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Experiencing diversity within French farm machinery cooperatives: member heterogeneity and cooperation

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Abstract - French farm machinery cooperatives (Cuma) are confronted with greater diversity in production systems. Little studied, the question of diversity in agricultural collectives is central to questioning the evolution and sustainability of cooperatives within their territory. Is it possible to work together with a diversity of systems and associated values? This work provides answers to this question through the analysis of two Cuma from the Tarn Region (France), which are characterized by a high degree of social and technical diversity. Agricultural diversity is expressed in different ways in the two cooperatives, depending on types of production, management methods and farm sizes. We find that members don't consider the experienced diversity as a threat for the collective, sometimes it is even perceived as a strength for the cooperative.

Keywords: collective action, coexistence, Cuma, diversity, member heterogeneity

1. Introduction

Since the Second World War, French farmers, long encouraged to follow a "productivist" family agricultural model, have professionalized. They specialized their production, increased the farm size and gained in labor productivity, in particular through the standardization and motorization of their activities. However, this overall movement, promoted since the 1960s by agricultural policies, has not prevented the emergence of alternative forms of agriculture. They are emerging as a result of societal expectations, of farmers' and consumers' needs, and more recently the renewal of public policies [1-3]. Thus, farmers have been encouraged to develop agroecological practices since 2012 [4].

Mechanization and then motorization of agriculture are two of the main drivers of the historical transformation of agricultural activities [5]. In France, farm machinery cooperatives (Cuma¹) were created at the end of the Second World War to make motorization accessible to farms that would not have been able to bear the cost individually [6-8]. Seventy-five years have passed and today, nearly 12,000 Cuma bring together more than 200,000 members, i.e., more than one-third of French farmers [9]. In these cooperatives (23 members on average per Cuma), links have historically been forged around the sharing of equipment and a solidarity based on similarity and belonging to the same community [10]. However, today, there is increasing member diversity within the Cuma [11]. This growing diversity is largely reflected in all types of agricultural cooperatives, where structural changes in the agricultural sector are intensifying differences among farmers, particularly regarding diversification of activities and farm size [12, 13]. Cooperatives themselves participate in this diversity, they adapt to societal changes by offering a variety of new activities and partners [14].

Cuma are particularly conducive to the development of organic or agroecological farming practices [15]. Within the collective, farmers explore new practices and solutions, often a starting point for the diversification of production, processing and marketing activities [16]. The national federation

¹ Coopératives d'utilisation de matériel agricole

of farm machinery cooperatives (FN Cuma²) shares this observation of increasing diversity among farmer members. Some Cuma are disappearing because they are no longer able to unite their members around a common project, or because their needs are becoming too different. These dynamics question the potential differences between the collective project and a diversity of individual projects. Described as a major challenge for Cuma in the FN Cuma's political project since 2012, diversity raises questions around the sustainability of Cuma cooperatives. From this observation, we formulate the hypothesis that the diversity of agricultural models within Cuma and the representations that their members have of them could be a source of tension between members and challenge the sustainability of those cooperatives. The main questions raised in this research are: what does it mean to cooperate with a diversity of members? Is it possible to work together with a diversity of systems and associated values? Is diversity, as represented and experienced by the members, a source of difficulty for the conduct of common projects in the Cuma, on the farms and in their territory?

Little studied in the literature, the question of diversity in agricultural collectives is central to questioning the evolution and sustainability of Cuma within their territory. In the first part of this article, we review the state of knowledge on the impact of member heterogeneity in cooperatives. Then we detail and justify our theoretical and methodological choices, before presenting the characteristics of the two Cuma case studies. We then present how farmers experience their differences and similarities within the two Cuma and how this challenges cooperative ties. Finally, we observe in which ways member diversity can be a driving force for the collective, and how these Cuma are held together in their diversity by arrangements and values. Finally, we conclude on the conditions for the coexistence of agricultural models within these two Cuma.

2. Heterogeneity: a threat to the cooperative equilibrium?

Literature on cooperatives has taken into account the idea of member diversity since the 1990s, by focusing on the emergence of conflicts that can challenge the cooperative equilibrium. Member heterogeneity can be a trigger for these conflicts [17]. In the literature, membership heterogeneity is often associated with reducing the efficiency of economic and social mechanisms, such as commitment and collective decision-making, [12, 18] and lowering the cooperative performance [19]. However, research on membership heterogeneity in agricultural cooperatives is still a little studied field today [12, 20]. In the cooperative literature, membership heterogeneity is often reduced to a few dimensions and seen as a disadvantage for cooperatives. Cook and Iliopoulos [20] initiate a more comprehensive understanding of the multiple dimensions of heterogeneity. Höhler and Kühl [14] summarize the different facets of heterogeneity in three dimensions:

1) Farm heterogeneity, broken down into two aspects: farm size, one of the most studied aspects of membership heterogeneity, and geographic location, which can determine different production and cropping conditions. This farm heterogeneity is likely to increase the control and influence costs within the cooperative, leading, for instance, to larger farms having greater control of the cooperative [21].

2) Heterogeneity in member characteristics: differences in members' personal characteristics (age, experience, gender, education, income, share of income in the cooperative, etc.) impact their preferences in terms of cooperative commitment and decision-making. According to Cook and Iliopoulos [22], three common problems result from this membership heterogeneity: *the free rider problem*, coming from the fact that new members get the same rights as existing members, which might lead some members to be less committed to the cooperative [23]; *the horizon problem*, as members, depending on their age and planned duration of farming activity, will not have the same time frames of investment [24]. *The portfolio problem*, which concerns the heterogeneity of

² Fédération nationale des Cuma

members' risk preferences [25]. Finally, members are also heterogeneous in their commitment to participate in the governance of the cooperative [26] and in their motivations to join the cooperative with respect to the benefits they receive [27].

3) Finally, the heterogeneity of products, which are purchased or produced by members. In light of an increasing heterogeneity of these products, it may become difficult for the cooperative to show that it is meeting the interests of all members [28].

Taking these different dimensions of heterogeneity into account provides insight into the diversity of member preferences regarding the cooperative's organization, goals, and strategies [14]. These different preferences could influence monetary and non-monetary outcomes of cooperatives, such as profits and member satisfaction. Not all of these dimensions are systematically relevant for understanding the impact of heterogeneity on cooperatives. Yet, knowing them allows us to be aware of the situations observed in our case study.

However, it should be noted that this literature considers diversity in terms of the criteria chosen by the researcher. We assume that "experienced diversity", i.e., the representation that members have of their diversity, is another determining element in understanding the functioning, governance and dynamics of cooperatives. Moreover, member heterogeneity does not immediately imply difficulty in creating a common project. It also depends on the definition of diversity: Thus, Ostrom [29] describes homogeneous actors as actors who develop a shared commitment to create a common ground, which is not necessarily in contradiction with the presence of heterogeneous attributes.

3. Methodology and fieldwork

The methodological choice of approaching the research questions through representations, the construction of meaning and the centrality of discourses allows an approach centred on farmers as actors. We pay particular attention to their interactions and their experience of diversity and collective organization. This approach implies the strong assumption that the meanings given by the actors influence their actions [30]. Studying collectives through this approach enables us to analyse not only individual, but also collective representations. This analysis allows for a better understanding of collective agricultural organization, which is not only organized around material needs, but also around social and symbolic ties [31]. The approach through social interactions provides a clear understanding of heterogeneous actors inside and outside the collective [32]. In this sense, our research contributes to the study of the coexistence of agricultural models [33]: we analyse the conditions of socio-technical interactions between farmers (and their production systems) at the scale of two Cuma, in which agricultural equipment and labour are shared.

This research is the result of a close partnership between INRAE, the FN Cuma, and the FD Cuma of the Tarn region. After numerous exchanges with the FN Cuma, the Tarn region was chosen as a research field, because of the interest of the FD Cuma of the Tarn for the subject and its availability to supervise a three-month fieldwork. In consultation with the FD Cuma, two Cuma in the Tarn were selected for this study: the "Puygouzon Cuma" and the "Deux-Monts Cuma". The two cooperatives were chosen in order to have case studies with a large diversity of members and with farmers volunteering to host the interviews. These two Cuma are similar in size and regarding their date of creation, but also because of their specificities in the organization of the collective (Table 1).

Table 1. Presentation of the two Cuma

	The Deux-Monts Cuma	The Puygouzon Cuma
Date of Creation	1989	1990
Number of members (2018)	66	74
Number of board members (2018)	7	12
Organisation	Central agricultural machinery shed, one full time employee, centralized organization	No shed, no employees, decentralized organization with farmers responsible for the agricultural machinery

Source: authors

The first author of this article spent three months immersed in the life of the two Cuma and in the offices of the FD Cuma of the Tarn, in order to better understand the individual and collective logics of diversity within the Cuma and their network. The data collection was organized in a complementary manner between semi-directive interviews and the observation of meetings. The interviews, which lasted between 1.5 to 2.5 hours, were conducted with 20 members, 10 from each Cuma. The interviewed farmers were chosen to represent the diversity of the Cuma in terms of production systems and forms of involvement in the collective. The interview guide addresses several central themes: the presentation of the farm (land, production workshops, work collective, crop and herd management, forms of marketing, equipment, extension services and trajectory), farmers' representations of diversity within the Cuma, the organization of the cooperative, interactions with other members and the contact with the Cuma federation. In order to observe the Cuma network's support of this diversity, three interviews were also conducted with employees of the FD Cuma. These interviews were complemented by the observation of several meetings, the annual general assembly (GA) of the FD Cuma, two GAs of Cuma from sub-sectors in which the two studied collectives were located, and two GAs of Cuma different from those studied. These moments of observation allowed for a deeper understanding of the interactions, the topics of discussion, and the farmers' concerns.

Taking notes, recording the interviews and some meetings, and full transcriptions of the interviews were used to organize the analysis of the collected data. A colour code was used to identify the central topics (diversity, interactions within the Cuma, organization of the Cuma, links with the Cuma federation). This information was then classified in a cross-sectional analysis table around four subjects:

- The structural characteristics of the farms
- The farmers' representations of themselves, of others and of the collective
- Interactions within the Cuma, outside the Cuma and with other Cuma
- Farmers' representations of diversity, of what works well or not so well in the Cuma, and of the challenges facing agriculture in general.

4. Experimenting differences

In both Cuma, there is a significant diversity of production, equipment and forms of commitment to the cooperative. The diversity of farms refers to the structural diversity of agricultural systems, in a multiplicity of organizational strategies around capital and work. Member diversity refers to the relationships between members (postures, functions), which can be a source of inequality, marginalization, or even conflict [34].

4.1. Diversity of production

The diversity of production is striking in both Cuma. “Crop farmers, livestock farmers, vegetable farmers, dairy farmers, sheep, chickens, pigs...”. The farmers agree that “there is a bit of everything” in terms of production types. This diversity of production also reflects different ideas of agriculture, “it is true that there are two worlds, the pure cereal farmers, the breeders, they do not see things the same way”.

This diversity is a reflection of the Tarn region, where there is a remarkable diversity of production systems. However, between the two studied Cuma, the diversity of production is not the same. If there is a majority of mixed farming and winegrowers in the Puygouzon Cuma, the Deux-Monts Cuma is more composed of crop farmers, but also of breeders and market gardeners. These differences are also a reflection of the territorial context. In the territory of Salvagnac, in the west of the Tarn, where the Deux-Monts Cuma is located, the decrease in livestock farming has been significant in recent years, to the benefit of the development of cereal farmers and “organic pioneers”. The “organic farmers, market gardeners and neo-ruralists...” have brought great diversity to the canton, which “has naturally found its way into the Cuma”. These developments have marked the representations of diversity in this Cuma, which are strongly connected to the “organic” or “conventional” farming styles. In this way, the diversity in the Cuma is presented as a “large core of organic crop farmers, a large core of conventional crop farmers and a small core of breeders”.

The Puygouzon Cuma is located south of Albi, in an area of livestock and wine production. These productions are found within the Cuma, the farmers mention mixed farming in milk or meat cattle, wine growing, but also some crop farmers and poultry production.

4.2. Diversity of equipment

The two Cuma have a diversified fleet of equipment: “it is the diversity that has allowed us to have this good equipment”. These two Cuma also have a large fleet of equipment, with about thirty different machines. In both Cuma, there is deep and superficial tillage equipment, equipment for spreading livestock manure, forage equipment, seeding equipment, harvesting equipment and equipment for livestock transport. Some specificities in the equipment between the two Cuma reflect the differences in the diversity of the farms. In the Deux-Monts Cuma, where there is more crop activity, the tillage pack is more extensive, in order to respond to the diversity of practices (ploughing, no-till, shallow tillage, mechanical weeding...). There is also a power harrow for market gardening activities. In the Puygouzon Cuma, where there are more breeders, there is also a silage unloader for cow feeding, as well as specialized equipment for wine growers (a grape harvesting machine, a hoe and a pruning machine) and for the corn seed group (a leaf stripper, a husker and a skip).

4.3. Diversity of forms of involvement in the Cuma

Beyond the diversity of production and equipment, there is also a diversity of forms of commitment to the Cuma. Commitment is understood by the amount of equipment to which farmers subscribe, and therefore the financial involvement they have in the Cuma, but also by their involvement in the daily organization of the Cuma. These two forms of commitment govern not only the farmers' sense of belonging to the Cuma, but also the organization of the Cuma between individual and collective logics. Farmers who are members of a large number of equipment groups and have large bills to pay to the Cuma feel more involved in the daily life of the Cuma. For example, in the Puygouzon Cuma, the three farmers with the largest bills are all sons of the founding members of the Cuma and have been involved in the life of the cooperative since they were young.

The participation in the life of the Cuma can mostly be seen through the presence on the management board. In both Cuma, the board members form a central core of highly involved members, surrounded by other members who are more peripheral in their involvement. This central core makes it possible to organize decision-making, despite the large number of members.

4.4. Accepting the diversity

This diversity of systems, equipment and forms of involvement was created over time, in response to changes within the Cuma and its surrounding territory. The fact that the two Cuma have been confronted with this diversity of production systems for several decades has led to a certain acceptance of these differences.

The two Cuma were first created in the 1990s as breeders' cooperatives, and over the years they opened up to a diversity of members. This opening up to other types of production reflects more broadly the evolution of Cuma in the Tarn region, where the first Cuma grouped together mostly breeders, who then grouped together by type of production (Cuma for livestock, crops or wine), and finally evolved towards a diversity of production within the same cooperative [35]. This reflects the general evolution of the Cuma in France: After initially supporting family farmers (1950s), the Cuma were then driven by the desire to allow small and medium-sized farmers to modernize, and finally opened up to the new diversity of farms in the 1980s. This openness to diversity led to a variety of new equipment in the Cuma from the 1980s onwards (fertilization, seeding and tillage equipment), as well as new processing and sales activities [35].

Thus, the Cuma are adapting to these changes in the diversity of farmers. In the beginning, the Cuma of Deux-Monts was very much oriented towards maintaining small and medium-sized farms. Today, faced with the evolution of farms, it is adapting to large structures. “At the beginning, the objective was to maintain small farms. And the Cuma had a big role to play in this. Today, we have to admit that farms have grown and that we have to adapt to farms of 120-130 hectares.”

The agricultural developments in the territories of the two Cuma also influence the diversity within the Cuma. The territory around the Deux-Monts Cuma attracted many neo-rural farmers in the 1980s, in particular thanks to more affordable land prices. Some of these farmers proved the economic robustness of their system, which improved their acceptance in the territory. In parallel, there is a more general dynamic of promoting organic farms in the last ten years, with the expansion of organic subsidies. This acceptance of diversity does not mean, however, that every outsider who settles in this area is directly integrated into the sector. One farmer recalls how, when she set up her farm 10 years ago, she was looked at by others “like a martian”. She was setting up as a “single girl, not from a farming background and with a noble name”. But she quickly made contact with people, facilitated by the fact that her farm “stood the test of time” and that she was not the first neo-rural to arrive in this area.

This entry through the history of the territory highlights what Hervieu and Pursegile [36] describe as a growing diversity of productive and commercial trajectories, which are created through power relations in the face of a modernizing logic. Between the diversity of production that has developed in the areas of the two Cuma and the adaptation of the Cuma movement to this diversity, the members have become accustomed to this diversity and accept it.

5. Experiencing diversity: a shared professional identity

The experience of difference is also the experience of a shared professional identity. Beyond their different visions and practices, these farmers are confronted with the same structural (economic and political) and climatic uncertainties. These shared concerns make them part of the same farming profession, all of whom are impacted by the weather and its consequences on their production. This

common experience creates a strong shared feeling, which builds a common identity in the face of difficult working conditions.

Even more than this basic shared identity, farmers create common identities around specific practices, which reinforce the feeling of proximity within diversity. This technical proximity takes different forms in the two Cuma. In the Deux-Monts Cuma, tillage, which is common to almost all systems, has made it possible to unite the members. The Cuma has thus created a “soil pack”, which links all the soil-working tools in a single set of equipment and makes it possible to have a group that includes almost all the members. This technical proximity creates links, sharing and openness to other members.

At Puygouzon Cuma, this shared identity is rather organized in sub-groups, between several farmers with similar systems. The corn group, the wine growers' group and the breeders' group share specific equipment for corn thinning, grape harvesting or cattle feeding. These sub-groups allow for a common organization of the equipment, but also of the work: the breeders share the silage distributor between all the member farms, the vineyard group sometimes helps each other with the pruning of the vines, and the corn group organizes common work moments for the thinning out of the corn leaves. In the Deux-Monts Cuma, while there are no specific sub-groups that are as independent, there are “working groups” created by the desire to invest in similar equipment. “The organic farmers work together with harrows, hoes, pruning machines, tools that they need and that we don't need, but afterwards it's true that there are also tools that intersect”. The technical proximity thus makes it possible to find similarities in the difference.

Thus, sometimes collective needs are not shared by the entire Cuma, but by a sub-group of farmers, identified by their type of production or their management style, who choose to invest in specific equipment. Diversity allows these farmers to find themselves in certain sub-groups, but also in others, and thus to cross their individual logic with several collective logics. Diversity is not only the taking into account of differences; a group can thus be heterogeneous on certain levels, but homogeneous on others [37].

6. Diversity tests the cooperative ties

However, cooperating in a Cuma with members with different visions and systems is not self-evident. Cooperative ties are tested in terms of maintenance and choice of equipment, participation in cooperative life, and through conflicting legacies.

6.1. Conflicting legacies

Some events have thus crystallized underlying tensions, linked to these diversities. Conflicts between more “conventional” modes of production and more “alternative” visions of agriculture were exacerbated in the canton of Salvagnac with tensions surrounding a slaughterhouse created by breeders. For instance, before the creation of the Deux-Monts Cuma, breeders organized themselves to slaughter and transform their animal production by themselves. The slaughterhouse burned down in 1992 in a “criminal incident”, without identifying the culprit. This period brought to light a “cultural divide” between “conventional, local” farmers and neo-rural or more generally “innovative” farmers. It was in this moment of crisis that the ideological differences between these types of farmers became more pronounced and led to the abandonment of the Cuma slaughterhouse project.

These conflicts reflect important divisions in the visions of agriculture, which also crystallized with the Sivens dam project in the 2010s, where the crisis situation in the Cuma was however managed differently. The Sivens dam polarized farmers' opinions to a great extent, with those in favour of the dam arguing that there was a great need for water for crops and that “the law had to be respected”,

and those opposed to the dam arguing for a change in practices to adapt crops to the surrounding conditions, particularly to the lack of water. Despite the highly divisive potential of this subject, the conflicts remained “outside the Cuma”. The Deux-Monts Cuma was not divided, because its preservation was too important for the farmers, as “it remains an economic tool to be able to work”. To avoid conflicts, the members “tried not to talk too much about it with some members” and knew “not to show off too much when it was not necessary”. These tensions were put aside to ensure the functional organization of the cooperative around the equipment and to avoid the disintegration of the cooperative due to conflicts of ideas.

This difference in the management of these two ideologically polarized situations within a Cuma raises questions. It can be explained in part by a historical habit of diversity, which is more important in 2010 than when the first neo-rurals arrived in the 1980s, and by the notions of openness and functionality, which have been developed since the creation of the Cuma des Deux-Monts.

6.2. Choice and maintenance of shared equipment

The different visions of agriculture can also create tensions in the choice and maintenance of equipment. Tensions around the choice of equipment can refer to power relations between the different farm systems. For instance, some breeders feel that there are differences in their relationship with equipment: they sometimes bend to renew equipment for better performance, whereas they would prefer to space out the purchases. These farmers mention a different relationship to equipment between crop and livestock farmers. Crop farmers tend to have a greater passion for modern equipment and “big tractors”, whereas many livestock farmers see equipment in a more functional way. In addition, some neo-rural farmers, who are in the minority, also have to adapt to the choice of equipment in the Cuma, which is sometimes too powerful for them. Furthermore, inequalities can be observed in the choice of equipment: for a large part of the equipment, such as tillage equipment, members agree to pay according to the surface area of the farm, with the idea of spreading the costs according to the use of the tool. In this payment system, it is necessary to involve a number of large farms in order to invest in equipment. These farms can mobilise this lever to guide the choice of equipment. While this investment system is not presented as a problem by farms with smaller areas, “small” farmers sometimes feel less legitimate in giving their opinion on the purchase of equipment: “to give our opinion by saying we prefer that, with 20 hectares, I think it would be a bit of an abuse, well, I think...”. Tensions regarding the choice of equipment are therefore very present and not mentioned very much by the farmers in the two case studies, perhaps because the farmers in a minority position in the Cuma have chosen to accept the will of the majority.

Furthermore, tensions may emerge due to differences in the maintenance of equipment, particularly concerning fragile equipment, such as ploughs: “some wear out the equipment quickly, others less...”. In addition, some tools are controversial, as they refer to certain practices that are rejected by some farmers. For example, a certain number of farmers were opposed to integrating the plough into the soil pack: “for some people it has nothing to do in the pack, they are absolutely against ploughing, for them it is an aberration.” Moreover, the availability of equipment remains a central concern, even in cooperatives with a diversity of members. While the diversity of systems can help spread out the use of equipment over the year, the availability of equipment remains a major challenge for the Cuma, frequently mentioned by farmers.

Another source of inequality appears in the degree of dependence on the Cuma. Two factors influence the “need” to be in a Cuma. Firstly, the type of production: breeders have a greater “need” for the Cuma, because they generally have a large need for equipment (for fodder, sowing, tilling, etc.), which is very expensive to own. Secondly, the size of the farm: many “large” farms have many duplicate tools, between their ownership, the Cuma and co-ownership. They can thus “do

without” the Cuma. This notion of “needing” the Cuma is one factor, among others, that can create positions of strength, potentially leading to tensions within the cooperative. These potential inequalities raise questions about the “one person = one vote” rule of cooperation, which seems to be fading in investment decisions.

6.3. Participation in the life of the cooperative

The participation of farmers in the management of the Cuma can be questioned in a cooperative with great member diversity. The issue of representativeness is raised in particular for the managing board of the Deux-Monts Cuma, which is mostly composed of “organic” farmers. With a board of directors that is oriented towards a certain production method, the question arises as to whether this unrepresentative composition might not lead to a lack of equity in decision-making. The representativeness of member diversity is a central element to ensure member participation in a cooperative. Some farmers may feel discouraged from participating in the management of the Cuma if the board of directors is composed only of a certain type of farmers.

Another challenge, raised by the economic theories of collective action, is the *free rider* behaviour of some members, which can weaken the collective. In the Cuma, this behaviour is found in particular when some members “do not want to get their feet wet for new investments, and want to get back on the tool when it is already amortised and cheaper”. In the Cuma cooperative system, where the number of years of amortisation of the equipment is decided at the time of purchase according to the number of members interested in the tool, the arrival of late members (or opportunists?) can create feelings of injustice among members that commit from the beginning, which can in turn jeopardize the purchase of new equipment. These concerns about *free riders* are not specific to this heterogeneous membership, but can be observed as potential sources of tension in the two case studies. We were unable to quantify the importance of this behaviour. The literature mentions other free rider situations, for example due to the existence of ghost members who participate very little in the life of the cooperative, with the risk of transforming the Cuma into a farm work company [23].

6.4. Structural tendencies

Finally, structural tendencies in agricultural development also participate in challenging the cooperative ties in these Cuma. Two developments in particular, the growing farm sizes and the reduction in livestock farming. “Today, farms have grown immensely, and we have to adapt to farms of 120-130 ha.” Expansion is a concern for some farmers, who fear that farms that are too large in size will “drop out of the Cuma”, because of a more frequent need for equipment and the ability to invest in this equipment alone, or because they are considering using agricultural work companies [38]. These fears are also present in the reflections of the FD Cuma, which is wondering how to respond to these developments.

Studies on other Cuma observe tensions between “organic” and “conventional” farmers and difficulties in interactions between these different farmers [11, 33]. The possibility of conflicts due to the diversity of systems and members is therefore present in the Cuma environment. In the two case studies, cooperative ties are also tested, especially historically, but also today, because of this member diversity.

7. Diversity as a driving force for the Cuma

In the representations of the farmers of these two Cuma, diversity is often represented as a driving force for the cooperative, it allows the development of the equipment pool, but also the exchange of ideas and practices between members. “It is an advantage to be all different”, “diversity (...) has been an advantage for the development of the Cuma”.

7.1. The development of the equipment pool

Diversity can be an asset to better develop the equipment pool. In farming, which is dependent on climatic hazards, it can be difficult to share the equipment needed by many members at a given time. The diversity of production can make it possible to distribute the use of tools and reduce problems of access to equipment: “In conventional farming, they sow sunflowers, soya, from the end of April until 15th May and in organic farming we rather sow from 15th May.” “For equipment that is only used by breeders, such as manure spreaders, the diversity of livestock also makes it possible to spread the use, because they are not the same farms, so they do not free the buildings in the same month in the summer.” The type of farming and the size of the farms thus lead to a different volume of use of the equipment, which is particularly important for equipment used over short periods, such as haymaking or harvesting equipment. This possibility to spread the needs, which is very present in the farmers' accounts, allows the optimisation of the equipment and a better response to the individual needs of each farm.

The diversity of equipment can also be a source of diversification of production or the creation of secondary workshops on members' farms. For instance, without the presence of farmers whose main activity is maize seed and who have invested in a maize stripper, a dairy farmer would not have been able to start maize seed as a side production. The diversification of farms is also facilitated by the exchange of know-how, as illustrated by the example of mutual aid between a wine grower and a seed maize producer in Puygouzon: “In fact, S. has a lot of vines and a little seed maize, and I'm the opposite. So, with my team of workers and my machine, I go to his place and I castrate the maize (...) And I harvest by hand, (...) I think that without that, I would have given up, but he comes with his team, one day, and then we make bills and then there you go.”

7.2. Exchange of ideas and practices

In their representations of diversity, farmers do not only talk about the equipment, but also about the advantage of having access to a diversity of ideas and practices. “If we were all the same, it would be sad, there is some ranting, but it makes things progress too.”

The diversity of productions can thus provide the opportunity to experiment and try out new practices. “Experimentation” is understood here according to Darré's [30] definition, as processes arising from the social production of knowledge and which in turn help to enrich it. Thus, practices and discourses can evolve according to the exchanges between farmers. The concept of *local professional groups* (LPG) makes it possible to analyse these links in a restricted geographical area, which here corresponds to that of the Cuma. These inter-knowledge groups are shaped by the visibility and number of clusters within them, as well as by the bridges between these clusters of farmers and the density of links [30]. The two Cuma studied resemble type 1 of this LPG typology, with several clusters of exchanges within them, and fairly strong bridges and links.

The observation is very present among farmers that the Cuma has made it possible to create links where there were none, between farmers who were geographically close. “If it wasn't for the Cuma, we would see each other once a year at the village funeral, almost.” “For a very long time, I had no contact with S., although we were neighbours. Because they had the vineyard group (...) and we on the other side of the village were more breeders, (...) Because we had formed our groups through our production, whereas today we have the equipment together, it's the Cuma that brings it, and before we didn't have it.”

The Cuma makes it possible to go beyond the ties of affinity - created by geographical proximity, age, or family ties - and to bring together farmers with different productions. The places where exchanges take place in the Cuma are mainly the spaces where the tools are housed: on the farms of the equipment managers in Puygouzon or in the central shed of the Deux-Monts Cuma. Occasional

exchanges also take place during board meetings and the annual general meeting. The members often exchange information on their practices, even if these exchanges are sometimes very short. “There are many different ways of doing things, so it also allows us to share knowledge and trials.” The meeting between a diversity of farmers over a long period of time makes it possible to observe their experiments, which favours the dissemination of “innovative” practices in the event of success, just as it does not lead to the same mistakes being made in the event of failure of certain practices.

This meeting with a diversity of farmers also allows the discovery of new tools. For example, a cereal farmer discovered the rotary hoe - a weeding tool - thanks to his organic colleagues. Although he now uses it for hoeing, he also wants to try it for weeding. These exchanges also make it possible to experiment new practices together. For example, three farmers have invested in a front hopper to try out localised fertilisation techniques. They bought the same model in order to be able to adapt the Cuma's tools. Plant cover is at the centre of these exchanges, as it is a new practice for many of the farmers surveyed and there is a growing interest in these techniques.

These exchanges of practices are also present at the level of the Cuma network, in particular thanks to the FN Cuma's magazine *Entraid*. For example, at the Puygouzon Cuma, board meetings are punctuated by discussions of practices experimented in other Cuma in France.

8. Collectives in practice

These positive representations of diversity in these two Cuma can be explained by internal and external factors, which favour the success and sustainability of collective action in this diversity of systems.

8.1. Rules for organizing a collective

The will to organize collectively is reinforced by the cooperative rules and statutes, and by the rules for managing the Cuma and the equipment that are defined within the collective [39].

The first rules that organize the Cuma are the statutes, which aim to ensure the reciprocal commitment between farmers and the Cuma, in accordance with the principles and rules of cooperation. Among the seven essential principles of cooperation, four are central to understanding how diversity is considered in the Cuma: 1. commitment is voluntary and open to all, which reflects the idea of freedom of membership, 2. democratic power is exercised by the members, which reflects the value of equality, 3. the principle of “dual status”, according to which cooperators are also economic actors, and 4. the autonomy of management and the political independence of cooperatives [40]. These cooperative principles are translated into rules that concern, for example, the fact that equity is composed of the members' shares, as well as the “one member = one vote” rule, a major rule that imposes the acceptance of diversity.

Secondly, the common rules of governance are adapted to local conditions and created by the members of the Cuma, which makes it possible to put the desire to adapt to the diversity of the members' needs at the centre of the cooperative. The operating rules in both Cuma's seek to define the management of the Cuma, the commitment of the farmers and the daily organization around the equipment. The presence of these rules is essential for the members: it guarantees the stability and fairness of interactions and treatments, as well as transparency in the cooperation. “A law is a law, you have to be transparent.” The strength of the rules for organizing these heterogeneous collectives lies in the balance found by the farmers between these rules and informal arrangements, which make it possible to adapt to the needs and expectations of the diversity of members. Even if these rules do not suit everyone, they are commonly accepted by the farmers. As far as equipment is concerned, the rules can be adapted on a case-by-case basis. For example, in the Deux-Monts

Cuma, one of the rules defined by the farmers is to limit the use of equipment to two consecutive days. However, farmers with smaller holdings are encouraged to do their work in one day, in an “informal” arrangement, to “make the effort for others” and free up the equipment for larger holdings.

To adapt to new needs, these rules and arrangements evolve over time at both the local and network levels. While the conventions and arrangements are seen as an asset at the local collective level, the director of the FD Cuma also mentions reflections on the evolution of the statutes at the federation level. “Can the statutes evolve while keeping the cooperative principles to which we are attached? (...) It is in this sense that the statutory evolutions can be understood, for example towards activities that complement the classic activities of the Cuma.” Indeed, some Cuma develop original cooperation experiences, which go beyond the traditional framework of sharing equipment, such as the purchase of a refrigerated truck, the creation of processing workshops or even collective practices of straw spreading to fight against erosion [41].

Accepted by the farmers, these rules organize the collective in its diversity, ensuring principles of equity and transparency. The potential for adaptation and evolution of these rules, in addition to informal arrangements, is crucial to meet the changing needs of a diverse membership.

8.2. The size of the collectives

The size of the groups is not a factor that clearly facilitates or hinders collective action in its diversity. The two case studies have a higher number of members than the departmental average. There are more than 60 members in the two Cuma, whereas the average is 35 members in the Cuma of the Tarn region [35]. The “large” Cuma can more easily accommodate a diversity of farmers because of their ability to invest in and make a profit from diversified equipment. In fact, in a Cuma with 12 members that was observed during two general assemblies, the small number of members limits the investment in a diversity of equipment. A larger Cuma size increases the capacity to meet the diversified needs of farmers and also creates a more “open” circle, where members are regularly confronted with diversity, which can encourage acceptance of difference.

At the same time, some members point to the possibility of drifting toward more *free riders* in larger cooperatives, who only benefit from the equipment and are not involved in the cooperative. “You have to be wary of the big Cuma, which tends to attract people, it shouldn't drift, and become a rental thing.” As Ostrom [29] and Olson [42] have shown for other forms of organization and common resource management, the large size of the group may not facilitate collective action. However, the case studies are organized into sub-groups, which may explain their good performance despite a large membership. The size of the cooperative is therefore a complex factor, favourable to the organization of diversity in our case studies, at the risk of some farmers disengaging from collective management.

8.3. Organizational specificities

The organizational flexibility of the two cooperatives can play a role in favour of a good management of membership diversity. Thus, the two Cuma have been able to adapt to the forms of diversity present on their territory and develop adapted organizational forms: a decentralised organisation in the Puygouzon Cuma, and a centralised organisation in the Deux-Monts Cuma. In Puygouzon, the different productions are grouped in different sectors. The equipment is organized into several geographical centres, which makes it possible to group together the equipment specific to certain productions, where they are located: the corn seed equipment in the Cambon sector, the wine-growing equipment in the Cunac sector. This also makes it possible to duplicate frequently used equipment in different sectors, which limits travel and facilitates access. In order to involve this diversity of sectors in the organization of the cooperative, the equipment managers are almost

all on the board of directors. This involvement of equipment managers in the board is central, according to the Cuma president, to ensure a “global vision” of the Cuma's future and to involve the diversity of members in the management of the cooperative. In the Deux-Monts Cuma, the different farms are scattered throughout the Cuma's territory. The cooperative centralizes the equipment in the shed, with the Cuma farms surrounding it within a radius of 20 km. For the members, this shed is the “optimal organization”, because it allows them to have a workshop and an employee, but also to create social links, when the members come to collect the equipment.

In both Cuma, the organization of the cooperative has been adapted to the needs of the members and the territorial context of diversity. This organizational flexibility is reinforced by key persons, who unite the members and mitigate potential conflicts. Because of its central structure, the role of key persons is particularly important in the Deux-Monts Cuma, in the figures of the employee and the president. Members share tensions about equipment or other members of the employee, “who does everything to make the Cuma work well”. The president is another pivotal person, “who knows how to listen to everyone”. At the Puygouzon Cuma, the president, but especially the equipment managers, have this unifying role. This presence of valued people, to whom members can turn, ensures that the two Cuma function well.

8.4. “Welcoming values” in the Cuma

Acceptance of diversity is also underpinned by values of openness and welcome, to which the members are attached. “It is really a welcoming Cuma”, a concept that embodies the idea of “welcoming everyone, that is the Cuma spirit”. This welcoming spirit implies putting aside ideological positions within the Cuma. These conflicts of ideas, which are likely to emerge in a cooperative where members have different productions and visions, are put aside in order to guarantee the functional organization of the Cuma. Thus, a member is accepted if he wishes to subscribe to the present equipment, regardless of his production, his technical conduct or his possible union affinities. New equipment is purchased if there are enough interested members, regardless of the type of equipment. This vision is in line with the principles of the Cuma federation, which claims to be “apolitical”. In this sense, the farmers of the two Cuma, as different as they are in their farms and their points of view, have a certain homogeneity in the sense of Ostrom [29] who qualifies as homogeneous actors who manage to develop a shared will to develop a common. In these case studies, the diversity of the actors is not in contradiction with the common will to develop the Cuma. The two Cuma have developed as cooperatives open to all types of farmers and farms, and as places where political discussions are set aside in favour of functional and practical concerns, in order to avoid conflicts of ideas. “The more numerous we are, the more ideas and strength we have.”

Thus, the cooperatives are organized by rules and arrangements, which favour the management of diversity. The values of hospitality, as well as the organizational factors of size and flexibility also facilitate the functioning of diversity in the Cuma.

9. Conclusion

Our research reports on the diversity experienced by the farmers of two Cuma created more than twenty years ago (1989/1990) in the Tarn department. The two Cuma are composed of 60-70 members and present a great diversity of production systems, which is historically constituted and geographically localized. This lived diversity is the representation that the members of the Cuma make of their diversity and the meaning they give to it.

Despite this diversity, forms of solidarity and a multitude of agreements and arrangements allow these two collectives to last and develop. These two Cuma are marked by a spirit of welcome and openness, and an experience of this diversity as a driving force for their cooperative, both for the

diversity of equipment and for the exchange of ideas and practices. The organization of this diversity is ensured by a system of rules and arrangements, by historical acceptance, as well as by organizational factors of the cooperatives, their size and their adaptability. We find well-known results from the Cuma federation: the economic success and functional organization of the Cuma presuppose that the ideological and political convictions of its members are put aside.

However, the diversity of actors also puts cooperative ties to the test. Power relations crystallize in the choice of equipment and dependence on the cooperative, which can be a source of tension. Participation in cooperative life raises the question of how to represent this diversity of systems on the board of directors. Structural changes, such as the expansion of farms, pose new challenges for Cuma. We highlight how conflicts of ideas between farmers are set aside in favour of the functional organization of Cuma. However, these divergences represent a risk of weakening these collectives.

Thus, in these two case studies, diversity does not seem to prevent the development of a common project and can even strengthen it. The Cuma manage to organize themselves despite the diversity of their members, but they also organize themselves thanks to this diversity, which can contribute to the development of the farms and the collective. These results are strongly linked to the territorial and historical context of these two Cuma and it would seem that in other case studies, diversity can be a source of tension for cooperatives. It therefore seems essential to compare these findings with Cuma in other areas, in order to compare these conditions that are favourable to the organization of diversity in other Cuma. In addition, this research did not take into account the question of structural competition between farms for access to financial, economic and environmental resources. It would be interesting to complete this research with broader reflections on structural competition between farms and the relationships of inequality in interactions within cooperatives, which are essential to study the issue of coexistence in its complexity.

Apart from the specific results on these two case studies in the Tarn, this research provides an interesting reflection on the question of the coexistence of agricultural models. These results invite us to think of this issue as dynamics that can be a source of tension in some areas and set aside in others for the benefit of functional needs, knowledge exchange and a shared professional identity.

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