

**Qualification and assessment of work organization in livestock farms:  
the French experience**

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**Abstract**

Farmers have to cope both with society and market pressures in their working practices and with the enlargement of farms, off-farm opportunities and profound changes in workforce, and expectations in terms of working duration and rhythms. Working conditions and the efficiency of work organization are critical issues nowadays.

The bibliography shows that work organization is mainly discussed by social sciences (notably ergonomics and sociology), but that livestock sciences have a significant contribution to the debate. Indeed, technical changes modify working calendars, priorities between tasks and interchangeability among workers; technical adaptations are levers to solve problems of organization with equipment, buildings and the workforce.

We present here French approaches to work organization that take into account livestock management and its implications in work organization. The Work Assessment method represents the work organization and evaluates work durations and time flexibility for farmers. The Atelage model describes and qualifies the work organization with its various regulations and time scales, integrating the other activities - economic or private - that farmers can carry on. Three principles underpin them: all workers are not interchangeable; tasks have different temporal characteristics (rhythms, postponement...); the year is a succession of work periods that differ in their daily form of organization.

We illustrate with concrete examples how these approaches contribute to helping and guiding farmers in their thoughts about change.

**Introduction: agricultural evolutions and farmers' work problems**

Farmers' working conditions have radically changed as a result of structural, economic and sociological developments. The volume of farmers' work grows steadily: farms are becoming bigger whilst the number of agricultural workers is decreasing (Tchakérian, 2000), and among farmers' adjustment strategies, we find participation in off-farm work or agricultural diversification (Lobley and Potter, 2004; Johnsen, 2004; Ondersteijn *et al.*, 2006). These changes are reinforced by the decline of work contribution by family members and the development, in France notably, of collective forms of farming (GAEC – Joint Farming Arrangement-) and work (CUMA – farm machinery cooperatives, replacement services, work banks, equipment exchange circles and employer groups - Harff and Lamarche, 1998). The perceptions of work are also changing: farmers are paying more attention to working regular hours, being free on Sundays and having holidays... This is the end of "peasant toil" (Barthez, 1996), when the livestock farmer did not count the hours, when there was no distinction between life at work and private life. Livestock farmers wish to have as much free time as others. In French family dairy farms, the lack of breaks is the first complaint of farmers (Seegers *et al.*, 2004) and explains the increasing interest throughout the country in labour replacement services, employers' groups, milking robots or once a day milking techniques.

Society, research and development institutions pay less attention to these structural and sociological transformations in the farms than to the evolution of production models towards multifunctional and sustainable agriculture (Kristensen and Halberg, 1997; Landais, 1999;

Hermansen *et al.*, 2006). European Aid Systems, contractual forms of production (Land Use Contracts, Official Quality Signs...) encourage the creation and implementation of new herd management patterns preserving the environment and ensuring quality of products and regular deliveries. It is nonetheless the farmers' responsibility to adapt the organization of both their technical activity and their work, at the scale of the working year and that of the long-term evolution of the farm management pattern.

Thus the goal of the paper is to demonstrate that livestock sciences have their place in the debates and reflections on work analysis in farms since i) the current agricultural evolution questions the work organization of farmers; ii) work analysis is mainly dealt with by social sciences but technical management is left in the dark. Or livestock management and productive events constitute one of the two parts of the work organization problem: the work to be done, which cannot be considered as uniform or stable (management adaptations are levers to solve work problems). The other part is the manpower that does the work (the workforce composition and the distribution of tasks).

Then, after placing them in the research evolution on that subject, we will present two current French models of work organization that take into account livestock management and its relations to work: the Work Assessment and Atelage. We will illustrate with concrete examples how these approaches contribute to supporting farmers in their thoughts about change.

## **1-Livestock farming system in the research field on agricultural work analysis**

Social sciences are of course the main disciplines developing studies and theories on work and its organization. But we will see that livestock sciences have their place in the debate on agricultural work analysis. We pick up here a short review of the French literature proposed by Dedieu and Serviere (2001).

### **1.1- Contributions from the social sciences to the study of agricultural work**

We are not offering here an exhaustive view, nor cross-references to theories specific to each discipline, but rather illustrations of approaches that we think are worthy of consideration and how they take into account livestock management and work organization.

In the rural **economy**, the term work firstly refers to a factor of production, characterised by two types of criteria: the number of workers or the actual number of hours worked. The first type is based on the definition of « full time equivalent worker» units (Annual Work Unit, Human Work Unit, Labour Force Unit...) used routinely in technical and economic farm analyses. The evaluation of the second requires specific methods such as time budgets, work budgets or analytical reconstruction (Lacroix and Mollard, 1991). These criteria deal with the remuneration of family farm work, and factors which explain farm income (Veysset *et al.*, 1999; Benoit *et al.*, 1999) or the growing gap between the farming world and the salaried world in the number of hours worked (Jean *et al.*, 1988). But these criteria and the way they are used do not explicitly take account of forms of work organization (Greenan, 1994), even though the industrial world recognizes that production organization (Taylorism, Toyotism...) is an essential factor of company competitiveness.

Finally, the work organization is not in itself a research subject. In economy, the term « work » immediately refers to a production factor, a count of the workers or the worked hours to take account of productive choice.

For **management sciences**, the analysis of production organization in its technical, economic, work and relational dimensions is essential for the evaluation of the system. Two

major viewpoints are centred on the organization of work in the industrial and services world (Lorino, 1995):

- the oldest aims, for a specific production system and a given technology, at correctly allocating the work resource, either to maximize the activity under constraints of resources (yield logic) or to minimize the activity for a given production (rationalisation logic). Criteria are profitability and efficiency in work;
- the most recent considers apprenticeships and skills mobilized in the production activity and more widely in the construction of « chains of values ». Criteria are sustainability and flexibility in work.

At farm level, we find illustrations of the first type by the simulation of the allocation of resources in labour and equipment at peak periods in arable crop cultivation. This is the foundation for the approach to work developed jointly by managers and agronomists (Attonaty *et al.*, 1987). The activity is analysed in a logic of dividing the production process up into operating modes: operational sequences and tasks to be carried out (Lorino, 1992).

We also find illustration of the second type through the need for labour on farms, more specifically for labour flexibility (Errington and Gasson, 1996) due to seasonal fluctuations in the demand for labour and the increasingly expressed expectations for breaks in the year. The authors mean that employers are increasingly looking for a workforce able to respond quickly, easily and cheaply to changes in product or process, which could expand or contract in response to market requirements and could match the needs of the job exactly through a range of working time options (use of subcontractors, hired workers -seasonal, regular or casual-...).

Rural **sociology** is interested in the transformations of relations within work groups and of worker conditions and status (notably for women – Brandth 2002) in relation with the task division on farms, the evolution of the composition of the work group (from family labour to hired manpower or associations...),

Characterizing these relations confronts the *values* borne by individuals with the *functions* they are required to fill within the work group. The values refer to conceptions of work (distinct or not from private life -Barthez, 1996-, focussed on labour efficiency, or quality of life or the whole family employment -Rault, 2005-), and to the special nature of the relations between men and animals -Salmona, 1994-). In this way, Cariou and Rault (1998) identify four behavioural models for farmers employing workers (the head, the company director, the humanist manager and the boss). The function of a worker is defined as the office he must fulfil within an organization (Lesne and Montlibert, 1972). So hired workers can be considered by farmers as farm seconds-in-command, labourers or specialised technicians for example, according to their degree of autonomy, responsibility and skills (Cariou and Rault, *ibid*). Functions enable workforce organization to be described in which supervision and execution activities are distributed differently (Chabanet, 1997).

The subject of **ergonomics** is how people function at work, with work analysis as its method. The purpose of ergonomics is to improve working conditions. It favours intervention in concrete situations where actions are carried out by operators (Daniellou, 1997). The physical, cognitive and psychic dimensions of work and their consequences on health are analysed (Pezet and Guyot, 1994). “Cognitive” designates the use of mental processes in receiving and processing information, in arriving at a decision and in short and medium term memorization. “Psychic” designates all the negative spin-offs, all the pollutions that can accompany intellectual activities at work. They belong to the emotional sphere.

The theoretical foundations of work analysis are based on the distinction between: i) the task, which is the work to be done; ii) the activity, which is the work actually done. The non

correspondence between the two comes from the intervention of an operator or a work team, who with their own characteristics, will adapt the work to be carried out to the situation (Leplat, 1994).

In the agricultural domain, ergonomics favours the mobilization of the concepts of « chronicles of actions » and « courses of action »: respectively circumstances and sequences of actions by the farmer at the scale of a period (Jourdan, 1997), at the scale of a day (Filippi and Nicourt, 1988) or for particular workstations (milking). The periods can be defined by a crop growing cycle or by the over-wintering of animals indoors (Sagory and Boittin, 2000). Others speak of “system of activities” (Curie and Hajjar 1987), in other words, a set of activities, in relations submitted to regulations. Regulation is considered as the compensation for disturbances by the search for new balances. According to Cellier and Marquié (1980), the concept of regulation makes it possible to account for the variations in activities in relation with the evolution of the work situations. Benchekroun and Weill-Fassina (2000) differentiate regulations of an i) individual type: substituting one activity for another, postponing it, anticipating it, modifying the operating mode...; ii) inter-individual type: new distribution of tasks between individuals.

Finally, the different disciplines have different views on work organization and the link with production or livestock systems. For economy and sociology, work organization refers first of all to the organization of workers. The farming production system, simply described (often by the type of production) is a context or a variation factor either of the duration of work or of the perception farmers have of their profession. Management and ergonomics are more interested in the expression of a production system in terms of its control activities and a calendar of material tasks to be carried out, mobilizing equipment and people. Ergonomics is the only discipline to deal with technical management and its variations during the agricultural year but work analysis by ergonomics is very little developed in agriculture: « 60 % of research efforts by ergonomics are dedicated to a few hundred cosmonauts and aviators, 30 % to thousands of drivers of nuclear, chemical or other power station, 8 % to hundreds of millions of industrial workers of mass production and 2 % to 2 billions of farmers » (Wisner quoted by Thon, 1988).

## **1.2- Why do livestock farming system researches have their place in the debate on work analysis?**

Farmers are operating in a context that is moving from production-oriented to more demand-oriented (Ondersteijn *et al.*, 2006): social expectations in terms of environment or quality of products, which are expressed in technical specifications, contracts, and often require practices demanding in work. This goes against the trend of farmers adopting techniques that are less demanding in terms of work. The general question that is raised is the way farmers harmonise:

- their response to social and market chain expectations (changing production management, limiting intensification, changing the type of product, adapting technical practices...);
- their expectations in terms of quality of life;
- the evolution of their farm (workforce, dimension, combination of activities).

This raises the question of how to represent the technical management in the farms to make a work analysis possible, a question that requires investment by technical disciplines in research into work.

In this research of harmonisation, technical changes have two types of consequences on work questions and its organization:

- technical changes, linked to society or market chain, can modify working calendars, priorities between tasks. The adaptations of technical management to answer the demands

modify the work to do but also the competences required to carry out the work. Thus it changes the interchangeability between workers and the work distribution between workers, notably with women (Brandth, 2002).

- technical adaptations are amongst levers to solve problems of work with equipment, buildings and the workforce (Dedieu *et al.*, 1993). They are levers to work re-organization. Cournut and Dedieu (2005) interested in the simplification of milking rhythms and feeding techniques, showed that the implications of such adaptations are varied: i) reducing the daily duration of work with for example once-a-day-milking (Davis *et al.*, 1999, Remond and Pomies, 2005) or complete diet feeding system; ii) modifying the distribution of work throughout the year with, for example, the temporal closing of the milking parlor by concentrating calving; iii) breaking the routine by omitting one weekly milking.

For livestock researchers, linking technical management and work can be done in different ways:

- to express livestock management in a form that enables it to be analyzed with regard to work and particularly to work organization and rhythms;
- to analyse the impact of technical changes on production and work. These changes can be justified by work problems but can also be justified by new responses to society or market chain issues.

The evolution of livestock farming systems had been considered separately in the past: on the one hand the improvement of productivity and work conditions, on the other hand the improvement of production techniques. Moreover, they were considered as two distinct registers each treated by different disciplines (social sciences versus technical sciences). The current dynamics show that such a separation is no longer relevant. This questions the investment of livestock sciences in the research field on work. In the following we will present a short historical overview of the contribution of technical sciences to work analysis. This will enable us to situate two approaches that we will present as well and the way they renew work analysis framework with the aim of shedding light on situations and helping and supporting changes in livestock farms.

## **2- Work analysis in agriculture: contributions of technical sciences**

### **2.1- Short historical overview**

Work organization is not a new preoccupation in livestock and crop sciences. But the questions and the analysed dimensions have evolved in relation with the evolution of the socio-economic context. In a synthesis, Madelrieux (2004) distinguishes three major inflections since the end of the Second World War in France: to rationalize the work, to improve the efficiency of manpower and equipment use, to harmonize efficiency and livability. This gives birth to different methods, although mostly based on the gathering of information about work duration.

#### *The first phase: the rationalization*

After the end of the Second World War, modernization and improvement of work productivity are the order of the day. “[French] agriculture will be modern... or won’t be” (Dumont, 1946). We see the passage from agriculture as a way of life to agriculture as a professional goal (Barthez, 1996), where work become a production factor evaluated in money and time. The reference to enterprises and waged work, the research of the « good employment » of resources give birth in this period to a number of institutions including IOSTA (Institute for the Scientific Work Organization in Agriculture). The analysis deals

with the description of tasks, their linking up and their time-keeping. They favour the measurement of work duration seen as an addition of elementary time. These quantifications are used to spot the “time, material and energy waste”, to research the improvements that are to be “technically, economically and humanly feasible” (Piel-Desruisseaux, 1963), notably the good correspondence between the demand in work and the offer to decrease production costs (Reboul, 1960). These studies produce norms to reach. The consequences are to favour mechanization, the specialization of men and machines leading to an improvement of work productivity, but also leading to an increase in peak periods and not to the spreading of work originally sought (Sebillotte, 1986).

#### *The second phase: the efficiency of manpower and equipment in cropping systems*

The previous approaches rapidly show their limits. The organization cannot be scientific in the way it combines different logics. The goal of measuring durations leaves aside the question of the irregularity of work throughout a production cycle, the competition between tasks, the hazards, notably the climatic hazard, and their management by the farmers. Moreover the questions of manpower (who is carrying out the tasks) and the farmer as a decider on his farm are not treated. The resistance of farmers to the adoption of technical innovation and the great decrease in agricultural workforce that changes the context lead the research and development institutions to give attention to the functioning of farms.

Against the optimization models, the agronomists try to understand farmers’ decision rules, “the good reasons” they have to do what they do (Petit *et al.*, 1975; Osty, 1978). This curve takes place in the 1980s and 1990s. The agronomists try to understand the ordering rules of crop work gangs (constituted by the cropping operations to carry out, the required equipment and manpower, and progression speed), the priorities between operations and the management of climatic hazard (Attonaty *et al.*, 1987). They focus on peak periods that are strategic periods for the production (sowing and harvest). The aim is the efficiency of work in regard to the obtained technical performances (yield), notably to think of the use of equipment and the management of the climatic risk.

#### *The third phase: efficiency in work and livability*

The third inflection corresponds to a change both in the work analysis challenge and in the approaches. A new object is appearing: the quality of life in work, the control over one’s own work. The analysis context is that of big herds in the centre of France, with great volumes of activities. It is about reflections to solve work problems to improve the situations and make them livable (Dedieu and Servièrre, 2001). In livestock farming systems a different perspective is then emerging that adopts the idea that work conditions are part of the farmers’ project: the technical choices depend on the way farmers define their work and life expectations (jointly with economical expectations). The registers “efficiency” and “livability” are still present in the current debates (Dedieu and Servièrre, 2004), with an increasing weight of social views on the farmers’ way of producing and increasing expectations of free time and time-controlled work, especially in dairy farms. Thus livestock farmers ask research and development institutions to help them to re-organize their system to harmonize the evolution of their structure and combination of activities, their problem of work and their response to social expectations. The models of work elaborated by livestock researchers integrate this last phase. Historically they were conceived to introduce the work dimension in the analysis of livestock farming systems in response to questions from farmers on the durability of their systems (Dedieu *et al.*, 1993).

## 2.2-Work models developed by livestock researchers: principles

### Specificities of livestock farming

Livestock farming is a complex, collective activity combining different scales of time. Indeed, livestock farming consists in articulating animal and plant cycles, which have different periodicities. There is a diversity of tasks to be accomplished all over the year. The tasks are variable in their nature (animals, land, equipment, administrative tasks...) but also in their rhythm: some tasks have to be done every day such as milking or feeding animals, others are carried out once or several times a week, such as selling cheese on markets, others are seasonal such as making hay. Tasks are either imperative or able to be postponed to a later date. Some tasks are subject to conditions such as climatic conditions (Papy *et al.*, 1988); others, even of limited duration, require a specific workforce or numerous helpers such as in handling for health treatments. These tasks require different skills (e.g. according to Salmona -1994- the care of animals requires patience) which are specific and involve the non interchangeability of workers. They can be operated by individuals (daily care) or by groups of workers (silage).

The workforce, too, is variable during the year. Their rhythms of involvement vary according to the individual and the periods of the year and are not necessarily linked to the peak work periods. Finally, farming activity can be integrated into a combination of other economic activities which have consequences on the organization of the agricultural activity.

To take account of the interactions between the technical management and the work requires considering that:

- work is a set of tasks to do and of persons to carry them out;
- work combines different temporal coherences (daily, weekly, seasonal and annual rhythms).

Thus to represent a work organization from a technical point of view requires dealing with three dimensions: the expression of tasks (the work to do), the workers, the temporalities of work. Recent work models in livestock sciences (that we detail in the following) are based on these three foundations:

1) tasks are not equivalent. They must be distinguished according to their rhythms and their character of being deferred. If the daily tasks, that is to say which are repeated each day over a period, always appear in the bibliography on work in livestock farms as structuring the work organization (Dedieu and Serviere, 1999), it is their interaction with other tasks, whose temporal characteristics are diversified, that raises difficulties in the work organization (Cellier and Marquié, 1980; Valax, 1989).

The nature of the task does not in itself define its temporal characteristic, which is to be defined in each case according to the practices of the farmer. The first criterion separates the tasks that are repeated each day over a period from the ones that are not.

2) all the workers are not equivalent according to their function in the work group, their rhythm of involvement (Allaire, 1988) and the way there are remunerated for their work. Thus we distinguish:

- the workers whose agricultural activity is preponderant and who organize the work on the farm (the farmer, the farming couple, the associates of a farming association...). This group is named “base group” (“cellule de base”) (for whom the farming activity is preponderant in time and income) in the Work Assessment Method and “basic group” (“noyau organisateur”) in the ATELAGE model (where the function of organization is put forward, which enables situations of pluriactivity to be better taken into account). The work organization models take into account their expectations in terms of quality of life, rhythm, work efficiency, and the need to cope with the temporal imperatives linked to other activities.

- the workers outside of the basic group consist of volunteers (retired people and people giving a hand), salaried workers, mutual help and the intervention of sub-contracting companies and temporary workers.

All these workers have not the same availability. Some are i) permanent (the worker is present every day of the year, except for days off); ii) seasonal (the worker is present every day, except for days off, over a period of time); iii) regular (he is present with a certain frequency - defined or not-, but not daily). We note in particular weekly rhythms, such as the presence of children at weekends; iv) occasional (this concerns people with no regular rhythm: asked for help or lending a hand). And all these workers have not the same skills: some will be versatile when others will be specialised in a few tasks.

3) the work organization at the scale of the year results from the linking up of periods whose organizational characteristics are different (either it is due to the evolution of the tasks to do, the manpower or the combination of activities). These periods are intervals of time with stable daily activities. These periods are not defined a priori but they express specific modalities of interaction between technical imperatives, the workers' rhythms of involvement, the weight of non agricultural activities and expectations about work organization.

### **3- Presentation of two models elaborated in livestock research**

#### **3.1- The “Work Assessment” method**

- **Presentation of the model**

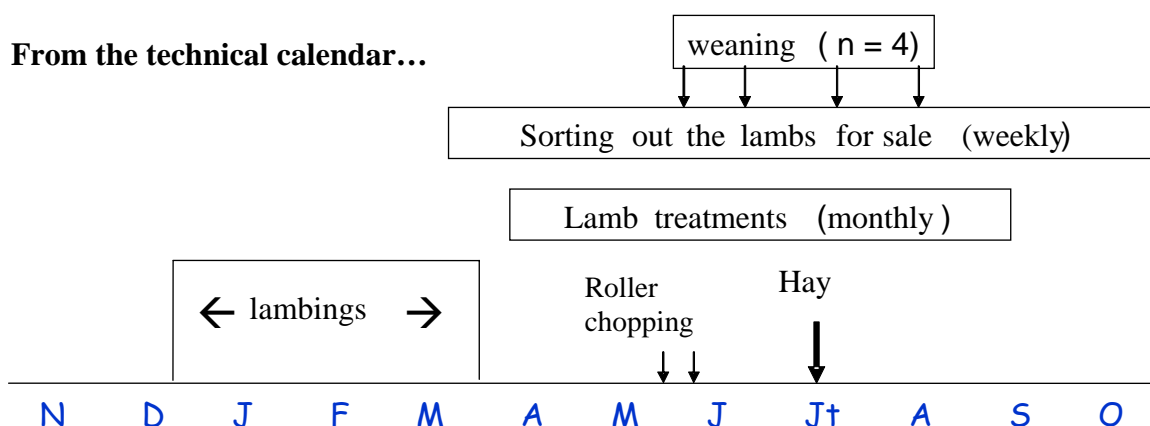
The Work Assessment (Bilan Travail) method proposed by livestock researchers (Dedieu *et al.*, 1993; 2000) aims at « integrating the work dimension into the analysis of how livestock farming systems operate ». The mean is to quantify the work linked to the management of the herds and areas and to evaluate the time remaining to the basic group for non-accounted activities (agricultural or not). The principle of the survey is inspired by analytical reconstitution (Lacroix and Mollard, 1991) of the agricultural year work during a semi-directive interview (Darré *et al.*, 1993).

Beyond the method of collecting information (by survey, and on working times), the categorization of tasks and labour is the foundation of the specific features of the approach to livestock farming work at year level (Dedieu *et al.*, 2000) (figure 1). So the daily *routine work load*, which cannot be deferred or concentrated, is clearly distinct from the *seasonal work* organized in the form of work gangs. This seasonal work can have quite variable degrees of deferability: weekly for animal handling operations, depending on when there are days available for work in the fields, or for longer periods in the case of land maintenance work. The categorization of labour identifies workers according to their degree of concernment and commitment to the farming activity, and on the nature of the compensation (money, gifts or days of work) for the work carried out by people external to the farm base group.

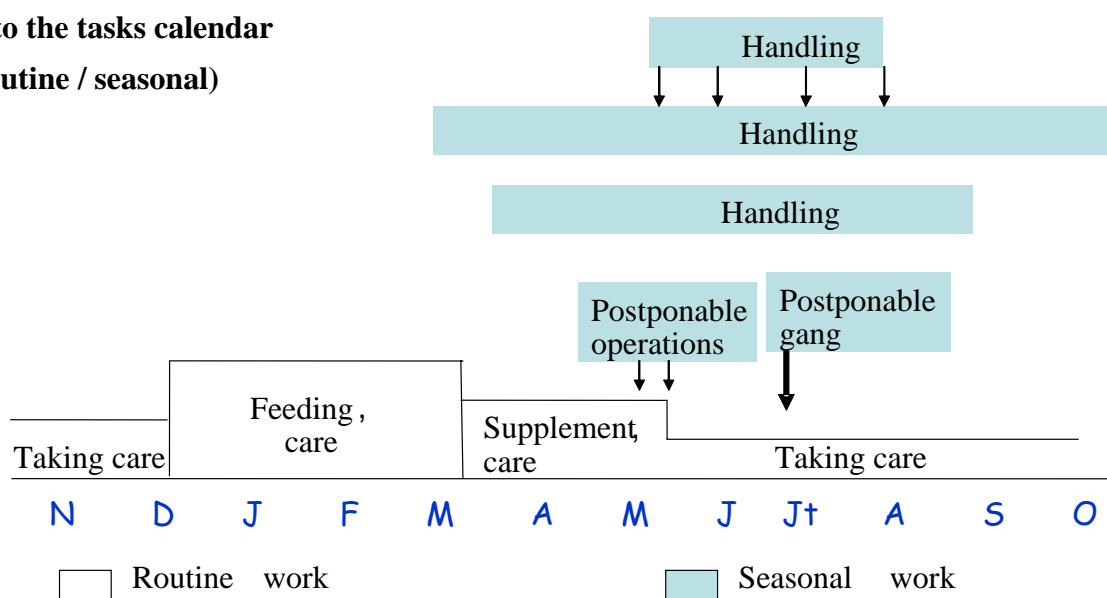
The “Work Assessment” survey lasts for two to three hours (only the time spent in herd and land management is quantified). The farmer divides up the year into periods during which the routine work load is of a constant duration. He can then specify the daily time taken for this work, usually by positioning his hours of work and those of the other workers in relation to



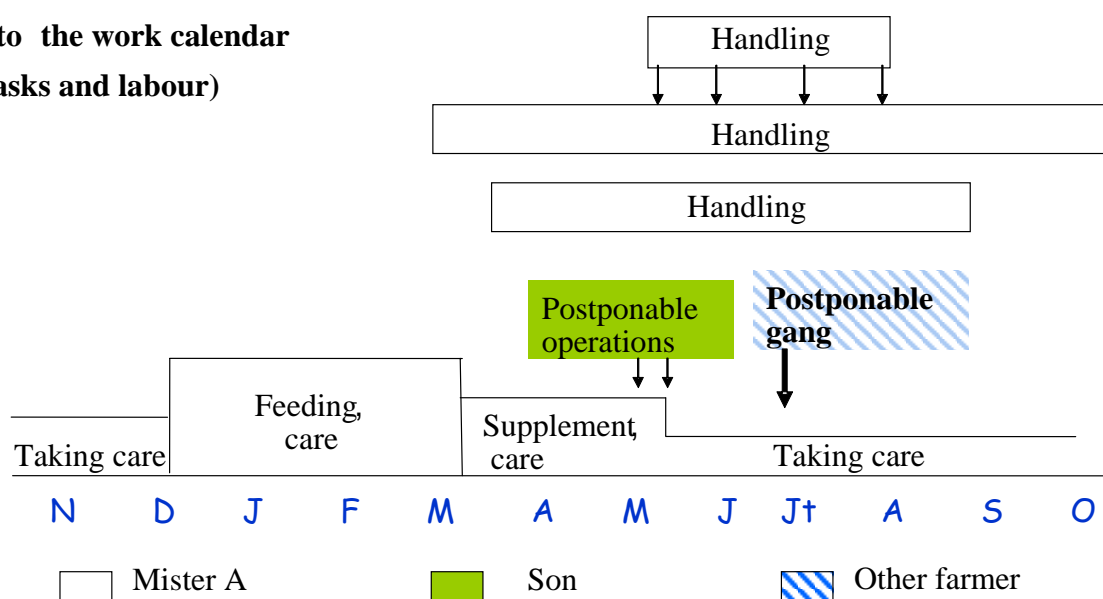
**Figure 1: the 3 steps from a technical calendar to a working organisation calendar combining tasks and workers (sheep farm of Mr A – see boxed text 1)**



**...to the tasks calendar  
(routine / seasonal)**



**... to the work calendar  
(tasks and labour)**



meal times. For seasonal work and work repaid, the time spent is quantified season after season by reconstituting in time the succession either of all the different tasks or of each type of work (herds, land, or work repaid).

At farm level, the data is analysed to characterize and quantify the routine and seasonal work load of the different contributors. At the base group level, the work organization is characterized in particular by a combined indicator: the “calculated time available”. This indicator corresponds to the time remaining to the base group for non-accounted activities (agricultural or not) after the routine work load, the seasonal work and the work repaid have been carried out. It varies from 0 to more than 1700 hours a year per person of the basic group. Recourse to outside labour is extremely variable: from 0 to 70 % of the seasonal working time and in different forms of mutual help or the employment of temporary or contracting workers (boxed text 1).

***Boxed text 1: the various forms of work organization - Illustration from two sheep farms in the region of Montmorillon (Vienne)***

The farms are two large sheep farms (140 ha, 800 ewes) both run by one farmer as the only permanent worker and both managed in an extensive way (less than 0.8 LU / ha). The routine work duration is less than 1600 hours for farmer A, instead of 2300 for B. The analysis shows that farmer A has a flock management that reduces the demand in work (one lambing season, outdoor wintering), whereas for B, management requires more work (two lambing seasons, indoor wintering) with old buildings. For the seasonal work, the lamb management of farmer A is very demanding in work (weekly sorting out of lambs), but roller chopping, hay press and grass sowing one year in three is delegated to other farmers or to the elder sons who are paid for the work. Farmer B is making more grass and crop sowing but has very efficient equipment. What is critical is his autonomy for the seasonal work: he works mainly alone.

Farmer	A	B	qualification
Routine work (hours/year)	1664	2312	A : demand for work -, no delegation B demand for work +, buildings -, family help
% Routine work done by the farmer	100 %	90 %	
Seasonal work (days/year)	110	98	A : flock demand for work + ; delegation of the land tasks B : machinery +, autonomy
% seasonal work made by the farmer	52	97	
Work repaid (days/year)	0	0	
Calculated time available (hours/year)	1058	528	

Farmer A has made radical choices in terms of work organization, by expressing the choice of one occupation and only one: being a shepherd. It is in the very close monitoring of animals that his expertise is expressed, with that of dog handler. The other tasks must not compete with this activity. Farmer B sees his job as being a shepherd associated with being a grower of grass (temporary meadows) and cereals (for consumption by his own animals). The recourse to manpower is reduced to large tasks when it is absolutely necessary (shearing, round bail silage and harvesting). At the end, farmer A's remaining calculated time is twice that of farmer B.

### **Uses of the model: a tool for farming development**

The “Work Assessment” method was designed to be easy for land technicians to adapt for their own use. Software for data capture and editing has been available since the autumn of 1998. More than 200 people had participated in training sessions designed for “Livestock Network” monitoring technicians and more than 2000 Work Assessments have been done on farms in France.

The results of “Work Assessment” surveys are principally discussed in the framework of farmer groups, both institutional (farmers’ unions, farming development groups, livestock networks, etc...) and occasional (training sessions for farmers).

This group reconstruction, particularly when anonymity is lifted, is generally very fruitful and rewarding. A situation of an individual expression of “work problems” emerges into a collective discussion that the “Work Assessment” formalizations help to structure. In some cases, these meetings result in visits on farms, to discuss each participant’s work organization in his own buildings. In others, discussions may focus more on the development of mutual help (for example, taking turns for week-ends), or a worker being hired jointly by more than one farmer, or the opportunity to change farm management choices.

These results are also contributing to the construction of sets of references by production system. They are now included in system modelling published in the form of ‘typical cases’. Finally, the group analyses and case illustrations are used in symposia and in farm or experimental station open days, designed to heighten the awareness of farmers and development agents (notably company consultants who intervene in the “40 hours” setting up courses).

All of these uses lead to concrete actions or interventions (“Work Organization” rallies, courses, interventions by machinery and equipment specialists, employer groups or farmer mutual aid societies ...).

### **3.2- ATELAGE: a model of work organization in livestock farms**

ATELAGE is the French acronym for « Activités de Travail en Exploitation d’éLevAGE » (work activities in livestock farms). This model is more recent (Madelrieux, 2004) and was conceived as a ramification of the work assessment method. The goals are to describe and qualify the work organization in a farm and to identify the reasons for such an organization. Starting from who does what, when and where, it is about identifying the forms of the interaction between production process, workforce and non-agricultural activities including breaks and holidays, and their evolution as a whole yearly production cycle proceeds. The work organization is seen as a system of activities (an “activity” corresponds to the association between a task with a temporal characteristic, a work team and a location) taking into account the different temporal scales at stake (daily, weekly, seasonal), and integrating the regulations linked to climatic hazard and the availability of workers. The quantification of the work is abandoned to the benefit of describing and qualifying work organization.

#### **• Presentation of the model**

The model consists in representing forms of organization at different temporal scales and their combination, namely:

##### **➤ *the forms of daily organization (FDO)***

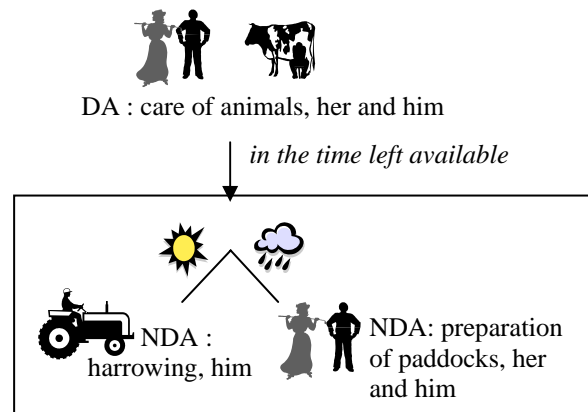
They represent “typical work days”, gathering particular daily combinations of activities that present the same daily activities -DA- and the same type of relation between daily and non daily activities -NDA-. If the daily activities change or if the relations between daily and non daily activities change (reversal in the orders of priority), we change the FDO. But if it is just the content of the non daily activities that changes from one day to another (due to the

climatic conditions for instance) without bringing the relations with the daily activities into question, then we consider that the form is the same (figure 2). It is only its implementation in concrete days of work that will vary.

**Figure 2: two daily combinations of activities for a same FDO**

In this example, there are two possible daily combinations of activities: when it is sunny (care of animals for both and harrowing for him) and when it is rainy (care of animals and preparation of paddocks for both).

In each case, the form of the daily activity is the same, and the non daily activities are subordinate to the daily activity. Thus, we represent these two combinations in a single form of daily organization.

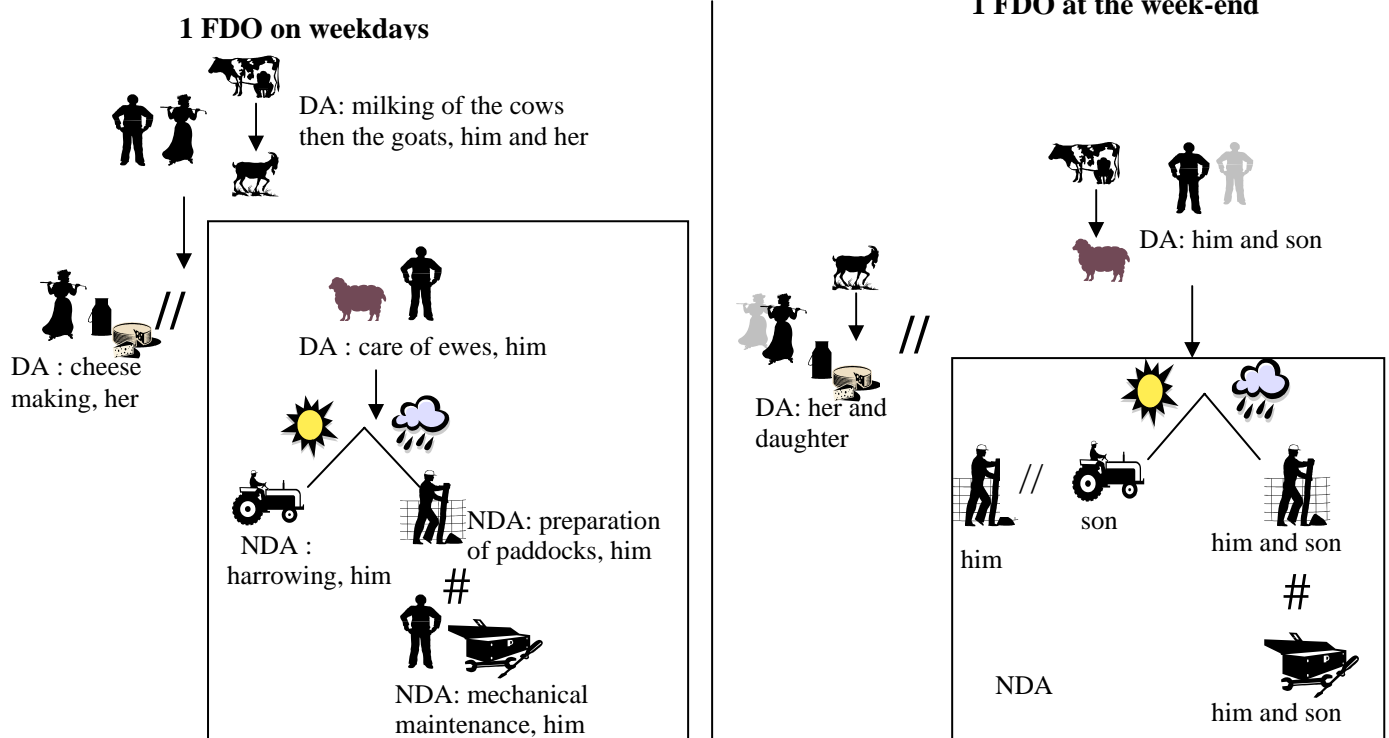


### ➤ the forms of organization of periods of time : organizational sequences

They define an interval of time with a single FDO or with several FDOs in alternation due to their complementary rhythms of activation. These rhythms can be:

- *each day of a period*: there is a single form for the whole period;
- *a regular rhythm, for example a weekly rhythm*. Daily activities can take different forms depending on the days of a week in relation to: i) the intervention of regular workers on daily activities (for example children coming back to the farm at the week-end and who take part in daily tasks: figure 3). Their presence brings about a redistribution of tasks and therefore a redefinition of daily activities; ii) the occurrence of non daily obligatory routine tasks (sale of cheese on market twice a week; work in a ski resort in winter 5 days per week...), modifying the daily activities.

**Figure 3: an example of alternation of two FDOs with a weekly rhythm at a same period due to the presence of children at week-ends**



- a non predefined rhythm or “day by day” activation. This case is linked with the implementation of particular tasks which results in modifying the form of daily activities and their arrangement, in our cases this is in relation to: i) the climatic hazard (a FDO when it is sunny can alternate with another FDO when it is rainy); ii) the occurrence of meetings that have not a defined and regular rhythm (days with or without meeting for a farmer who has a lot of professional responsibilities).

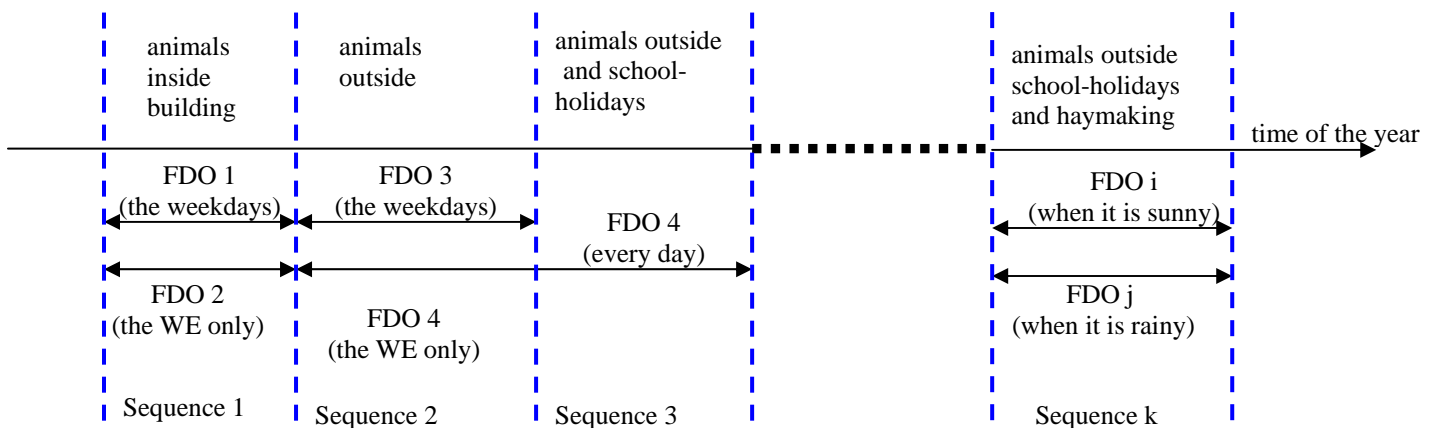
Thus, within a same interval of time of the year, several FDOs can alternate. The organizational sequences delimit all the intervals of time whose content in FDO and alternation between FDOs are different (figure 4).

#### ➤ *the form of organization of the year*

It corresponds to the linking up of the sequences. It shows the variability of the work organization over the year through both:

- the alternations between FDOs at each period;
- the evolution of the FDOs and their alternations from one period to another over the year.

**Figure 4: delimitation of the organizational sequences in a case where the work organization is sensitive to the presence of the children during school-leave (week-ends or holidays)**



#### **The qualification of work organization**

Just like description, the qualification of work organization can be done at the scale of a sequence or of the year.

The main themes for qualification at the scale of an organizational sequence are the regulations in the work organization (alternation of FDOs); the relations between agricultural and non agricultural activities; the labour division. The procedure to qualify work organization at the scale of the year is based: i) on the linking of the sequences throughout the year. What is expressed is, for each criterion of the sequences, the profile of evolution of its modalities through the year; ii) on specific criteria, focussed on the variability of forms of organization.

The boxed-texts 2 and 3 present two contrasted types of organization (and their links to explicative factors) corresponding to dairy farms in the same area in the Northern Alps (France), producing milk for Beaufort cheese. The farmers JCG and JFG use alpine pastures and have off-farm activities. Their systems of activities are nevertheless very different with

regard to the combinations of economic and private activities, the detail of the production process, the composition of the work group, the scattering of the field pattern.

***Boxed-text 2: the annual work organization in the case of JCG***

JCG is a farmer, producing milk all year round with 20 dairy cows in the Beaufort cheese area, he is alone and works also for the cooperative (he collects the milk every day on his sector : 1 to 2 hours every morning). He benefits from help, especially from his mother.

In the case of JCG, the agricultural year is not divided up very much with only 7 sequences. It is based on 3 patterns of organization. One pattern associates the milking of the cows in the cowshed with the help of his mother; another one when he does everything alone (in alpine pastures); and then a specific pattern when he is on holiday (one week at the end of the summer). The sequences are mostly due to the evolution of the production process, except for the holiday period. There is only one sequence with the alternation of two FDOs. It is linked to the climatic conditions at the haymaking period. The evening milking is then subordinated to the haymaking (inversion of priorities between daily and non daily activities according to haymaking).

JCG conceived his system to be autonomous; given the choice he made in other respects to collect the milk for the cooperative (non agricultural activity with fixed hours):

- 1) he sized his herd according to the buildings and the available workforce to avoid animals being wintered outside the farm and rear them as he wants;
- 2) if workforce is available to help him, he shares tasks, otherwise he works without help. He has anyway a limited network of help. Moreover it seems that JCG does not easily entrust tasks to others and prefers sharing when he benefits from help.

The structure of the farm composed of two sites (the village and the alpine pastures) plays on the intervention of the workforce since his mother is available only when the cows are milked in the cowshed. JCG finds himself alone during the alpine pasture period whereas it is the time with the highest workload.

Thus:

- the organization is quite stable and the regulations in work organization are mostly due to the evolution of the production process;
- the non agricultural activity (for the cooperative) subordinates the agricultural activities with which it is imbricated, all the year (except during his holidays);
- no tasks are delocated;
- no tasks are delegated except when he is on holiday;
- the farmer partially shares daily activities with his mother except during the alpine pasture period;
- he does not have recourse to workforce to achieve non-daily tasks on the farm. Other solutions are preferred: to postpone tasks from one period to another, especially tasks of fertilization and land maintenance from spring to fall.

***Boxed-text 3: the annual work organization in the case of JFG***

This farm is a GAEC (agricultural pooling for farming in common) with 2 associates: JFG and WF. They produce milk all year round with 45 dairy cows, in the Beaufort cheese area. They manage 3 sites: around the village, alpine pastures and a site 100 kilometres away. One of the associates works at a ski resort during winter. They have ten days' holiday each at the end of the summer and they take one weekend in two in October.

They benefit from the help of:

- WF's mother during summer in the mountain pastures;
- JFG's sister and brother-in-law who are living at the distant site.

Their buildings are too small so they entrust the care of heifers to a subcontractor during winter. Whereas in summer they board with them on the alpine pastures 10 dairy cows and 120 heifers and suckling cows.

In this farm, the organization is constantly renewed with 15 sequences, 7 of them with two alternating FDOs. We will not detail here the 16 “patterns” of organization. They oppose for example:

- a formula in winter where the two associates take charge of daily and non-daily activities and a subcontractor takes care of the heifers outside the farm;
- a formula in summer at the peak haymaking period where JFG milks in alpine pastures in the morning with WF’s mother and makes the regrowth hay at the distant site with his brother-in-law, whereas WF makes hay at the village and the evening milking with his mother. This formula alternates with another form according to the climatic conditions, when it is not possible to make hay: JFG remains in the alpine pastures and milks in the morning and in the evening and WF remains at the village to maintain haymaking machinery.

Cutting up the agricultural year into many sequences and FDOs is self-explanatory because on the one hand the technical management is more complex with regard to the previous case:

- the farm has 3 sites at different altitudes, which shifts the period of grazing or harvest and requires specific organizations;
- there are complicated flows of animals (heifers that are wintered outside the farm, heifers that graze in spring and fall at the remote site and in summer at the alpine pastures, animals that are boarded in summer in the alpine pastures).

On the other hand, there are reasons that are non-technical but linked to manpower and the combination of activities of the associates:

- one of the associates works at a ski resort 5 days a week in winter (2 FDOs);
- each associate takes holidays at the end of the summer (2 extra sequences);
- each associate takes one week-end out of two in October (2 FDOs).

The basic group relies on family help, especially to manage the remote site by delegating tasks to them there. Inside the basic group, they choose to work together as often as possible, to avoid the problems linked to specialization. This principle is valid all the time except during the period combining alpine pastures and haymaking (a geographic division of labour is then favoured due to the configuration of the farming sites) and of course during their respective holidays or week-ends.

JCG is alone. He favours autonomy in his work because he wants to rely only on himself and avoids entrusting tasks. Everything happens as if his reaction capacity was limited and thus he clings to a very simple and stable organization, with a reduced number of forms of organization which are repeated in the year. Whereas the associates JFG and WF give the impression that they react to events that occur throughout the year rather than seeking to synchronize them. They practice many regulations with various patterns of organization. Their system cannot be autonomous except perhaps in winter: they rely on the availability of family workforce to manage a farm with a scattered field pattern.

#### • Uses of the model

The ATELAGE model aims at accounting for and qualifying the modalities of interaction between the process of production, manpower, combination of economic and private activities in the context of livestock farming where the seasons mark the content of the work to do, the rhythms of the tasks are different, the limits and competences of the work group are fluctuant and not systematically known in advance. Starting from a “stylized” representation of « who does what, when and where » and detailing the variations over the year and their causes, ATELAGE makes it possible to:

- better understand the current situation of farmers from a work organization point of view and their problems of work;
- characterize and qualify the forms of organization and shed light on explicative factors, so as to accompany reflections about changes in livestock farming systems and their consequences on the re-organization of work.

As Ford *et al.* (1993) claim, “the most important outcome of the modelling process may not be the model itself, but rather the insight we gain as we struggle to articulate, structure, critically evaluate and agree to it”. This stage is carried out so as to:

1) elaborate a tool to help advisors accompanying changes in farms, particularly in looking at the consequences of changes (technical or organizational) on the re-organization of work. This action takes place in the French Northern Alps within the “GIS Alpes du Nord” (association of researchers and agricultural advisors);

2) to introduce a view on work in the learning process that leads to the “farmer establishment project”, which is done in France in association with the public organisms (CNASEA) in charge of the settling of farmers. The objective is to help future livestock farmers to think of their future work and work organization and take position on this point as they do for technical management, investments and foreseen incomes. The model appears to be a conceptual framework: i) to identify, with a prospective approach, the degree of maturity of the young farmers about their future work, through questions enabling them to access the foreseen organization and regulations; ii) to delimit the targets of more in-depth discussions about the concrete work achievement. Three profiles of young farmers were identified in the first year of research:

- those who have everything in mind (the tasks, the workforce and its diversity, the rhythms, the time and their interactions);
- those who have in mind the production tasks but have difficulties with tasks which do not refer to the production schedule and are linked with the establishment phase: the housings to build, their house to fit out, the elaboration of a customer base...;
- those who have no clear idea of what their work will be. They clearly consider routine and regular tasks but ignore the seasonal rhythms and priorities between tasks at peak periods, hazards and non-agricultural constraints on work organization.

The last two cases appear to be two different publics for further discussions about work organization in the elaboration of their plans for establishment. The use of the model may put these farmers in a double-loop learning process that is the modification of their organization’s underlying norms, policies and objectives (Argyris and Schön, 1978).

## 4- Discussion

### *The work and the farm*

Introducing the analysis of work organization in research on livestock farming systems means reconsidering the reasons why farmers do what they do without reducing their goals to only techno-economic goals. This led us to adopt a new point of view on the farm in livestock production sciences, considering it not only as a technical unit of production, but also as a system where economic and technical projects, expectations with regard to quality of life, social networks, combination of off and on farm activities interact to create the organizations we study (Dent *et al.*, 1995). It leads us to reconsider the contours of the farm and even the place of work in the system: a simple production factor or a constitutive element of a life project associated to the exercise of farmer craft. Indeed, it leads us to adopt a unit of observation that is on the one hand, the farm and its work group (all the participants in work),



and on the other hand the basic group and its combination of economic and private activities (included non-agricultural activities).

We can only note that those elements (the diversity of composition of work groups, the diversity of work representations...) are not recognized as criteria in the elaboration of typologies and thus as elements playing on the expression of work problems by farmers and the process of change they carry out (Madelrieux *et al.*, 2002).

The concept of « practice » is used by agronomists to take into account the actor (the one who acts). The practice is thus differentiated from the technique: “if the technique can be described independently from the farmer who carries it out, it is not the same with practices that are linked to the operator and the conditions in which he exercises his craft” (Teissier, 1979 quoted by Landais and Deffontaines, 1990). Introducing the work in the approaches of livestock farming systems means: reconsidering the “practical” side of the carrying out of the practices and not only their meaning (Darré *et al.*, 2004); taking into account the problems raised in the concrete carrying out of the systems of practices (who does what, when, where, how). The passage from the practices to the tasks, to the activities, to the systems of activities illustrates the complexity of the relation between the production process and the work organization (Marschall and Osty, 1997).

#### *Complementarities and specificities of the work assessment method and Atelage*

The two approaches share a common base: principles of representation of work and its organization. Nevertheless, they differ on three points: the relation to the agricultural activity, to the duration of tasks, to the regulations. In the work assessment method, the agricultural activity is the centre of the study. In Atelage, it is situated in a combination of elements which play on the organization: the economic, associative or private non agricultural activities; the availability of workers and their wish for free days; climatic hazard... Work duration is an indicator of evaluation of the work organization in the work assessment method by the way it is elaborated and evolves during the year. It gives quantitative reference marks that are useful for farmers and extensionists. But a representation by indicator of work duration centred on the agricultural activity does not cover all the debates on work organization from the farmers’ point of view (Hervé *et al.*, 2002). The debate is also on the interactions between all the activities (agricultural and non agricultural) and their regulations. With Atelage we propose bases to take account of that.

Thus, with the two methods we have conceptual bases for the design of tools to support and help changes in farms, technical changes but also changes in the combination of activities and expectations of life quality and changes that modify the work duration and the way the work organization is regulated.

#### *Livestock management simplifications and work re-organization*

Farmers are facing production processes that are becoming complex since agriculture is incorporated into a much broader set of processes: food chain, rural development and the management of natural resources. Social expectations in terms of environment or quality of products are expressed in technical specifications, contracts, and often require practices demanding in work. Now, this goes against the trend of farmers adopting techniques that are less demanding in terms of work. It raises the question of the impact of technical changes on production and work, and the place of technical choices in the variability of the work to be done throughout the agricultural year.

In livestock farming systems, the technical propositions relative to “the simplification of work” can be categorized in two ways:

- adaptations that aim more specifically at reducing daily work duration at some periods of the year without modifying technical logics, that is to say the modalities of the livestock production management (Cournut, 2001). Amongst them, we can find techniques that aim at simplifying the feeding of animal, such as the modalities of forage distribution (Grenet *et al.*, 1997; Farrié *et al.*, 2004). These proposals do not require an elaborated point of view on the transformation of the work organization, but imply variations in task duration, which can be evaluated by the work assessment method.
- more radical adaptations that modify the annual work calendar and present more daily and weekly flexibility. These adaptations are no longer adjustments of well established production management models, but contribute to building alternating models. For example, in dairy farming systems, Cournut and Dedieu (2005) showed that once-a-day milking, which implies losses in milk production from 25 to 30 % per cow (Remond and Pomies, 2005; Broccard *et al.*, 2005), was integrated in different production logics as far as they were oriented to the economy of feeding costs, that is to say associated with adaptations of the feeding system. These proposals disrupt the organization more profoundly since they modify at least the work calendar, if not the abilities of the production management. Then it is no longer possible to consider as invariable the sequences of work, the task distribution, the temporal interactions between the animal farming tasks and other tasks whether they are agricultural or non agricultural. And all this is taken into account by Atelage.

## Conclusion

Behind the work question, the questions are the reproducibility of farms, employment, the place of livestock farming systems in the dynamic of spaces and rural territories. It is time to think of the reproducibility of farms as something other than questions of economic viability! In France, the milk production and processing system became aware of this and calls into question its previous technical and social production models based on the specialized farm, the couple, and a management aiming at a production goal without other considerations than economic. More widely, the agricultural profession, if it wants to renew itself, should show the young that it is concerned by work conditions and not just by work productivity and technical responses to social and market chain expectations.

The two terms do not conflict but the research for coherent solutions requires dealing with the different terms of the problems.

Different disciplines deal with work and its organization in agriculture. Work organization is neither the object of a single discipline, nor the object of a single definition. Relations between production process and manpower are barely tackled. Indeed each discipline deals with one dimension: organization of the work group or work relations inside the group (by sociology), technical organization (by agronomic sciences), temporal organization or work planning (by management sciences), know-how or working conditions (by ergonomics). Few tackle concrete work organization (in the sense who does what, when, where, how and why).

The conceptual frameworks and models elaborated by the livestock researchers come within the scope of the evolution of the way to tackle work organization, where the question of task duration, important to judge the efficiency of work, progressively gives way to questions of allowed latitude, available time and the different ways to preserve or organize it, sources of disruption and regulations of the coordinated “task-workers” associations. It remains to associate more closely these dimensions of the organization and to open them onto other dimensions such as mental tensions, the knowledge of farmers and their transmission

(Moneyron, 2003; Soriano, 2002), the elaboration of the identity and the meaning of work with animals (Salmona, 1994; Porcher, 2002). Indeed, if livestock sciences have their place in the discussion about work in livestock farming systems, they are not enough to answer the expectations of livestock farmers. We need to think of a construction from different points of view to improve our assessments of the situations, especially of the tensions and workloads but also to explore satisfactory solutions for the farmers according to their conception of trade and work, to their relations with the other members of the work group. It is around multidisciplinary that help and support for farmers' projects can be built and enable the future to be considered, without sacrificing work conditions and the attractiveness of the job for potential successors.

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