone is now limited to the Jura Mountains, bringing consistency between the final product and the conditions of production. The prohibition of cheese production at dairy farm stage established the role of the cheese-makers and their specific know-how. The code of practices enable the cheese-making cooperatives to highlight their contribution to product quality and protect them from industrial competitors via a series of rulings in 1976, 1979, 1986, 1994, 1998 and 2007. With the exception of the PDO zone's reduction, all the rulings focused on promoting small-scale local dairy units (no heating treatment for the milk, no robot for the processing activities, restriction of the milk collection area, size limitation of the processing unit). Therefore, it forces large industrial groups involved in the supply chain to respect the production requirements at dairy stage and thus, similar production costs.

(iii) Finally, a third phase sought to control the cheese supply. The interprofessional Comté organisation controls today its supply through a mechanism of “campaign planning” which defines the volume of production every year to avoid cheese shortage, overproduction and price volatility.

The barriers to entry raised by the code of practices for milk and cheese processing are necessary to protect the specificity and link to the *terroir* founding the competitive advantage of the product. The surplus created through this original organisation of the production corresponds to higher production costs resulting from restrictive conditions that make the specific quality and image of the product. The creation of values is effective if the cheese-makers together with the cheese-ripeners agree on the crucial elements determining quality differentiation, identity, image and long-term reputation at the consumers’ level. This value constitutes a surplus as the selling price paid for the end product by buyers external to the supply chain is higher than what the agents would have obtained without collaborating. The surplus resulting from the organisation originates from the PDO code of practices [30]. The Comté supply chain is often considered a model of collective action. It set a powerful organization and giving extended authority for negotiating and implementing Comté supply control measures, as well as promoting the differentiation strategy which protects the interests of the Jura dairy farmers, small-scale cheese-makers and ripening facilities. The Comté supply chain shaped the agro-food sector in this mountainous region and supported the selling price of that cheese. In 2007, the average price was 10.20 €/kg compared to 7.10€/kg for French Emmental¹, that is to say a positive price difference of 47% in favour of the Comté².

A mechanism for distributing surplus set at the core of the PDO Comté’s logic

Until today, the supply chain organized the surplus’ distribution between « production » and « market ». The system’s efficiency was based on the regulated distribution of the collective surplus that allowed dairy

farmers, over the last 15 years (excepted 2007) to reach a 20% higher price for milk (until 25%) compared to national average.

The resilience of the Comté supply chain organisation persisted over time as cattle breeders and local small capital-holders shared common interests [31]. Until recently, the number of units at first processing stage granted the cheese-ripeners with a diversity of cheese’s taste that was valued by the local and specialised buyers. While obtaining comfortable profit margins, the cheese-ripeners accepted to share the added value, following a standard contract set and enforced by the interprofessional organization (named *Comité Interprofessionnel du Gruyère de Comté: CIGC*). Cheese-ripeners may amend the contract; however the specifications should be at least as strict as the standard contract’s.

The cheese-ripeners must declare their sales’ volumes and selling prices for ripened cheese to the CIGC on a monthly basis. The organisation then publishes a weighted average price of the monthly sales: the so-called *MNPC*, acronym standing for “*Moyenne Pondérée Nationale Comté*”. This reference price will help establishing the cheeses’ final price. The price for fresh cheese (not yet ripened) is calculated on the base of the *MNPC*, and published. In addition, the fresh cheese quality grading is sanctioned in the price through the use of specific ratios. These ratios are negotiated by the dairy farmers, who are simultaneously shareholders of the cheese-making cooperatives, and the cheese-ripeners. This mechanism stands at the core of the value distribution process. The cooperatives can then establish the average milk price.

So, the milk price is set through deducting the processing costs from the monthly turnover of each individual unit (sales of Comté, butter and milk whey). The result is then divided by the delivered quantities of each farmer participating to the cooperative. The milk price at farm gate still undergoes further adaptations based on chemical composition and bacteriological quality. The milk pricing changes monthly and primarily depends on the milk quality at producers’ stage and the ability of the cheese-maker in maximizing the cheese-milk ratio and minimizing the processing costs (cheese-makers’ salary most often depend on the amount of the turnover). The milk price

¹Source : syndicat français de pâtes pressées cuites 2007

²Source CIGC : <http://www.comte.com/le-marche-du-comte,4,0,8,1,1.html>

depends as well on the negotiation skills of the dairy farmers (as they also control most of cheese-making cooperatives) when discussing within the collective organisation the calculation ratio for fresh cheeses.

B. The Gruyère PDO: a new differentiation strategy bringing together breeders, cheese-makers and cheese-ripeners

A growing traditional cheese supply chain

With a tonnage of 28'206 tons in 2008, the Gruyère amounts for 16 % of the Swiss cheese production and 41% of the Swiss PDO volume. In the 1990's, the Gruyère production was around 24'000 tons and reached over 29'000 tons in 2009, almost taking over the production of Emmentaler in the decrease since 1990 (going from 56'600 tons to 30'000 tons in 2009). About 2'800 dairy farmers produce 340 millions litres milk yearly processed in 180 cheese-making facilities and 52 alps (grazing season). The production of 29'000 tons of Gruyère (including 800 tons of organic cheese and 490 tons of alp cheese) are sold to 9 cheese-ripeners who manage the sales outside the supply chain. In 2009, 40% of the Gruyère volume was exported and 7% went to the reprocessing industry (non-PDO cheese). Like the Comté's, the Gruyère's supply chain is based on a great number of dairy farmers, small-scale cheese-making entities and a few cheese-ripeners. The cheese-makers control the processing and only marginally sell cheese onsite for local customers. The cheese-makers are independent entrepreneurs and the cooperatives of which farmers are members do not exist at the contrary to Comté's supply chain. According to the inter-professional organization, the cheese-ripeners ensure a better market access and higher value for the cheese as they hold high volumes which give them a better position for negotiating. However, the role of the cheese-makers remains crucial as the cheese wheels mature for three and half months in the cheese-maker's cellars, inducing additional costs at cheese-making level (the minimal duration of maturation is five months). The cheese-ripeners have exclusivity for the market access and do not interfere in the cheese production. The surplus resulting from the PDO collective organisation is based on the negotiation of

production and trade conditions for milk and fresh cheese while setting stringent traditional technical requirements in the terms of reference. Number and distribution of the cheese-makers within the zone generate a great cheese diversity through the sourcing (plain or mountain) and the ripening duration. This diversity is comparable to the Comté's.

From a publicly administrated supply chain to an autonomous governance by an inter-professional organisation

In the beginning of the nineties, public support guaranteeing cheese sales ended and seriously challenged the Gruyère supply chain. The state used to buy the whole supply when the cheese reached three and half month age. This practice had to stop with the enforcement of the GATT agreements signed in 1994. The Swiss Federal Department of Public Economy started a consultation procedure for a new agriculture bill suppressing price guarantee for milk, opening borders to some cheeses import, and reducing subsidies for agriculture goods exported to the European Union. The withdrawal of state's support in 1999 and the disappearance of the protectionist market structures raised many questions as to how to collectively organise cheese production in Switzerland. The federal legislation then opened new opportunities for the agro-food sector in defining collective organisation to which stakeholders could freely adhere [32]. Agents active in specific product supply chains gathered and developed inter-professional organisations while completing the horizontal structures (producers' organisation, dairy association, cheese-wholesalers and exporters' association). New forms of solidarity arose on the base of specific products link to their *terroir*. The regulation on inter-professional organisations leads the Swiss Confederation to enforce quality promotion and product marketing measures as well as supply management mechanisms based on market demand. Strict conditions were defined as to which organisation was entitled to receive a mandatory power for enforcing its decisions.

At the same time, the supply chain was facing the potential development of industrial dairies. In the 1990, the Cremo group (market leader in the Swiss

butter industry) with several cheese-makers planned to set up an *semi-industrial* Gruyère production facility (milk collection every second day, shortened ripening duration, large volumes, changes at several steps in the production process). At the same time, severe challenges in marketing the Swiss Emmental cheese indeed led some Emmental cheese-makers to plan to switch production for Gruyère. These attempts were threatening the traditional character of the Gruyère and the supply chain welfare in the cantons where production was historically founded. Still in the nineties, the Gruyère production originated for 95% from the cantons Vaud, Fribourg, Jura, Bernese Jura, and Neuchâtel. Several stakeholders started a recognition process for the future PDO Gruyère and took steps to defend the local and traditional practices and to counter the development of the production outside the traditional zone.

These circumstances led, in the nineties, the stakeholders to structure their approach successively through a Charter, an Inter-professional Body, and finally to code of practices for the PDO. Led by the Gruyère's supply chain, the creation of the Charter followed by the PDO protection set the ground to maintain a traditional production within a context of industrialisation and State disengagement.

They could not wait for the future Swiss legislation on PDO-PGI to be ready but largely contributed to its development [33]. Counting on the specificity of the product and a traditional production process relying on labour division, the stakeholders first drafted a Charter, setting the ground for the PDO. This document was signed on the 2nd of July 1992 and defined the conditions for milk production, cheese-making and ripening.

Feeding silage was banned (hay as a main feed for cold periods) and the milk could not be treated (except cooling). Milk processing should take place in copper tank within 18 hours after the last milking. The cheese-maker had to use rennet with home-grown milk bacteria and could not reincorporate whey cream. Besides, the Gruyère's Charter foresaw that a specific commission should develop a code of practices for the PDO Gruyère. Finally, the PDO Gruyère was recognized in 2001 and registered in the Geographical Indications' Register of the Federal Office of

Agriculture. The code of practices was also approved [34] and included most of the elements of the Gruyère Charter while adding further points. The conditions of production and processing were more detailed and, in particular, the ripening process had to last minimum 5 months before sales. Only the first and second milking can be mixed together for processing Gruyère. It cannot contain growth hormones or other synthetic hormones. Milk tanks should be open and made out of copper with a maximal content of 6'600 litres and can be used for another cheese type production after washing. Cheese processing takes place first and once a day. Besides, the distance between the cheese-making facility and the dairy farmer has to be smaller as a ray of 20 km, and milk has to be delivered twice a day after milking. Gruyère production in the Alps takes place during the grazing season as long as mountain pastures are sufficient to cover the basic feed intake of the cattle. The processing must be located on the alp. The code of practices implicitly limits the size of the processing units and the structures on the zone. Industrial groups like Cremo (holder since 2002 of a processing facility for organic Gruyère with a capacity of 6 millions litres per year) cannot develop a strategy based on cost leadership through rationalisation of the production process, production volume expansion, shortening of the ripening duration, production facility's expansion, or relocation of the activities.

The PDO Gruyère production follows a decentralised model maintaining an important economic activity through the 232 cheese-makers in the plain and the alps included in the PDO zone. The code of practices protect the traditional structures of the supply chain from industrialisation as production costs are identical for small facilities and large industrial groups that might be interested in entering the Gruyère production and market. Above all, the Swiss agents strengthen and protect a traditional model under a support limited by the fact that the Swiss state respects the WTO rulings. This new model seems efficient as agriculture and cheese-processing structures did not massively weaken, Gruyère volume evolved positively, and milk price kept up. Since a small decade, the price gap between milk meant for PDO Gruyère and standard milk (meant for instance for Emmental production) is about 20 % (0.85 CHF for Gruyère milk against 0.70 CHF for standard milk on average). Though the State

supports specifically all the producers delivering milk for non-pasteurised cheese production with a subsidy of 15 Swiss cents per litre and the price gap can be traced back in the surplus. However, the other Swiss cheese supply chains, even the other Swiss PDO, do not achieve in paying such a high price for milk like the Gruyère. The reason is to be found in the specific shaping and organisation of this supply chain.

The interprofessional Gruyère organisation plays an important role for creation of surplus as it hosted the negotiations resulting in setting quality criteria and supply management measures (quota for the cheese production facility, volume and price setting for the cheese meant to the reprocessing industry). The interprofessional Gruyère organisation protected the creation of surplus bound to the PDO through a collective organisation set in the terms of reference matching with the traditional conditions of production of the Gruyère supply chain.

A mechanism of value distribution from upstream to downstream

Before the milk season 1999/2000, milk price was guaranteed by the Swiss Confederation. Price, subsidies and quality grid were set for the whole territory whatever region, industry or product was concerned. Nowadays, the price for milk and cheese as well as the quality grid are negotiated between farmers, cheese-makers, and cheese-ripeners within the inter-professional Gruyère organisation. These recommendations are mostly followed by the agents of the supply chain.

The original aspect lays in the establishment of the recommended price. The final value of the final product is not used as a reference for calculating the milk price. Instead of it, the agents set a target milk price to which a margin for the cheese-makers is added, resulting in a minimum price for the Gruyère on the market. Of course, this price is not disconnected to the market price and it is obvious that the consumers are willing to pay that price since the sells still increase at that level of prices. This process is facilitated on the Swiss market by the duopolistic organisation of the retail industry, also involved in the supply chain and, more generally, promoting products *made in Switzerland*.

To achieve this presentation, we want precise that the milk price comprises a basis price (around 0.50 CHF per litre) to which incentive subsidies meant to guide production are added (PDO Gruyère milk bonus: 0.10 CHF/litre, quality bonus: 0.05 CHF/litre). Moreover, two subsidies depend on the agricultural policy: the bonus for the milk dedicated to cheese-production (0.15 CHF/litre) and the no-silage feed bonus (0.03 CHF/litre).

IV. DISCUSSION

Both cheese production models for the Comté and the Gruyère are quite similar in the way they are organised. They both focus on a product whose name is protected, and rely on agents sharing collective interests and structured in a powerful inter-professional organisation. These are interesting examples of collective action deploying a strategy of competitive advantage without considering cost leader strategy but product differentiation based on the product's name, geographical origin and intrinsic quality (depending on the conditions of production and processing set in the code of practices). They exemplify what territorial governance can be.

The analysis of the two PDO supply chains allows us to highlight that the price creation on the market depends on three major factors that give ground to our analytical grid for the regulation of production systems (cf table 2):

- The first factor focuses on the value creation which depends, on one hand, on the use of specific territorial resources formalised in the production requirements appearing in the code of practices, and on the other hand, on the balance between supply and demand generated by the inter-professional organisation through the control of the production volume (production quota, campaign planning, export policy and marketing, etc.) and the quality (quality segmentation, grading, and clearing of low quality cheese towards the reprocessing industry).
- The second factor focuses on the protection of the production model, which allows structuring the relations between dairy farmers, cheese-makers and cheese-ripeners. It is important to notice that the recognition and protection of the PDO does not

guarantee higher milk prices for the farmers [35] [36]. In addition, specific measures in the codes of practices protect traditional small-scale enterprises and farmers as they impose to their competitors (large dairy industry companies and intensive dairy farmers) specific production techniques and its related costs. We propose indeed, while using the *Raising Rivals' Costs Theory*, an additional dimension to explain the strategies for raising competition's costs (vertical integration of suppliers, exclusive contracting or collusion with suppliers). We debate the idea that the control of the regulations protecting a territorial production system constitute a lever for imposing to the competitors identical production costs compared to the traditional producers/processors'.

The question is whether the PDO cheese production costs were in fact imposed to competitors by the defenders of the local PDO production system. It is very challenging to proceed to a precise analysis of the production costs at the different stages of the supply chain, which would support our theses of imposing production and processing costs to competitors. The information is confidential and the reconstitution of the costs would require, in the calculation, to integrate holdings costs that do not appear in the bookkeeping of the profit centres, without mentioning the modalities – for tax optimisation purpose – for invoicing between companies. Salop and Scheffman [37] defend moreover the idea (in a publication of 1983) that the analysis of products' price allows to assess the effective costs augmentation of competitors. They state that when production costs rise, usually selling prices rise as well. We compared the prices for PDO Comté with standard Emmental over 18 years at wholesaler stage, considering they related well to the production costs. From price parity in 1990, the average price for ripe Comté in 2007 was about 5'500 €/ton against less than 4'500 €/ton for Emmental. We hypothesise that the 1'000 €/ton gap likely indicates a cost production difference between the traditional PDO Comté production system and the industrial production system permitted for Emmental. The presence of this gap may support the idea of a process of imposing production costs of the traditional supply chain on the competitors. This statement is even more credible that the industrial dairy groups present in the

Comté supply chain are also involved in the Emmental production. They demonstrated their ability to produce hard cheese at low cost as they master economy of scales and low cost processing standards unlike the Comté production.

- The third factor focuses on the distribution of the value added along the supply chain. While protecting their production practices, the dairy farmers could maintain a balance in the power they have in both local production systems, French and Swiss. The power relation allows weighing on the value distribution between the agents. On one side it brings transparency on the product' price at market stage and supply management mechanisms negotiated within the supply chain's organisation. On the other side, when the value of the final product is communicated, the power relation between the agents is rebalanced through the distribution of the producers' surplus among the agents. A recommended price for the cheese or for the milk is collectively set and its implementation goes through a contract standard imposed to the agents.

The conjunction of these three factors explains the price gap between the PDO productions (Gruyère and Comté) defending a specific model based on history and collectively built, and the industrial productions controlled by a few large dairies group. It includes as well a territorial governance dimension implemented by an inter-professional organisation having received a public mandate for managing domestic businesses, which explains the fair milk prices paid at farm gate. In our analysis, the inter-professional organisation, with its capacity to master supply volume and quality, and establish standard contracts defining price, appears as an institution giving the capacity to the supply chain to deliver and to distribute economic value in a fair manner between the agents while maintaining and protecting the collective organisation over time. This can however not be compared with a monopolistic situation as the agents still behave as competitors between each other, and because the legislation does not prevent newcomers as long as they respect the PDO code of practices. Benefits cannot be raised through lower production costs.

As a consequence, our analytical grid is interesting for explaining the regulation of localised cheese production systems. We are though very much aware of the limits of our approach as the hypothesis was

only tested on two PDOs and it cannot be generalised. Further research is presently conducted to test this analytical grid of the regulation modes of localised production systems.

Table 2. Comparison of the regulations of the PDO Gruyère and the PDO Comté

	PDO Gruyère (CH)	PDO Comté (F)
Value creation	Use of specific territorial resources Recognition by the consumers of specific organoleptic qualities Segmentation through plain/mountain seasonal productions Supply control by managing quality and diversification at selling (quotas at processing stage, removal of low quality cheese via reprocessing industry, export promotion policy)	Use of specific territorial resources Recognition by the consumers of specific organoleptic qualities Supply control through quality management (reduction of the production zone, quotas on cheese, removal of low quality cheese via reprocessing industry, segmentation through grading)
Value added distribution	Institutional guidance of prices from upstream to downstream Definition of a recommended price retaining balance in the power distribution at the different stages of the supply chain Rebalancing through bonus including public subsidies (for silage ban, quality, cheese processing, etc)	Institutional guidance of prices from downstream to upstream Standard contract including a balancing mechanism for distributing value along the supply chain Price transparency (monthly price declaration and calculation of a basis average weighed price for cheese)
Protection of the competitive advantage	Differentiation strategy Barriers to entry towards the competitors (promoting industrialisation) by controlling production conditions	Differentiation strategy Barriers to entry towards the competitors (promoting industrialisation) by controlling production conditions Imposing costs to competitors
Regulation mode of the system	Power relation dealt within the interprofessional organisation	Power relation dealt within a managing interprofessional organisation State gives power of attorney to the managing organisation

V. CONCLUSION

This paper shows that the governance mode for managing a PDO leads to different performances in PDO cheese supply chains with regard to milk price at farm gate. In the two case studies, the price difference lies between 15 and 25% depending years between the PDO products and industrial products. – we could highlight the role of formal and informal institutions depending on the governance type. We demonstrate in particular the control on legal mechanisms (regulation, standard contract, supply management planning, etc.) allows retaining the cheese production system and its benefits for producers as well as for consumers.

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