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Adaptation of work arrangements on dairy farms in France

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Abstract: In France, the organisation of the workforce on dairy farms is becoming increasingly diversified. The reduction of family labour, the development of a salaried workforce, associations between farmers and contracting out to service companies, all attest to the adaptation of farms to current socio-economic trends. Farmers adapting their workforce organisation will help to sustain farming without exclusive reliance on family labour, and meet new aims in terms of quality of life or improved productivity. This study focused on work, based on the hypothesis that workforce group, structures and farm management have not evolved independently of one another. It is based on two surveys carried out among dairy farmers in the Ségala region. The results confirm that the man-and-wife model is no longer a standard in farming. Workforce patterns are still mostly family-based, but alternative structures are developing. Certain trends have emerged, such as women working off the farm, and the ageing of lone farmers and farming couples. Voluntary work by family members is still important and is a weak point in farm management. Indeed, these workers are often old relatives who may stop working sooner or later. Adaptations implemented by farmers to respond to work constraints are numerous and varied. They often combine the three possible ways in which farm management can be adapted, namely through the technical management of the farm, changes in the workforce and improvement of buildings and equipment. Four adaptation profiles were identified. They show that there are different ways to adapt a system to address work-related issues. The differences arise from the nature of the group of permanent workers carrying out and organising the farm work, and their expectations in terms of income and work conditions. This study shows that the adaptation options are dependent of the dynamics of the farm, the workforce and the persons who compose it.

Key words: dairy farming, workforce, labour, farm management, adaptation.

Introduction

Questions related to work are now critical for the future of dairy farming. Labour issues have become a brake on the setting-up and maintenance of dairy farms (Ferris *et al.*, 2006; O'Brien *et al.*, 2006). Since the 1970s the number of dairy farms and corresponding jobs have been continuously in strong decline (Eurostat, 1999; Parsons *et al.*, 2004), while their size has increased (Seegers *et al.*, 2006). In line with these trends, the composition of the workforce has changed. Family labour has decreased (Johnsen, 2004). The participation of wives in farm work is less and less frequent as more of them find work off the farm (Agreste GraphAgri, 2003). There is also less unpaid volunteer work provided by family members such as retired relatives (Rattin, 2007). The farm management model with two self-employed workers, namely farmer plus spouse and (or) other family members (Harff and Lamarche, 1988) is being superseded by a more diversified reality: individual permanent farmers (the spouse working off the farm), couples, family farms with permanent wage labour, associations managing groups of farms (Desriers, 2007) or shared wage labour. Although permanent full-time wage-earners are still few in number, less regular and cheaper employment has appeared through employer groups (Harff and Lamarche, 1998). Dairy farming is also directly influenced by social changes affecting the way farmers view their work. They aspire to regular work schedules, separation of work from family life, and time free from farm work (Barthez, 1986), unlike the traditional pattern where private life and work were confounded. The work constraints in dairy farming are made worse by twice-daily milking, which represents some 50% of daily constraint against 33% for feeding (Chauvat *et al.*, 2003). Dairy farmers have income expectations, but also seek to gain more control over their work (Glesson *et al.*, 2007; Bergevoet *et al.*, 2004). They are concerned by total work time, the strenuousness of certain tasks, and also the distribution of work time: week-ends off (53%), holidays (41%) and more daily free time (29%) (Moreau *et al.*, 2004). Work is no longer just a resource but is also part of the lifestyle of a dairy farmer (Dedieu *et al.*, 2006).

In general, the adaptations explored by dairy farmers to solve their work-related problems can be grouped into three categories (Dedieu and Servièrre, 2001): (i) changing the composition of the

workforce, (ii) improving buildings and equipment, and (iii) improving technical management. Recent studies (Cournut and Dedieu, 2005 ; Rubin *et al.*, 2006) show that adaptations made by dairy farmers do not always seek to meet the same goals. Some aim to reduce daily work time or make it more flexible by once a day milking or automatic milking system (Rémond and Pomiès, 2007; Bijl, 2007) or to reduce the number of rations offered (Ferris *et al.*, 2006). Others are designed to free time during a particular period of the year to allow for leisure pursuits or other farm tasks. These can involve seasonal once-a-day-milking or the use of wage labour (Errington, 1996; Ligero-Toro *et al.*, 1990). Still other adaptations are intended to introduce a modification of the weekly work schedule to bring it in line with those of other occupations, e.g. where Sunday is a day off. Dairy farmers may then skip the Sunday afternoon milking. Several studies (Moreau *et al.*, 2004; Rubin *et al.*, 2006; Cournut and Dedieu, 2005) have shown that these adaptations are not entirely independent of each other. In addition, they do not have the same implications for the organisation of the dairy farm. Lastly, the adaptation options need to take into account the nature of the workforce that organises and performs the farm work, and how they perceive their work (Dufour *et al.*, 2007).

This study is thus based on the hypothesis that the composition of the permanent workforce that organises and performs the farm work (the organising core) affects how work-related problems are expressed and what approaches are taken to adapt the organisation of dairy farms. To test this hypothesis, dairy farms in Ségala were surveyed. Ségala is in the south of the French Massif Central, spread over the Aveyron, Cantal and Lot departments. The area is dominated by agriculture: farming employs one quarter of the active population against 2.7% of the overall French population of working age. It is also characterised by a very high density of dairy farming. The future of the family dairy farms is a vital socio-economic concern in this region. The survey aimed (i) to obtain fuller knowledge of the diversity of workforce groups in dairy farming and of the adaptations made to organise the workforce and (ii) to determine how the workforce, structures and farms management were evolving.

Materials and methods

A dual survey approach

Data was collected in cooperation with the Livestock Institute and Milk Recording Service of the three departments by means of two series of surveys carried out in 2006 among Ségala dairy farmers subject to official milk recording.

A general survey of 458 dairy farms aimed to obtain an inventory that was as complete as possible of the composition of the workforce and the adaptations implemented to reduce labour or organise it differently. The survey was conducted by milk recorders and was based on four themes: (i) the farm, its legal status, its buildings and its surface area, (ii) the importance of work-related considerations as a concern for the farmers, (iii) the composition of the workforce, and (iv) the adaptations implemented. This information was extended by data from milk recording organisations on the dimension of the farm and on herd management. The sample consisted of 458 farms out of the 1600 farms subject to official milk recording. In order to describe the workforce, we assumed that the workers were not equivalent as regards to their function in the workforce, their time contributions (Allaire, 1988) and the way there are remunerated for their work. We used the concept of organising core (Madelrieux and Dedieu, 2006) which makes the distinction between the permanent workers who carry out and organise the farm work (the organising core: lone farmer, farming couple, associates) and the non-organising-core workers (unpaid volunteer labour, mutual aid, contractors and wage labour). The organising core was described in terms of size (number of persons), the relations among the persons (family or non-family) and the duration of their involvement (permanent or not). The non-organising-core was described in terms of presence of unpaid volunteer labour, and recourse to various forms of contracting, mutual aid and wage labour. To obtain informations about adaptations, we used an inventory of adaptations which came from the different studies carried by the Livestock Institute (Moreau *et al.*, 2004; Livestock Institute, 2007).

A detailed survey of 30 dairy farms was designed to explore the links between workforce group, structure and farm management and adaptations implemented. The legal status provided a means to specify workforce type. We chose farms to target three major types of adaptation: modification of the workforce, modification of the herd management, and grouping of farms outside a family-based structure. To this end a sample of 30 farms distributed evenly over the three departments was made up to cover as well as possible all the different combinations of these adaptations. Associations were well represented, as we wished to study associate farm structures. The questionnaire addressed: (i)

the history of the farm, (ii) the farmers' appraisal of their system and how they saw the future, (iii) its technical management in relation to the work organisation. To describe the technical management we used variables suggested by Cournut and Dedieu (2005).

Statistical analysis to link workforce, structures and adaptations

To process the data on workforce, farm structure and work-related adaptations, we used several bi- and multivariate statistical analysis methods. On the basis of the sample of 30 dairy farms, to identify links between farm workforce, structure, management and the adaptations adopted, we used a graphical method that amplifies visual cognition, described by Bertin (1977) and Card *et al.* (1999). We set up a matrix table with the 30 observed units in rows, the different variables in columns, and the modalities in the cells. We grouped the dairy farms with similar modalities (Girard *et al.*, 2001). We thus identified the organisation profiles that correspond to associations between structures and farm management and work-related adaptations.

Results

First we present descriptive data on the sample of 458 farms. From this sample we then describe the diversity of workforce groups and adaptations made to modify work patterns. We then examine the results of relationship between farm workforce, structure and management on the basis of the sample of 30 farms.

Quantitative data on the 458 dairy farms

The dairy farms occupied an average position among the dairy farms in the Ségala region, with a quota of 224,037 litres/year, 37 dairy cows and 56.6 ha of utilised agricultural area (UAA) (Table 1). The UAA was mostly used for the dairy herd. The farms relied on a forage system that had remained mixed: 17% of the main forage area (MFA) was used for maize silage. Permanent pasture took up 16% of the MFA. 37% of the farms were specialised in dairy livestock. Structures and management were fairly similar in the three departments.

Table 1. Structure and legal status of dairy farms in Ségala

	Structure							Legal status (%)		
	% specialised livestock	Dairy cows	UAA (ha)	MFA (ha)	Permanent pasture (ha)	Quota (L/year)	% maize in MFA	Individual	Association of farms	Company
458 farms	37	35	56.60	48	16	224.037	17%	45.6	30.8	22.6
1600 farms subject to milk recording	45	36	60	49.7	/	217.081	19%	47.5	33.2	18.2

Workforce group

The legal status of the farm was used as a classifier to help define the organising core. It enables us to place our sample in the population of Ségala farmers subject to milk recording. Thus the 458 survey farms were distributed fairly evenly among the three main legal status categories (Table 1).

We defined four types of organising core in the 458 farms. The individual farm was composed of a farmer set up and operating alone (182 farms). Couples (61 farms) with both members working on the farm. The wife was not always officially considered as a farmer but worked at least the equivalent of half-time. Family associations (199 farms) were run jointly by several members of the family: father and son or siblings. Non-family associations were groups of farms or farmers outside the family, in which associates were not all part of the same family (13 farms).

The results show that the man-and-wife farming model, underpinned by the agricultural development from 1960, is no longer the sole reference: these farms represent less than 15% of the dairy sample in Ségala, and confirm the observations made in other regions (Béguin *et al.*, 2007). Company forms have developed and lone farmers have fallen in number. However, farms are still being run by a family workforce. Groupings of non-family associates are still a very small minority (only 3% of our sample) although they have been growing in recent years (Rattin, 2007).

In 90% of the farms the members of the organising core have a permanent pattern of involvement, i.e., they work on the farm all year round. In the couples, 25% of the persons were non-permanent: the husband or wife had an activity off the farm and did agricultural work regularly or occasionally. These results confirm the development of off-farm working among farmer's wives (Agreste GraphAgri, 2003). Voluntary unpaid labour, most provided by family members (retired relatives and children) remains essential, forming most (68%) of the labour outside the organising core. Some 40% of farms had recourse to such labour. This finding thus underlines the fragility of many farms, where the work organisation relies heavily on this voluntary labour, which can disappear unexpectedly, without alternative solution. The increasing employment of wage labour and contracting are clear-cut trends in the evolution of farm workforce patterns already reported in several studies (Agreste GraphAgri, 2003). One third of the farms had recourse to wage labour. Permanent salaried were still rare (3% of the farms). Wage earners are more often hired jointly by farmers in groupings, in machinery pools or for interim replacements (Harff and Lamarche, 1998). Lone farmers and couples make more use of wage labour than associations (Rattin, 2007).

Work-related adaptations

A broad diversity of work-related adaptations

The work-related adaptations made by dairy farmers are very wide-ranging. Forty-six different adaptations were identified, which we classified into three groups according to whether they concerned the workforce, herd and field management or buildings and equipment (Table 2). Workforce adaptations predominated, with 95% of the farms in the sample implementing one or more such adaptations. The most widespread were unpaid workforce with equipment as mutual aid (82%), and contracting (paid workforce with equipments: 75%). Improvement of equipment and buildings was also a widely adopted adaptation with 83% of the farmers taking this option. Some 30% of the farmers invested in equipment to feed the herd (automatic concentrate dispensers, automatic milk powder dispensers, etc.), and 48% purchased shed cleaning equipment. Adaptations involving herd and field management were widespread with 86% of the survey farms opting for one or more such adaptations. The most common concerned herd feeding (67%) (e.g. dispensing a complete feed, not dispensing feed for some time of the year or adopting free feeding). A large number of farmers reported adapting their system using grazing (54%), increasing the proportion of grazing or lowering that of maize in the surface. Innovative practices are becoming more common: once a day milking, skipping a weekly milking or closing down the milking parlour for some weeks were reported by 21% of the farmers in the survey. These practices, which challenge earlier production models, are increasingly discussed in both the agricultural professional world and the agronomic research (Pomies *et al.*, 2008).

Table 2. Work-related adaptations in 458 dairy farms

Adaptations		Number of farms	%
Workforce	Unpaid workforce with equipment	377	82
	Paid workforce with equipment	342	75
	Paid workforce without equipment	140	31
Herd and field management	Milking	95	21
	Feeding (dispensing)	305	67
	Grazing	246	54
	Simpler crop practices	159	35
	Delocalisation (heifers or forage)	60	13
Equipment and buildings	Cleaning equipment	221	48
	Feeding equipment	138	30
	Replanning and construction of buildings	172	38
	Pooled machinery	211	46

Different options for different requirements

The farmers used several adaptations, with on average 11 per farm. The adaptations were not designed to meet the same requirements of dairy farmers. The main requirements expressed concerned the reduction of daily work time (93%), reduction of intense work periods (91%), and easier work (74%). To reduce daily work time dairy farmers have emphasised simpler technical management and improved equipment and buildings. Modification of work patterns, through reduction of intense periods, evenings off or holidays, was achieved through adaptations involving technical management

and workforce organisation. Making work easier was achieved through mechanisation of certain heavy tasks.

Cross data in the detailed survey

We briefly present our sample of 30 dairy farms. We then describe the four adaptation profiles identified and their links with the types of organising cores.

Characteristics of the sample of 30 dairy farms

The farms in the sample were larger than the average of 458 dairy farms: they had an average milk-quota of 278,818 litres per year, 45 dairy cows and 65 ha of UAA. The farms were also relatively intensive, with 19% of the MFA taken up by maize for silage. 17 farms had productions additional to dairy production (suckler cows, pigs, etc.), which was consistent with regional data. The sample of 30 farms did not have the same distribution in terms of legal status as the overall population (Table 3). Individual farmers ran smaller farms than the other types of organising cores (Table 3). The adaptations made by the 30 farmers in our sample were classified less finely than in the preceding survey, but even so were highly diversified. They involved all three main ways of adaptation (Table 4).

Table 3. Structure and organising cores in 30 dairy farms

	Individual	Couples	Family associations	Non-family associations
Number	12 (40%)	5 (7%)	7 (23%)	6 (20%)
UAA (ha)	40	56	68	122
Variation	22-63	31-73	40-103	52-151
Dairy cows	30	40	68	74
Variation	22-42	20-57	40-103	38-153
Quota (L/year)	174.515	235.212	305.851	445.375
Variation in 1000 L	130-320	137-396	217-459	262-1042
% maize in MFA	18	21	17	24
Variation	3-32	6-36	0-30	9-41

Table 4. Adaptations in the sample of 30 farms

Adaptations		Number of farms
Workforce	Wage labour	13
	Mutual aid	24
	Machinery pool with wage labour	9
	Farmwork contractor	24
Technical management	13 milkings per week	2
	All-year once a day milking	3
	Seasonal once a day milking	8
	Close-down of milking parlour	3
	Grouped calving	14
	Spread calving	4
	Complete feed	10
	Free feeding	4
	Spanish feed	1
	Milk yoghurt for calves	3
	Calf raised by the cow	1
Equipment, buildings	Farm buildings layout	8
	Automatic concentrate dispenser	8
	Machinery pool with equipment	9

The four profiles identified

Four profiles combining certain adaptations were identified:

1. Grouped calving, simplified milking, high proportion of grazing in food supply.
2. Spread calving, wage labour, automatic concentrate dispenser.
3. Adapted equipment, buildings and facilities, grouped calving and complete feed.
4. Adapted workforce, combining wage labour, mutual aid and contracting.

1. Grouped calving and simplified milking: GRP

These 10 farms featured an organisation of herd and field management marked by the grouping of calving during the year and matching the herd size with forage availability. This organisation corresponds to a clear desire to reduce costs. A low amount of maize was used in the feed (0-15% of MFA) compared with common practice in Ségala. The forage area is composed of temporary and permanent pastures. Food resources were grazing alone for a large part of the year with provision of concentrates all over the year (500-1000 kg/cow/year). Owing to once a day milking, the productivity of the cows was low for the region (4,000-6,000 kg milk/cow/year). Dairy farming was the only agricultural activity practiced and was representative of the farm structures in Ségala (40-60 ha, 30-40 dairy cows, 150,000-250,000 litres of milk), with low stocking rates of 0.9-1.2 head/hectare. These farms opted for adaptations in which the technical management of the dairy herd was modified. Calving was grouped over a few months in early autumn. This practice allowed once a day milking at the end of lactation, i.e. in late spring when the forage availability is low. Three farmers practiced once a day milking throughout the lactation. Two others stopped milking for a few weeks. For labour, the farm relied on family members with unpaid voluntary labour supplied by relatives. Labour was pooled with neighbours for silage campaigns. These farmers held a positive view of their systems and wished to continue adapting them to improve their work conditions.

2. Spread calving and wage labour: SPR

These five farms featured an opposite type of organisation to the preceding one: calving spread over the year and dairy production were emphasised. The proportion of maize in the MFA was higher (25-30%), as was the quantity of concentrates (1,500-2,000 kg/cow/year). The ration was given individually by means of an automated concentrate dispenser, thereby making it possible to adapt feeding to each animal individually without wasting time. Milk production per cow reached 7000-8000 kg of milk per lactation. The farms were somewhat larger (250,000-300,000 litres of milk produced) than those with the GRP profile, but above all had higher stocking rates (1.5-1.9 head/ha). Dairy farming was associated with other livestock (intensive indoor production or suckler cows). One important feature of these farms was the use of wage labour to make up for a lack of permanent voluntary labour. Like in the GRP profile, these farms were based on a family workforce but they were evolving differently. They were in their start-up phase rather than in a process of handing-over the farm to the next generation. These farmers also held a positive view of their systems and wished to go on improving their work conditions.

3. Buildings and equipment, grouped calving and complete feed: EQP

These eight farms displayed a further adaptation strategy. The farmers made two types of adaptation: (i) they restructured their farm buildings and (or) made use of better-performing farm machinery, (ii) they grouped calving over a few months and dispensed complete feed rations. These farms mostly resulted from the grouping of several farms and were therefore the largest in the sample (more than 300,000 litres of milk produced). The herd management made it possible to simplify batches management and feeding while maintaining high milk production (7,000-8,000 kg/cow/year). Dairy production was the sole activity or was combined with suckling cows. The workforce was composed of several permanent workers, and was not purely family-based. The unpaid labour of relatives was mobilised, and mutual aid and contracting out of seasonal work were used. This workforce was characterised by two main features: off-farm working by spouses and the non-farming background of one of their founding members. The farmers held a very positive view of their systems, which they described as being in a stabilisation phase.

4. Workforce adjustment : WKF

The last profile comprised seven farms in our sample, and was characterised by adaptations involving only the workforce, but combining several such adaptations: wage labour, mutual aid and contracting out of seasonal work. Herd and field management were consistent with the dairy system in Ségala: calving most often grouped in autumn, MFA with 15-20% of maize, with stall housing or deep litter housing. The dairy activity was associated with an intensive indoor production or suckling cows. These farms also featured unpaid workforce by the spouse. These farmers did not have a strongly positive view of their system.

Links between adaptation profiles and types of organising core

The different profiles identified are of course not independent of the type of organising core. The EQP profile corresponded mainly to farms run by non-family associations (6 out of 8). In these farms the

link between the evolution of the workforce and the adaptation of the system was sometimes obvious: the setting up of the group had made it possible to share investments for the construction of more functional buildings. However, the choices made in parallel (grouped calving and use of complete feed) reveal a desire to improve the operability and the productivity of the farm. For other farmers, this evolution may be impossible (e.g. financially) or not wanted, because the farmers are not seeking labour productivity (Rault, 2005). The workforce may then emphasise seeking a way to share the work as a couple or family rather than efficiency. We note the absence of couples in the profiles where there was an obvious desire to be productive (*SPR* and *EQP*). Individual farmers were represented in all the profiles, attesting a broad diversity of situations already reported in earlier work (Dufour, 2007). Family groupings were in an intermediate position, being found in all the profiles except for *EQP*.

Discussion

Evolution of the workforce and the development of work-related adaptations

The results obtained from the representative sample show trends in the evolution of the workforce in dairy farming. The model based on a man-and-wife workforce is no longer the sole reference. The workforce is still mostly family-based, but alternative forms are being developed. Wives may work off-farm, changing the way the farm work is organised and the labour requirements of the household. The question of the future of the individual or man-and-wife farms arises because the farmers in these cases are older, while associations can rely on a larger proportion of young workers. Unpaid family labour is still used. To make up for a shortage of family labour, farmers use wage labour or contract out. In terms of adaptation, the survey of 458 farmers shows (i) the diversity of work-related adaptations to modify work organisation, and (ii) that the farmers use multiple adaptations. Adaptations involving the workforce are the most widespread: mutual aid and contracting are found in almost all the farms, wage labour being commoner for individual or man-and-wife farms. Adaptations involving technical management are becoming more frequent, including adaptations that challenge current technical productivity models, such as seasonal or all-year once a day milking. Improved equipment and buildings is an important mean of adapting farms and most often concern farms run by associations. Farmers mobilise different types of adaptation according to their requirements: wage labour to deal with intense work periods, equipment to reduce daily work time, grouped calving and closing down of the milking parlour to take holidays.

Work-related adaptation of dairy farming: different profiles for different organising cores

The sample of 30 farms differed from that of the 458 farms in that it was chosen to cover a diversity of associations between workforce, adaptations and farm management. However, certain trends observed with the representative sample were found in the smaller sample. Adaptations related to equipment and buildings were appreciably more frequent in associations, while the use of wage labour was more frequent in individual and man-and-wife farms. The four adaptation profiles identified show that there are different ways in which a system can be adapted to address work-related issues, through the implementation of specific combinations of adaptations. An analysis of these profiles shows the importance of the organising core in specifying the work-related issues. In associations, in particular non-family, the question of free week-ends or holidays is not a major concern, because the functioning and size of the workforce allows turn-taking among farmers (Seegers *et al.*, 2006). These farms are more concerned about work efficiency, and so invest in the operability of their buildings and in farming equipment in order to work faster. Individual and man-and-wife farms do not have these possibilities and often declare other priorities: daily free time to spend with their families, week-ends off, holidays, or being able to do everything themselves. They use combinations of adaptations to modify their work patterns.

Work-related adaptation of dairy farming: different profiles for different expectations of income and work conditions

The analysis of the profiles thus shows the importance of the ways in which work-related requirements and balance between income and quality-of-life expectations are expressed. This sample shows two opposite ways: (i) grouped calving, with adjustment of dairy herd requirements to available herbage

resources, and (ii) spread calving plus wage labour. In the first case, cost reduction is sought. Control of the organisation is achieved by control of the herd's reproduction. This involves periods of the year with intense, important work (insemination, calving, milking, etc.). In the second case the farmers want to avoid intense work periods, and control the organisation by making it less sensitive to different variables such as weather, availability of unpaid labour, market. Production is sought, and the farm is diversified. Another adaptation way was found in earlier work (Cournut and Dedieu, 2005), consisting in grouping calvings to close down the milking parlour in summer and achieve the lactation peak of cows with maize-based rations. This profile is similar to that identified in this work: *GRP* in our sample, except that the desire to produce overrides the best use of forage resources.

The adaptation options taken are not independent of how the farms and workforce are evolving

Lastly the analysis of profiles shows the role played by the dynamics of the farms, the history of the workforce and of the individuals that compose it. The adaptations are different according to the phase in which the farm is evolving (installation, stability or transmission), and this is of course linked with the work force composition. In the case of start-up after a transmission phase, the farmer can often be helped by family relatives, while he must organise his system in order to be able to work alone in the case of non-family settlement. In the case of farm associations, the large proportion of workers with a wage-earning or non-agricultural activity prior to farming shows that the ways chosen also differ according to the workers' backgrounds. For farms with the *WKF* profile the few adaptations made suggests they have a weak adaptability. The system seems to be consistent with the traditional Ségala system: calving in the autumn, 20% maize in the MFA and the presence of another livestock activity. The adaptations implemented concern the workforce, with shared wage labour, mutual aid and contracting. There are no changes in technical management or work distribution, and the unpaid labour of the spouse remains important in these farms.

The necessary contribution of the social sciences

All our results confirm that the workforce on dairy farms is not evolving independently of the farm's structure and management. They also show the utility of taking into account socio-cultural dimensions in understanding these joint trends. This finding is supported by recent studies showing the strong links between the nature of the dialogue networks of dairy farmers, how they see their activity and the work organisation (Dufour *et al.*, 2007). The social sciences are thus very helpful to understand the interrelated trends in the workforce, farm structure and management.

Conclusion

Solving work-related problems in dairy farming is crucial for the future of the dairy industry. Work expectations expressed in terms of quality of life or improvement of work productivity influence how these dairy farms evolve. Maintaining activity involves different considerations according to the nature of the workforce: working alone, with a spouse, with several family members, or with outside associates. The ways of solving work-related problems, by adopting adaptations to modify work time, patterns or intensity, differ according to the workforce. Devising adaptations to meet farmers' requirements must also include introducing new techniques and designing new farming systems from complex combinations of adaptations. Hence the search for adaptations has to take a different approach for each case, taking into account the features specific to each farm (workforce, structure, dynamics, etc.), together with the objectives, expectations and work representations of the farmers.

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