Les Indomptables

*An **ethnography** of niche **novelty** production in Walloon Agriculture*

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« Les marchands nous manipulent, l'agriculture n'est qu'un prétexte pour le business. On la fait vivre pour ça…

Là, je spécule ! Je laisse pousser l'herbe, il y a un abri, des haies, elles pourront pâturer tard…

Ces aides, ça te conditionne à beaucoup de choses, se préparer pour les contrôles : la compta, le contrôle bio, la déclaration de la PAC, les MAE… On se mord la queue. Avant les aides, les fermiers étaient trop *indomptables*. Nous, on est encore indépendants, plus libres mais il faudrait l'être encore plus. »

(Dany Dubois (FDM), Oct 25th, -Cahier n°9 p.17, italic added)

« Salesmen manipulate us; agriculture is just a pretext for doing business. They make it live just for that reason…

Over there, I speculate! I let the grass grow, there is a shelter, hedgerows, they will graze late [in the year]…

Those aids, it conditions you to do a lot of things, get prepared for all these controls: accountancy, organic certification, CAP declaration, agri-environmental measures… We're biting our own tail. Before the aids, farmers were too *indomitable*. Us, we are still independent, freer, but we should be even freer."

"Nous travaillons le cœur plus joyeux, nous ne travaillons plus « contre » mais « avec » -plus en harmonie- nous essayons de sentir les besoins de la terre, des bêtes et ils le rendent, un contact s'est rétabli.

En deux mots, pour terminer, nous voulons dire que, pour nous, l'agriculture biologique c'est d'abord une question de conscience et de bon sens. Peut-être le défi qui s'offre aux agriculteurs d'aujourd'hui est-il de retrouver *l'audace de la liberté*… »

(Francis Delobel (CHV), Script of talk in Péruwelz (B), December 1999 -from family archives, italic added)

« Now, we work 'the heart more joyful', we do not work "against" anymore but rather "with", more in harmony, we try to feel the needs of the earth, of animals and they give back, there is a contact again.

In few words, to conclude, we want to tell you that for us, organic agriculture is a matter of conscience and common sense first. Perhaps, the challenge for today's farmers is to find *the daring of freedom* again…"

Le Credo du Paysan

Lyrics: F et S. Borel - Music: G. Goublier (1890)
Lit. Peasant's credo; 'credo' means 'I believe' in Latin.
Picture: harvesting hay bales for goats at home

L´immensité, les cieux, les monts, la plaine,
L´astre du jour qui répand sa chaleur,
Les sapins verts dont la montagne est pleine
Sont ton ouvrage, ô divin créateur!
Humble mortel devant l´œuvre sublime
A l´horizon quand le soleil descend
Ma faible voix s´élève de l´abîme
Monte vers toi, vers toi Dieu tout-puissant

The vastness, the heavens, the mountains, the plains
The star of the day that spreads its warmth,
The green pines which the mountain is full
Are your work , O divine creator !
Humble mortal in front of the sublime work
On the horizon when the sun goes down
My feeble voice rises from the abyss
Up to you, to you God Almighty

Je crois en toi, maître de la nature
Semant partout la vie et la fécondité
Dieu tout-puissant qui fis la créature
Je crois en ta grandeur, je crois en ta bonté! {bis}

I believe in you, master of nature
Spreading life and fertility everywhere
Almighty God, who made the creature
I believe in your greatness, I believe in your goodness! {bis }

Dans les sillons creusés par la charrue
Quand vient le temps je jette à large main
Le pur froment qui pousse en herbe drue
L´épi bientôt va sortir de ce grain.
Et si parfois la grêle ou la tempête
Sur ma moisson s´abat comme un fléau
Contre le ciel loin de lever la tête
Le front courbé, j´implore le Très Haut!

In the furrows dug by the plow
When the time comes I throw wide hand
The pure wheat that grows as thick grass
The spike will soon get out of this grain.
And if sometimes hail or storm
On my harvest falls like a plague
Against the sky, far to look up
Head bowed, I implore the Almighty!

Mon dur labeur fait sortir de la terre
De quoi nourrir ma femme et mes enfants
Mieux qu´un palais j´adore ma chaumière
A ses splendeurs je préfère mes champs
Et le dimanche au repas de famille
Lorsque le soir vient tous nous réunir
Entre mes fils, et ma femme et ma fille
Le cœur content j´espère en l´avenir

My hard work makes out of the ground
To feed my wife and kids
Better than a palace I love my cottage
To its splendor I prefer my fields
And on Sunday at family meal
When evening comes & gets us all together
Between my sons, and my wife, and my daughter
The heart glad I hope in the future

Je crois en toi, maître de la nature
Toi, dont le nom divin remplit l´immensité
Dieu tout-puissant qui fis la créature
Je crois, je crois en toi comme à la Liberté!{bis}

I believe in you, master of nature
You, whose divine name fills immensity
Almighty God, who made the creature
I believe, I believe in you as in Freedom! {bis}

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INTRODUCTION

My ancestors from both sides have been farming for ages. My two grandpas sang this song *"Le Credo du Paysan"* together at my parents' wedding; this Christian song imprinted by peasant culture remains well-known in farm families. It glorifies beautiful, created and malleable living nature, dedication to hard work of the land to feed one's family, life, fields, fertility, hope in the future, and freedom to come. Peasants have continuously held this as ancestral as salutary art of nourishing *"débrouillardise"* (lit. problem-solving creativity) for ages; they have fed others in the plain as in the mountain, under dictatorship as under "democracy". However, farmer newspapers today say we may disappear soon; 'eternal' peasant population rushes to the bottom.

Are we really going to disappear? How and why did we get to this situation? What is going on in farms today? What are farmers' plans and projects? What futures do these projects lead to? This is in short the structure of this MSc thesis. This alarming observation motivated me to go and see in farms, not only at home but also to colleagues' in order to better see, understand phenomena going on in the reality of farms, and to reflect deeper on underlying issues. Thus, I phoned a few cousins and other colleagues and told them I was interested in their *"inventivité"* (inventiveness), their own way of doing things; I asked them to go and work with them in their own farm, in their daily activities -whatever it would be- to understand why and how they are looking to change their routines, i.e. for novelties.

While the adoption of new technologies, 'innovations' -e.g. new tractor or milking robot- is highly visible, the production of novelties is not considered, sometimes assumed, but almost invisible. Actually, it takes place in private, intimate farm space; it emerges from personal observation, experience, intuition, and even religion and relation with ancestors… However, I would like to point it out; as van der Ploeg (2013, p. 11) says, peasant agriculture is a practice without a theory and its enactments are too often considered as "irrational behaviors", not understood so inexistent and irrelevant. Here, the word "novelty" is used to highlight the dynamics within heterogeneity of practice and what is going on within the intimacy of farm spaces.

Thus, this MSc thesis is about freedom to produce new ideas but it is also about food security, food sovereignty, sustainability, social justice and employment. It's about freedom to carry on projects toward a better society - multiple, diverse as our worldviews and wishes are. It is about peasants' struggle for the right to make progress in the direction they -we- want. This practice-oriented ethnography is aimed at studying repeasantization as self-organized development, i.e. studying how farmers actively connect local, available resources with their own activities and projects.

THESIS PROJECT

In this first section, I would like to explain briefly my thesis project i.e. the theme, theoretical framework, problem statement, research questions, and methods. Practicalities will be discussed in the last sub-section.

THEME & RELEVANCE

Since the end of World War Two, Agriculture Modernization interventions in Wallonia (south of Belgium) sought to foster the application of agricultural scientific knowledge by farmers. Since the 1970s, these interventions have been less and less managed by the State and increasingly leaded by private companies; the *"conseillers"* (lit. advisors) -nutritionists, accountants, insurer, plant biologists- are actually travelling salesmen for private companies.

At the end of the 1990s, several agricultural crises disturbed this socio-technical regime -for instance the BSE/Mad Cow and Dioxin crises (animal food provisioning issues) and milk overproduction crisis (an expression of the economic squeeze). These events resulted in an increasing distrust in the expert system while, at the same time, farmers realized their reliance on these experts.

As responses to these crises, grassroots initiatives "born from within" emerged and started to plead for family farming, fairer arrangements with factories, quality production and short food supply chains. Thus, farmers produced "novelties" often together with some scientists: new farmers' newspapers and technical sheets on agro-ecological practices have been published; meetings about farming system management and networks of direct selling farms have risen.

This research seeks to understand what is happening in Walloon agriculture from within, through the observation of its internal dynamics, focusing on what farmers actually do despite their expected disappearance. Thus, I really want to focus on the heterogeneity of practices and look for positive deviance rather than for averages.

Background in this area

As my parents are farmers in the studied area and as I will take over family farm in two years, I have a particular relationship with these issues and these actors. In 2011-12, I organized conferences and "days of reflection" on my parents' farm, about different issues related to peasantries and sustainable agriculture. Various farmers, academicians, consumers' associations, South NGOs etc. took part in these events

and know me. From this rich personal experience, I really want to understand better these new trends and the diverse initiatives we are taking part in.

PROBLEM STATEMENT: CONTESTED MODERNIZATION & GRASSROOTS INITIATIVES

Today, agriculture Modernization -understood as a process consisting in three pillars: the reliance on external knowledge and technologies, the commoditization of inputs- is increasingly contested: its positive promises are questioned and its harmful consequences are more and more considered by farmers -cf. (Sherwood S. , 2009) about pesticide poisoning. This contestation results in the erosion of trust of farmers toward the expert system (van der Ploeg, 2003) within the dominant regime, so called "conventional agriculture".

Self-organized responses to this crisis are initiated by different actors, notably by farmers themselves. These responses take different forms: the valuation of on-farm knowledge production through everyday life work experience, the establishment of new relationships with other farmers as well as with scientists (Hebinck, 2001). In this context, novelties that seek to foster autonomy and sustainability are produced.

RESEARCH OBJECTIVES AND QUESTIONS: ETHNOGRAPHY OF NOVELTY PRODUCTION

The goal of this research is to study some novelties produced by farmers in Wallonia that seek to foster autonomy and sustainability. Thus, I would like to understand better the motives of these farmers to look for novelties, as well as their knowledge, objectives, expectations and relationships with experts and colleagues. In the course Methodology for Field Research in the Social Sciences, we learnt that ethnography combines empirical investigation and the construction of an argument; it consists in understanding people's actions and accounts in their everyday context and in making sense of local action in terms that are applicable across wider range of phenomena (Hammersley & Atkinson, 2007).

General and sub research questions:

<u>What are the dynamics of niche novelty production in Walloon agriculture?</u>

What novelties are produced?	**How** do they come out? Through what knowledge practices?
Who contribute to their production?	**Why** are these actors looking for novelties?
What actors in what network?	What are their motives, objectives and expectations?

THEORETICAL FRAMEWORK: NOVEL PRACTICES AS SEEDS OF TRANSITION

Before going to the field, I read about two theoretical inputs that can be used to make sense of empirical data. The first theoretical lens consists in considering novelties as seeds of transition developed in "niches" (Roep & Wiskerke, 2004)[Fig. 1]. In the literature, ***novelties*** are defined as deviations, new ways of doing and thinking. This approach considers social, cultural, political, and economical aspects of novelties as well as their biological, physical, and chemical aspects (Roep, van der Ploeg, & Wiskerke, 2003). As novelties are produced in particular contexts, they have different potential to upscale and provoke further changes at the level of the (farm) system and even at higher levels (regimes changes, societal ***transition***). Socio-technical ***regimes*** are "shared sets of cognitive, social and technical rules that guide or govern technical change along certain technological paths or trajectories" (Roep, van der Ploeg, & Wiskerke, 2003, p. 200). They are reproduced through social interactions, formalized and materialized in major organizations, agreements, and institutions. Beside regimes, ***niches*** are particular social spaces where new arrangements, connections, combinations -novelties- are created and tested (Wiskerke & van der Ploeg, 2004).

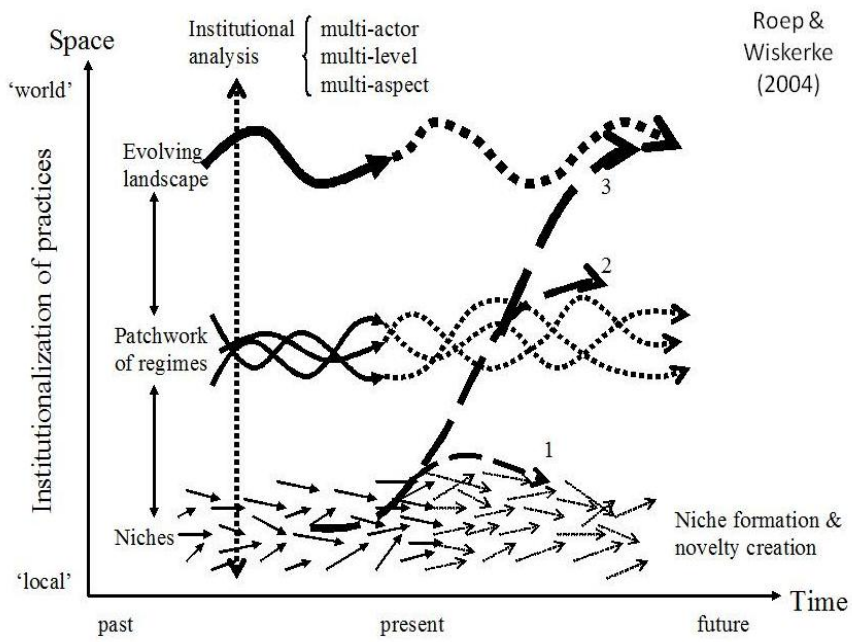

Figure 1: Framework to study technical-institutional design - source (Roep & Wiskerke, 2004)

Secondly, the framework of Mc Gee (2004) -further elaborated by Sherwood et al., (2013) - considers social practices as results of the dynamic and complex interactions between actors, knowledge, and spaces [Fig. 2]. This theoretical approach offers appropriate lenses for ethnographical study of novelty production. In fact, the production of a novelty can be seen as the emergence of a new social practice resulting from changes that occur at the level of the actors, knowledges and spaces. ***Actors*** are interdependent social actors interacting whith each other. Actors cannot be reduced to isolated individuals acting only for their self-interest. They have agency and they are "singular pluralities" i.e. they belong to different networks and exist in different 'worlds', 'realities'. Different types of ***knowledge*** are all socially and contextually constructed; Mc Gee questions to what extent 'expert science' is neutral, objective and absolute. Thus, other types of knowledge

(incl. experiences, skills, affects) should also be considered. Knowledges can be stored in physical landscapes and devices (e.g. hedgerows, tools) and expressed in social practices, institutions, and categories. ***Spaces*** are the multiple contexts where actors interact, where social practices happen, and where there are knowledge encounters. Spaces are created through debate and are not contained in tight boundaries. Their relationships (coevolution, fusion, negotiation, clash, persuasion) create room where new reality can emerge. Every space has history -influence from the past-, mechanics -shared practices that characterize members-, dynamics -degree of creativity-, and both front and backstage. Every space is not accessible to everyone but we can always learn something in spaces as there is debate and knowledge encounter.

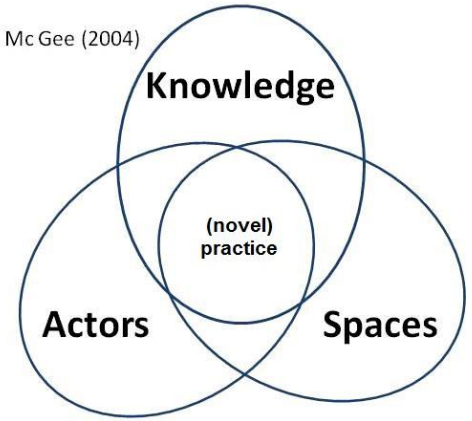

Figure 2 Actors, knowledge and spaces - source (Mc Gee, 2004)

Peasant farms can be understood as niches characterized by strong interactions between farm families and their resource-base and thus as spaces of novelty production. From these two theoretical approaches, we can consider that novelties are produced in certain niches of certain socio-technical regimes. Niches and regimes can in turn be understood as social spaces created through certain social relationships among actors and knowledge practices.

METHODS

In ethnography, categories are provided by data analysis and there is no a priori fixed and detailed research design. However, before going to the field, I already chose that this ethnographical study would consist of observations, participant observations and interviews on novelties developed in nine farms in Wallonia (southern part of Belgium). It is very important to get information on farmers' motives, knowledge and relationships but also on the socio-material settings in which novelties are produced. Thus, document and artifact analysis may be helpful as well. The relevance of these methods in this particular context will be explained in the following sub-sections.

Beforehand, I would like to explain briefly how I chose the nine farms. As I said above, my family lives on a farm and our story is characterized by three major farm shifts, *"conversions"* as we call them in French. In 1997, we shifted from intensive dairy farming to organic farming. In 2002, we stopped farming cattle and started breeding goats. In 2006, we started processing all our milk, producing all the animal food we need and we opened the farm to schools and children during holidays. Together with the "reflexive" events we organized on the farm, this permanent search to new ways of farming brought us to build new relationships with consumers, scientists, and colleagues.

Thus, the eight other farms are "connected" to ours via family relationships, networks of producers for direct selling or the events we organized on the farm related to farm autonomy and sustainable farming practices. These farms are actively adopting, adapting, producing novel practices such as low-tillage, fodder autonomy and the production & direct selling of distinctive products. In fact, these novelties deviate from the idea of modern agriculture (plant-centered agricultural development, externalization of "tasks", standardization of products) and seek to respond to its undesirable effects. Moreover, though the novelties may go in different directions and concern different dimensions of farming, they are quite related to each other as soils, plants, animals and people are related in these farms. Thus, for instance, changing one's relation with consumers may imply another conception of animal feeding. As farms are unique, particular spaces where different novelties are combined, I find it relevant to study different but "connected" farms to understand better novelty production. This is really important as I consider novelties as produced in relation with other novelties, through particular networks, niches (social spaces) and knowledge practices.

OBSERVATIONS AND PARTICIPANT OBSERVATIONS (INCL. ETHNOGRAPHIC INTERVIEW)

Before entering a farm, it is interesting to observe the landscape and the farm itself: presence of -young- trees, how the farm is organized, location and distance from roads, rivers, woodlands, village, other farms etc. Taking pictures helps to gather information and to convey messages as well. In the following sections, pictures from fieldwork are included in the text in order to support the argumentation; I chose not to put them apart in 'annexes'. Moreover, I think that taking time for observation also helps to de-familiarize and to problematize the setting i.e. to formulate questions and avoid taking it for granted.

To go further in the understanding of niche novelty production, I chose to do participant observation in these nine farms. As I consider farms as "spaces" of novelty production, it is important to see and listen to farmers in their context, and to experience as closely as possible their daily work reality where knowledge and novelties are generated. In farming, manual and mental activities are entangled. Thus, I think that participant observation is a relevant way to see what these farmers do: the products they make, how they manage their soils and crop rotations, how they relate with consumers, colleagues, scientists -e.g. whether they read books, articles or meet them.

To participate in their activities is important for two main reasons. Firstly it is a way to compensate the time and the information they give to me. I would not be at ease to follow them for hours without helping and participating in their tasks. Secondly, to participate helps to build rapport and trust; I think that farmers will be more open -i.e. confident-, talkative, and willing to cooperate if I work with them. I am lucky to

be ‘farmer son’ from this particular area; it helps in terms of vocabulary but also for rapport. In this situation, participant observation seems to be the appropriate setting for asking questions on their motives, expectations, reasons to look for novelties, etc.

First, I phoned them and then, I met them on their farm to introduce briefly the broad idea of this thesis. While contacting them about this project, the words *“inventivité”* and ‘responses to economic squeeze’ were telling and meaningful for them. Although they were all quite enthusiastic, I could feel some shyness, humility and modesty; they often evoked ‘doing differently’ as deviance. I could go in all the farms I planned to; I could even go back *“tu viens quand tu veux, tu fais signe”* (you come whenever you want, just let us know) as they say. I told them I would like to come as soon as they start in the morning but they were still free to decide at what time I would come. In most of cases, I arrived when they finished their (first) breakfast around 6.30 a.m. At the end of the day, I usually left between 9 and 11pm. During these days, I carried farm boots, home-made water-proof notebooks, camera, and work gloves with me -see Annexe 1: list of useful things to carry while doing participant observation on a farm. Thus, I went on their farms but also to fairs, conferences, weekly markets, open doors, and could even get access to farmers meetings via some of them. Their various activities brought about many topics of discussion and offered different settings for asking different questions (e.g. with the man, woman, children, grandpa, consumers, neigbour, employee, alone or together, in the car, greenhouse, shop or kitchen). I always ate with them; thus I could share their discussions during eating times. Farmers generally liked discussing about their practices but also broader issues such as CAP reform, environment degradation, relationships with industries, land issues. As their many activities and issues of interest are related, I could gather extra information on the wider context and their worldviews. With this kind of method, the encounters take place in particular settings farmers are mastering (their stable, fields, house, shop, car) much more than I do. In addition, farmers themselves - their logic, their motives, their observation and knowledges, their intimate experience of coproduction, their (version of the) story- are the center of the study. I think these favourable elements contributed positively to build rapport.

SEMI-STRUCTURED INTERVIEWS

During fieldwork, I chose to do some semi-structured interviews in order to get the perspective and the story (-pieces of - answers to sub-questions) of the actors that are not present on the farms but that are still relevant as members of the network (“niche” or “regime”) or important actors of the context (“evolving landscape”, cf. Figure 1 (Roep & Wiskerke, Reflecting on Novelty Production and Niche Management in Agriculture, 2004)). These people are Carlo di Antonio -Walloon Minister of Agriculture-, Louis Hautier -scientists and researcher at CRA-W Walloon Agricultural Research Centre-, Etienne Trifin -farm accountant, working for the major Walloon farmer union called Fédération Wallonne de l’Agriculture-, and Jean Frison -father of one of the farmer, founder of a cooperative called *“Coprosain”*.

Except from the Minister, these people all collaborate directly or have direct interactions with at least one of the nine farmers. I recorded and transcribed the discussion when it was possible.

DOCUMENT AND THING ANALYSIS

As the focus of this research is the socio-material settings in which novelties are produced, document and thing analysis helps as well. Thus, objects and documents related to these novel practices such as books, plans, accountancy records, newspapers, tools, machinery, statistical data, family archives, soil analysis, food rations, food process equipment, etc. and their "social life" are relevant sources of information to develop my Thesis. In the following sections, I try to show them as much as possible as they are key-elements of the argumentation.

PRACTICALITIES: PLANNING & BUDGET

Pre-field	April - June 2013	Thesis path & brainstorming
	July 3rd, 2013	Presentation of the Thesis Proposal
	July - August 2013	Back to Belgium, work on family farm, inventory of contacts and possible cases
Fieldwork	September - November 2013	Contacting farmers & interviewees
		Interviews with key-informants, observations, and participant observation in farms
Post-field	November - January 2014	Interviews with key-informants and Thesis writing
	February 5th, 2014	Presentation of Findings
Internship	Feb. 16th - June 2014	Internship at the Organic Research Centre (UK)

Budget issues:

- Journey: the studied area is my home area. Thus, I had no travel cost to get to Wallonia. The only travel costs were spent within the studied area. My parents have a car and the furthest farm is located forty-five kilometers from home.
- Accommodation: as most of the meetings took place relatively close by, I could sleep at home. Thanks to the practical organization of participant observation sessions and the willingness of farmers, I could sleep on one other farm for two days.
- Funding: I don't have any external funding. As the costs were quite limited, I could take charge of them personally.

WALLOON AGRICULTURAL CONTEXT

The objective of this first section is to picture the historical and socio-economical context of the field. The first sub-section will present Wallonia and its agriculture (incl. statistical data). The second sub-section will tackle how agricultural modernization (the project, the process, and the practices) has affected these farms. Finally, the third sub-section will report farmers' formulation and definition of "modern problems".

WALLONIA AND ITS AGRICULTURE

As mentioned above, I decided to do fieldwork in my home country: Belgium. This is a small country (10,839,905 inhabitants, 30,527 km² (Service Public Fédéral - Economie, 2013)), member of the European Union, located between France, Luxemburg, Germany, and the Netherlands. Wallonia is the southern, French and German-speaking part of Belgium, between France and Flanders i.e. the northern, Dutch-speaking part of the country. Wallonia consists in a bit more than the half of Belgium's total area and this is the most rural part of the country: the average population density is 208 inhabitants per km² in Wallonia and 355 inhabitants per km² in Belgium (Service Public Fédéral - Economie, 2013).

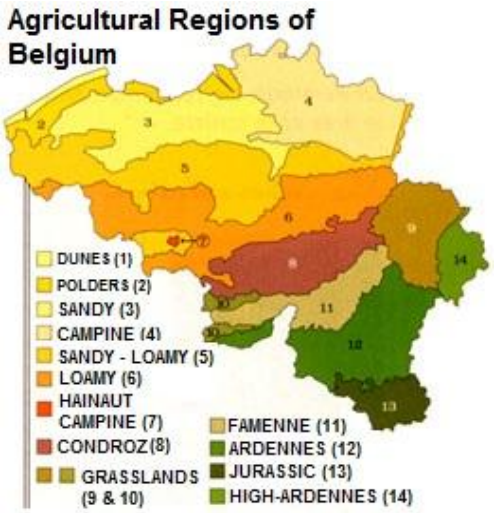

Figure 3: Agricultural Regions of Belgium - source (APAQ-W, 2013)

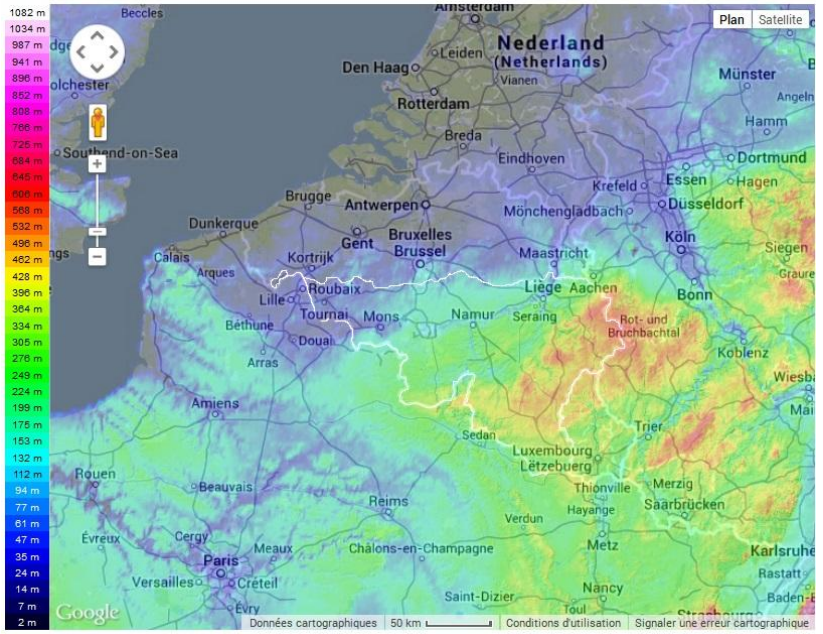

Figure 4: Topographic map of Belgium - source http://www.cartes-topographiques.be/Belgique.html

As you can see on the topographical map [Fig.5], Wallonia is located at 200km from Wageningen (as the crow flies) and its relief is varied. There are plains around the Scheldt River (Schelde in Dutch, Escaut in French) in the West

and it starts being more and more hilly further in the East. On [Fig.4], there are the different agricultural regions characterized by dominance of croplands in the West, grasslands and forests in the East (APAQ-W, 2013).

Another relevant contrast between Flanders (North) and Wallonia (South) is the employment rate i.e. the number of employed people divided per 15 to 64 year-old total population. It is lower in Wallonia (whiter) and higher in Flanders (more red) [Fig.6] (IWEPS, 2011). After a prosperous industrial era during the 19th and the first half of 20th century, Wallonia's economy has declined until now. At the same time, Flanders' economic growth increased so that Flanders became richer than Wallonia in the second half of the 20th century. At the moment, the unemployment rate (i.e. unemployed people divided per total active population) is 18,1% in the Province of Hainaut, the Western province of Wallonia where the nine studied farms are located (IWEPS, 2011). According to the same report, youth unemployment (15 to 24 year-old people) reaches 33,8% in my municipality (Tournai).

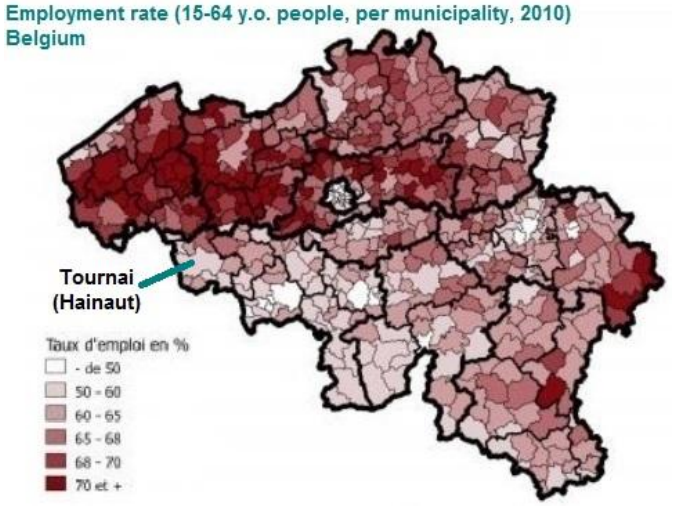

Figure 5: Employment rate in Belgium - source (IWEPS, 2011)

Partly because of these socio-economic differences, the competences of the national state have been increasingly delegated to sub-national entities over time. Thus, agricultural policy is "regionalized" i.e. ruled independently by Flemish and Walloon governments. The Walloon Ministry of Agriculture also called Operational General Direction of Agriculture, Natural Resources, and Environment (DGARNE) organises censuses, surveys, and publishes statistical data on Walloon agriculture as the Federal Ministry did before for the whole country.

Today, 43 % of Walloon area (i.e. 722.652 hectares) is devoted to agriculture and is considered as "usable agricultural area" (UAA). There are 13.521 farms of 53 hectares on average (DGARNE - SPW/DGO 3, 2011). In 1953, the average farm size in Wallonia was 7,05ha (Christians, 1993). Since the first European free trade agreements and agricultural policies, land use has been simplified: some areas of Wallonia got specialized in milk cattle breeding (e.g. Le Pays de Herve between Maastricht, Aachen

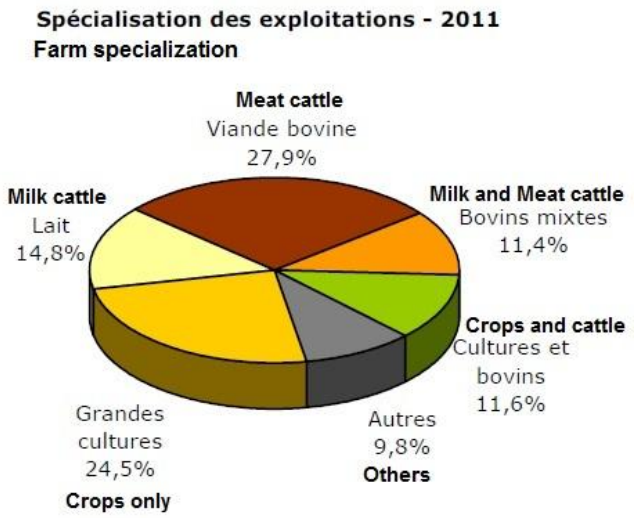

Figure 6: Farm specialization in Wallonia - source (DGARNE - SPW/DGO 3, 2011)

and Liège) while others intensified commercial crops, winter wheat and sugar beetroot in particular (Christians, 1993) [Fig.7]. Since 1980, a lot of grasslands and *"pré-vergers"* (grazed orchards) have been plowed to grow fodder maize; "green fodders" (cabbage, turnips, etc.), tobacco and hop growing have almost disappeared (Christians, 1993). In 1990, there were still 29.178 farms in this area (Christians, 1993); more than two times the number of farms of today [Fig.8]. Finally, farmers invest on average 520,000€ themselves[1] on their farm, this amount increased by 4,4% per year (2006-2008) and the average farm debt increased by 5,2% per year (2006-2009) (Bouquiaux, 2012). The author says that the increasing size of the investment threatens farm solvency and continuity.

As you can see on the map [Fig.9], the nine farms are located in the western part of Wallonia, around Tournai in a small triangle between North of France and Flanders. For comparison purposes, here are some data about these neighboring areas. Since the 50s, Flanders' agriculture has developed more in intensity and less in scale than Wallonia's: the average farm size in Flanders today is 24,5ha (Landbouw en Visserij, 2013) and this densely populated port region is known of its greenhouses, horticulture, poultry and pig industrial farming (Christians, 1993). In Belgium, only 6% of pigs and 13% of poultry are located in Wallonia (DGARNE - SPW/DGO 3, 2011). On the opposite, the average farm size in North of France (Nord-Pas de Calais) is 61ha and 20% of farms are bigger than 100 hectares (DRAAF Nord-Pas de Calais, 2013). This neighboring area is characterized by *"grandes cultures"* (commercial crops) and lost 25% of its farms between 2000 and 2010 (DRAAF Nord-Pas de Calais / Agreste, 2011).

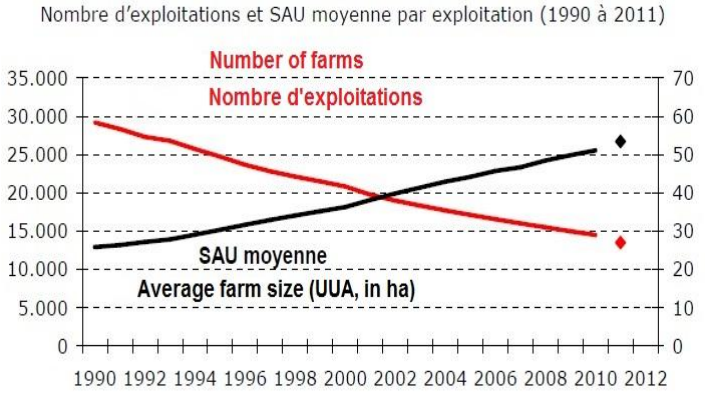

Figure 7: Number of farms and average farm size in Wallonia - source DGARNE - SPW/DGO 3, 2011

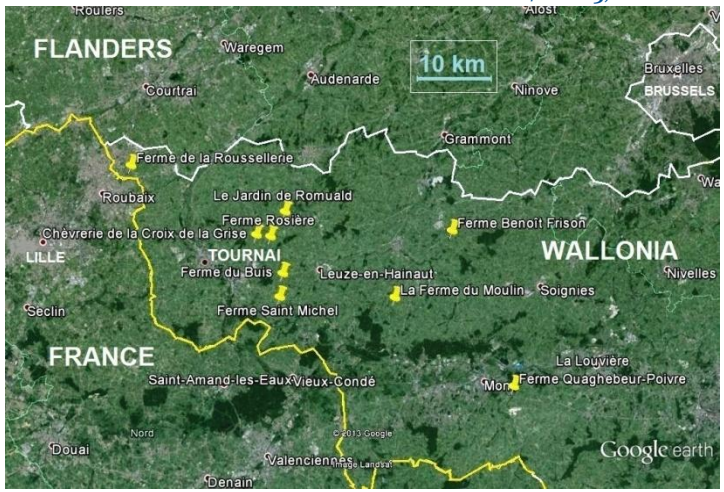

Figure 8: The nine farms, screenshot Google Earth

[1] "Themselves" means their own savings and the loans they got from the bank. The total capital invested on a farm in Wallonia (incl. by land owners) is 1, 146, 700 € on average (DGARNE - SPW/DGO 3, 2013)

Thus, statistical data show two major trends in Wallonia: (i) farm specialization mostly in cattle breeding and commercial crops processed by industry (ii) the constant decline of farming population: almost 700 farms disappear every year, only 22,566 people work in Walloon agriculture today i.e. 16,740 full-time workforce units; almost 1,5% of active population in Wallonia. It also means that there are on average 44,1 ha per full-time workforce unit (DGARNE - SPW/DGO 3, 2011) (Service Public Fédéral - Economie, 2013). In addition to this, 61,6% farmers are older than 50 years old [Fig.10].

Behind figures and averages, what's happening in these nine farms? How did we get to that situation? How do they respond to their expected disappearance? Do they plan to take over more land i.e. to take part in "the battle for the future" (van der Ploeg, 2003) or to quit farming? What novelties do they look for and develop? Such thought-provoking figures call for a deeper ethnographic study.

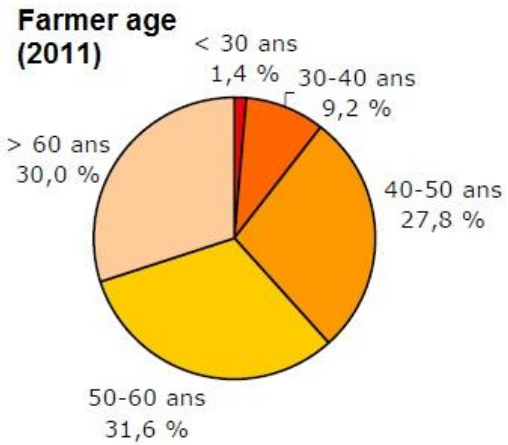

Figure 9 Farmer age (2011) -source (DGARNE - SPW/DGO 3, 2011)

HOW MODERNIZATION HAS AFFECTED THESE FARMS?

In order to understand what have actually changed in the farms, I would like to unpack "agriculture modernization" in three distinct but related elements: the project, the process and the practices. Modernization is an important element of the context that helps to understand why novelties that will be presented in following sections are actually 'novel'. Thus, I chose to allocate room to this historical and socio-economical overview.

MODERNIZATION: THE PROJECT

Let's first consider agriculture modernization as a normative discourse about what the future should look like. In Europe, this discourse has started to be spread by the new European institutions (supra-national policy level) and relayed by national governments since the end of World War II (Laureys, 2004). The goal of this project was to reach Europe food autonomy, deeply-held by (catholic) socio-democrats, the larger political force in the EU at that time. In the literature, van der Ploeg (2003) defines agriculture modernization as the orientation of agricultural policies toward the realisation of a modernized agriculture; Hayami & Ruttan (1985) talk about guiding technology and institutions for agricultural transformation. We can already highlight three major *structural* traits of this project. Firstly, agriculture modernization was a policy project, at least at the beginning. Farmers were not involved in the design at the early beginning of this project. Secondly, this project refers to a linear development trajectory. It's possible to locate countries on a line (the transformation, the route toward modernized agriculture) and rank them according to indicators: there are advanced countries, retarded (but developing) countries, and less developed countries. Thirdly, the project had a goal: filling the (imaginary) gap between the current "state of affaires" and the "modern" one which is of course far better. This posture is also called "seeing-like-a-state" i.e. starting with defining an ideal situation rather than studying the potential contained in the heterogeneity of current situation. Now, let's look at the *content* of this discourse: a pressing problem, the solution, a rupture, a new rationale, disconnections and new connections.

A pressing problem. During the 18th century, fallow lands were progressively replaced by artificial grasslands (clovers, alfalfa), *"cultures sarclées"* (row crops: hops, tobacco, peas, beans) and other green fodders (turnips, cabbages). This first agricultural revolution brought an incremental but significant increase of livestock size and food production (Mazoyer & Roudart, 2002). But after World War II, the anxiety of Malthusian theories is back as population grows faster than food production (Mendras, 1984). We must find a solution to feed this hungry world; we need a second agricultural revolution. Other versions of the story say that the unofficial threat was the expansion of communism, but anyway current situation is defined as problematic; continuity is not allowed nor moral.

The solution. This normative discourse provides also the solution: the achievement of modernized agriculture i.e. the structural development of agriculture both in terms of scale (objects of labour [e.g. hectares, cows] per labour unit) and in terms of intensity (gross output per object of labour) (van der Ploeg, 2003). The central issue becomes "managing science for technical progress" (Hayami & Ruttan, 1985) i.e. to develop expert-designed technologies that promise to bring breakthrough change and to get them accepted by farmers (Mendras, 1984).

Rupture. According to Mazoyer and Roudart, this policy-supported second agricultural revolution creates a rupture with the past incl. in terms of cultural norms (e.g. food habits). The discourse builds two opposite categories: *"agriculture ancienne"* vs. *"agriculture moderne"* (Mazoyer & Roudart, 2002). The "old agriculture" refers to the one developed over time until the first agricultural revolution -included. This agriculture is characterized by relative farm autonomy, self-provision, and partial specialization i.e. poly-production includes also "typical" food products related to the specificity of the local *"terroir"*. This agriculture suddenly belongs to the past, it is entirely behind us. On the opposite, "modern agriculture" is the one promoted by the second agricultural revolution; the one we must and we will tend to. The farmer is a business man like other economic agents in other sectors; the farm is connected to international markets and integrally specialized. Henri Mendras already described this sudden rupture: the "eternal peasantry" is "killed" by the so-called industrial civilization (Mendras, 1984). He names it *"néantisation intellectuelle de la paysannerie"* (literally: the intellectual obliteration of peasantry) i.e. peasant agriculture and its particular functioning are not considered as relevant and they are not part of the offered solution. Thus, peasantry became a practice ignored by theories and its enactments were considered as anomalies, irrational behaviour, or vanishing traces of ancient world. Modernization operated an abrupt shift in terms of relevance. Locality is not considered as a resource for local-specific practices anymore, the focus is on global parameters: market trends, newest technologies, agricultural policies -rules and subsidies (van Dijk & van der Ploeg, 1995, pp. VII-XIII).

A new rationale. Modernization as a normative discourse contains also prescriptions about the organisation of the farm itself. Good farming became intensive farming, while farming economically (low external input agriculture) was considered as inferior (van der Ploeg, 1996). In other words, Modernization promoted a new moral economy and a new rationale, a new legitimate way of mentally organizing the farm production -also called logic of farming. Van der Ploeg (2008) characterizes two ideal-types, the peasant and the entrepreneur, that correspond to different logics of farming [Fig. 11 and Fig 12]. The entrepreneur sticks to the prescriptions of Modernization discourse. In this logic, market is a regulatory principle; social norms and non-commodity relationships do not regulate farming anymore. The farmer should not look for autonomy but rather for integration to markets. The future is perceived as a scarce commodity, only few will survive (i.e. the best farmers). To be one of them, the farmer should be "innovator" (vs. laggard) which means to be an early-adopter of expert designed technological systems, and to adapt the farm to it. Even if the margin decreases (e.g. because of market competition), the farmer pursues his

activity by taking over resources of others (land, quotas, water, etc.). In many cases, technology-driven intensification goes together with scale enlargement to sustain the pay off of expensive technologies. Labour-driven intensification is neglected: new technologies seek to save labour and it is considered as a moral objective; it is assumed that there is a demand for workforce in the cities. The farmer should focus his activity on a particular type of production (meat or milk or crops or pigs or poultry). Solutions to problems are researched in artificialization (pesticides, herbicides, chemical fertilizers, antibiotics, genetic modification, etc.) and not in co-production i.e. the ongoing mutual transformation between the social and living nature -the resource base. Finally, the farmer should be able to constantly reorganize the farm according to external indicators sent by markets and policies in particular. The "entrepreneurship" thus differs from the "craftsmanship" i.e. the capacity to get sustainable, high, and rising production per object of labour while relying on local knowledge, care, quantity and quality of labour force, and responding to internal indicators (for instance sent by the cows, the soil, or farm family).

Disconnections and new connections. As we could see in the previous paragraph, Modernization discourse promotes disconnections with local ecosystem, social norms, cultural repertoire, and local knowledge in particular. However, it also promotes new connections. Castiaux and Morelle offer a nice illustration of disconnection and new connection brought by Modernization discourses. Propaganda about hygiene and farming scale enlargement (larger herds) incited farmers to stop using water from the ponds and get connected to the water supply system (Castiaux & Morelle, 2012). In the same vein, Henri Mendras considers three types of societies: "savage" (or archaic) i.e. totally disconnected from the rest of the world; "peasant" i.e. partially connected, that "enjoys a relative autonomy" toward each other "like potatoes in a bag" - citing Marx- and toward the encompassing society (the city); and finally "industrial" i.e. connected notably thanks to transport systems (Mendras, 1984). The author talks about the "industrialization" of agriculture as the end of this autonomy and quiet continuity.

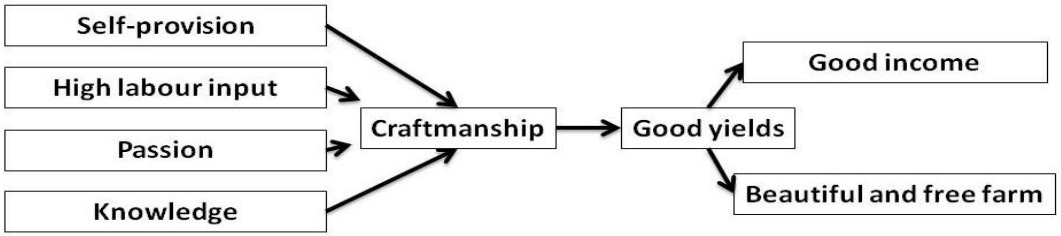

Figure 10 The logic of the peasant, source (van der Ploeg, 2008)

Figure 11 The logic of the entrepreneur, source (van der Ploeg, 2008)

In a more explicit way, Hayami and Ruttan advise to integrate agriculture to economy as factor of growth. The goal is to mobilize agricultural growth for overall development via markets, i.e. to develop non-farm sectors with farming incomes. *"The market system is not only effective in inducing increased streams of output. The product market is also an effective device for transferring the gains of productivity growth to other sectors of the economy"* (Hayami & Ruttan, 1985, p. 439). Indeed, "modern agriculture" means intensive in external inputs (commodities) and in technologies (equipment, tools, machinery) purchased to other economic sectors. In other words, this way of farming is characterized by a market-dependent reproduction. Moreover, farms are supposed to sell raw products that will be processed by industries. Thus, agricultural transformation enrols agriculture into the development of market economy. To visualise, the balance between commodity and non-commodity resource flows on the farm is well presented in [Fig. 13] form (van der Ploeg, 2003).

In brief, agriculture modernization project featured the reliance on external knowledge and technologies, the commoditization of inputs and outputs, the intermediation of relationships through money and distancing markets (Sherwood, Leeuwis, & Crane, 2012). This development project is top-down, planned, and focuses on the internalization of new technological systems and new markets trends in the farms. According to van Dijk and van der Ploeg, this kind of development can be labelled as exogenous (van Dijk & van der Ploeg, 1995, p. 11).

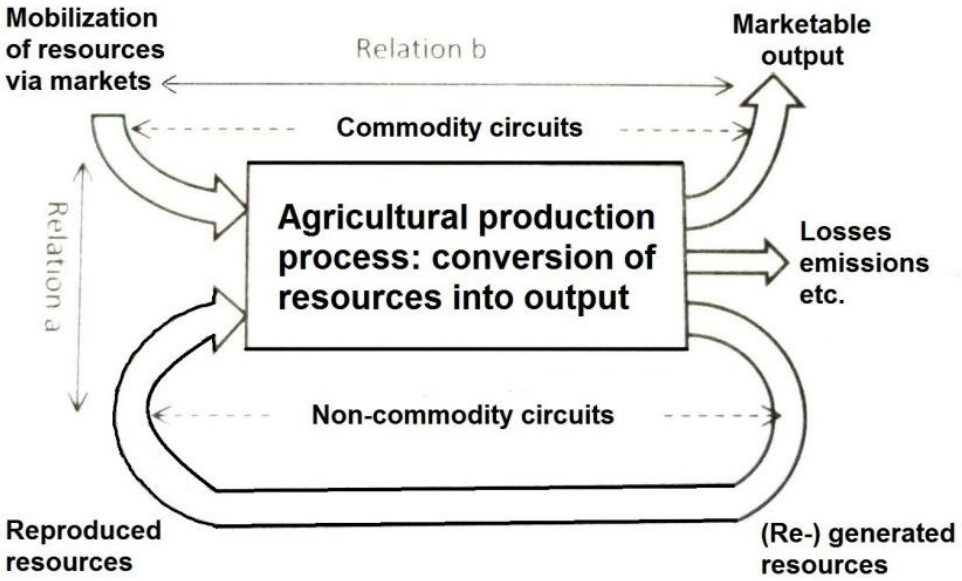

Figure 12 Resources flow on the farm - source (van der Ploeg, 2003).

MODERNIZATION: THE PROCESS

This section focuses on what happened at the aggregate level: what are the new institutions and the new arrangements. Here are some theoretical insights on this process and then some examples.

Mazoyer & Roudart point out two divides that happened in the second agricultural revolution (Mazoyer & Roudart, 2002). First, the horizontal or inter-regional divide corresponds to the ***specialization of agricultural regions*** toward different types of production. To make it a bit caricatured, cattle graze the hilly areas, crops cover the plains, pigs and poultry populate portal areas. In Wallonia, the process of specialization can be seen on [Fig.14] (DGARNE - SPW/DGO 3, 2013) . Intensive herds (cattle, poultry, pigs) and commercial crops are concentrated in the plains. The hilly areas are mostly used for extensive grazing or forestry [Fig. 15] (DGARNE - SPW/DGO 3, 2011).

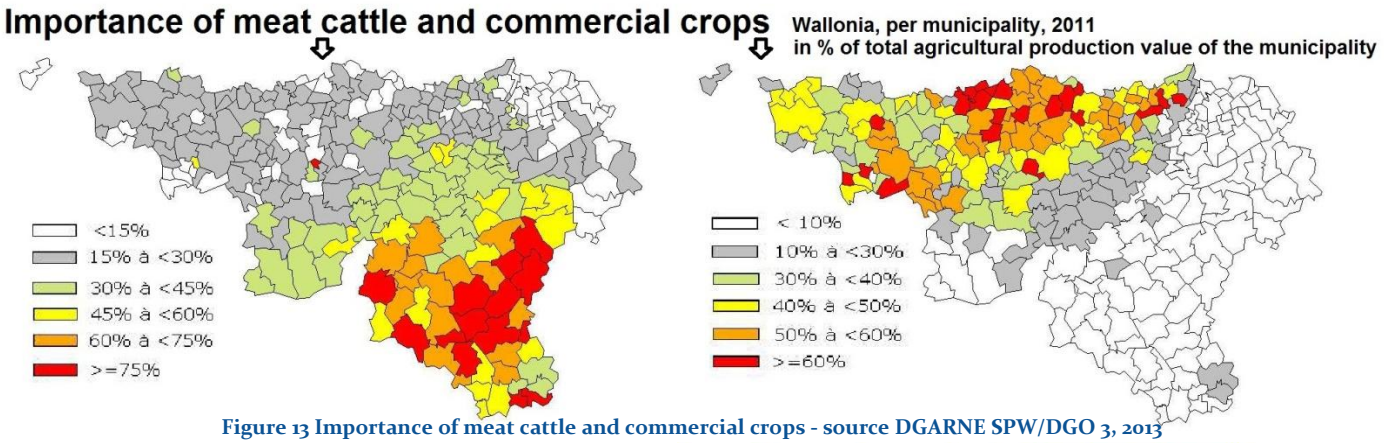

Figure 13 Importance of meat cattle and commercial crops - source DGARNE SPW/DGO 3, 2013

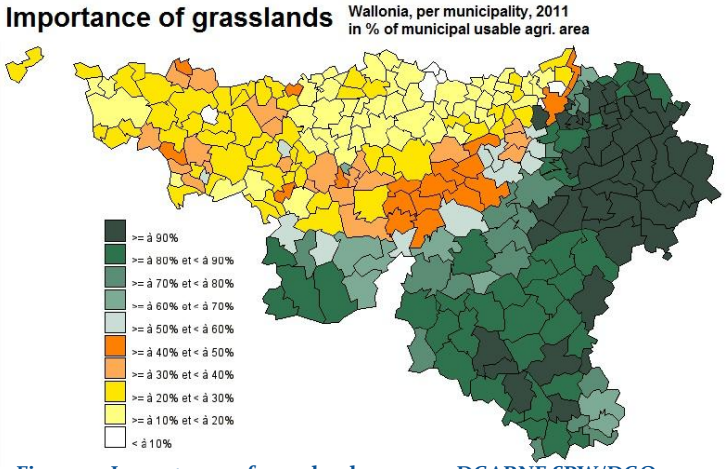

Figure 14 Importance of grasslands - source DGARNE SPW/DGO 3, 2011

Second, the vertical divide takes place along the ***food supply chain***. Mazoyer and Roudart point out the increasing distinction between raw material producers (farmers), transporters, process industries, distribution and retail companies. Thus, farmers were distanced from final consumers. Moreover, food processing and selling left the farm. I will come back to this in following paragraphs.

If we look at the structuration of the labour process i.e. the multiple tasks that have to be done 'from the soil to the plate', agriculture modernization fostered the

externalization of some of these tasks toward "external" (i.e. out of the farm) institutions (van der Ploeg, 1991: 33-35). This phenomenon had three major implications that redesigned the farm and changed the relation to its environment.

First, the externalization of tasks changed the ***knowledge*** required to run a farm. As the farm activity is supposed to be focused on a reduced number of tasks, many techniques became redundant. In a primary school book from one of my ancestors -he was teacher in the countryside- I could find well-written lessons aimed at young children. With *"Le Manuel Agricole"* [Fig. 16], those children were taught to observe the different types of soil, the different kinds of manures and their impact on soil life, different tillage and sowing techniques, various crop rotations, specific cultivation of several plants (incl. vegetables, forages and legumes), the manufacturing of tools, fruit trees grafting, food preservation, domestic use of wild and medicinal plants, the construction of farm buildings and the arrangement of stables, pulling, milking and meat animal breeding, and frequent animal diseases (Queyriaux, 1862). Over time, farmers' education evolved and focused on preaching the "modern" logic of farming. Farmers had to stay at school longer and the content of their courses was reframed: agronomy, economics and their associated ontologies became the framework of reference to talk about farming. The young entrepreneurs are taught to reach the agro-economical optimum level of production (where the function of production meets the prices ratio) and the optimum scale of the farm according to the pay-off of equipment (loans and interests) and the relative prices of inputs and outputs. Calculation and modelling became increasingly important while observation and intuition were considered as too subjective. The "openness" of farmers toward "innovations" is taught as an important value, through the visit of international agricultural exhibitions for instance. The "higher" education programmes are specialized in particular disciplines; most of these young scientists then work for agro industries or the ministry. The sources of new knowledge shifted out of the farm, the village or ancestors narratives and became "ahead", in "centers" where future is designed by experts. Thus, the challenge is to make knowledge come 'down' to the farm, in the field via vulgarisation and farmers "openness". Another form of externalization is the execution of certain tasks with mechanical technologies, i.e. high-tech instruments that require little skill to use it (e.g. the tractor vs. working horse). Expert knowledge is materialized in technologies while farmers' skills are made redundant. I will not go deeper into the details about this but one should keep in mind that modernization did not only bring new knowledge to the farm, it has also created ignorance. Certain knowledge slipped out of the scope of relevance while others became rules and institutions.

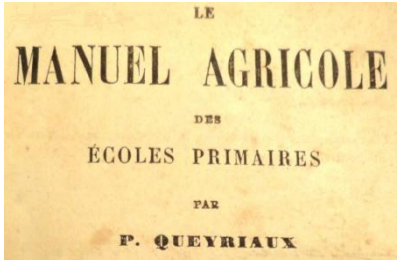
LE
MANUEL AGRICOLE
DES
ÉCOLES PRIMAIRES
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Figure 15 Le Manuel Agricole (book cover)

Indeed, the realization of this project implied the creation of synergy among "stakeholders": agro-industries, trade companies, agronomical research centers, extension services *"les ingénieurs de l'état"*, and the farmers. As some tasks have been externalized from the farm, they

must be re-coordinated with the rest of the farm. This alignment is created through market relationships and technical-administrative relationships (van der Ploeg, 1996). This leads to two other implications.

The second implication of externalization is the ***commoditization*** of resources that used to be produced and used on the farm. In other words, resources (e.g. animal food, fertilizers, water, seeds, heifers) that did not leave the farm during their lifecycle in the past (or only exceptionally) are now exchanged for money (bought or sold) on the market (cf. Fig. 13). Resource commoditization can take different forms. Either these resources are still produced on the farm but in order to be sold or these resources are replaced by commodities bought on the market. Commoditization changes the way the resource is built and so, its expected properties. If the resource is meant to benefit the farm through the expression of its potential on the farm itself, the calculus of its construction will seek to maximize its performance in the long run or to reach another specific objective of the farm family. On the contrary, if the resource is meant to benefit the farm through a market exchange, the calculus of its construction will seek to maximize output quantity and reach generic market standards while minimizing costs. For instance, there are two different ways of feeding female kids (baby goats). We can let them drink mothers' milk and "lose" a part of mothers' production or give them cheap milk powder bought on the market and keep mothers' milk for making cheese. The former option costs more but it's a long-term investment to get healthy and vigorous milking goats later. If the kid is sold before it gives milk to the farmer, the kid will have to be expensive or the farmer would lose a lot of money. The latter option is the cheapest way to get kids that can be sold quickly.

Figure 16 A kid (CHV)

The process of commoditization does not only affect regular farming inputs (animal food, fertilizers, seeds) but also instruments (e.g. machines, tools, buildings), objects of labour (cows, kids, land), workforce and capital. The example of the soil (object of labour) pushes us further in the reflexion. Although farmers do not buy and sell land that much, a piece of land may enter or leave family resource-base in the short term. Actually, land use right evolves not only with land ownership but mostly with tenure agreements. In Wallonia, 68% of agricultural land is used under tenure agreement (DGARNE - SPW/DGO 3, 2013). With modernization, farmers take over land via these time-limited contracts but their duration tends to be shorter. On the land "market", it is quite common to rent a piece of land for one year only. This short-term presence of the piece of land in the resource-base may imply short-term strategies and a lower level of investment in soil health and structure (crop rotations, cover crops, agroforestry). The farmers I met told me that in the past, the workforce consisted in family members (often three generations) and the help from smaller farmers in the village (or their children) that were looking for extra

income. It was also common that travellers stayed for few months on the farm and helped to fix the barn, dig a ditch, and cut firewood. They were "fed and housed" and paid a little at the end of the stay. This kind of reciprocity was a way to get extra workforce for cheap in money but remunerated with other resources that the farm family had (house, meals). During the last fifty years, agriculture modernization sought to reduce labour input: new technologies saved labour and labour-intensive activities were abandoned. At the same time, labour laws evolved with the negotiations between 'patrons' and the growing number of workers and employees in other economic sectors. To get extra workforce, farmers have to hire workers on the labour market and so pay wages and social contributions (in money). The resource "capital" has also been affected by commoditization. Deeply rooted in peasant culture, farm savings consist in different resources accumulated over time (e.g. extra cattle, working horses (foams), timber trees, stock in the granary) that could be released i.e. exceptionally sold in case of need although they were not produced exclusively to be sold. These resources grow in and with the farm; their maintenance is relatively easy. The second industrial revolution brought forward bank credits that became more and more common also in agriculture (Mazoyer & Roudart, 2002). In the credit system, the farmer buys loans from the bank; he pays interests for this service. At the moment, average farm loan is about 160 000€; i.e. one third of what farmers invest on their own farm (DGARNE - SPW/DGO 3, 2013). Unfortunately, there is no statistical data that shows differences between young and old farmers; almost two thirds of farmers are older than 50. To sum up, resource commoditization reduced socio-economic autonomy of the farm and fostered its connection to the markets.

The third implication of externalization is the shift of the source of the know-how. As entire segments of the labour process left the farm, the farmer has to learn the codes ("directions for use") of technologies from the vendors and to comply with prescriptions and standards of food-processing industries. State rules and subsidies (conditionality) also prescribe what, how, and when to do. ***Technical-administrative relationships*** seek to create alignment and coordination on the farm again (van der Ploeg, 1996). Labour norms (how to do well) were not only produced in external institutions but were also subject to commoditization. Farmers have to pay for pieces of advice directly (private consultant) or indirectly (incl. in the price of the commodity). Thus, "innovation" and "progress" became expensive technologies, commodities developed by specialized industrial and scientific institutions. For instance, New Holland Agriculture employs 400 people to optimize the design of combine harvesters in Zedelgem Center for Excellence (Belgium). In this same plant, there is even a training center [2]for resellers and technicians of the group. In the case of

Figure 17 Logo & motto of New Holland Agriculture

[2] You can watch a video about this on Youtube: http://www.youtube.com/watch?feature=player_embedded&v=h-8o594Blsw

regulations and subsidies, "progress" toward sustainability means better rules or better payment scheme for ecosystem services. The externalization of innovation and design tends to favour system optimization rather than system innovation. Actually, it is hard for the farmer to fine-tune these technologies and rules with unconventional 'combinations' or 'farming systems'; their codes assume generic farming systems. Moreover, the centers of innovations are specialized in particular kinds of technology or regulation and their activity is bounded by patents, trade and political agreements. This can lead to path dependency, homogenisation of farming and farmer technological dependency.

Specialization, externalization, commoditization, all these processes did not happen smoothly. There were also frictions, resistances and entanglement with other societal issues. In the following paragraphs, I will go through five manifestations of modernization as a process in Wallonia. Indeed, many institutions such as the church, national education, state subsidies and regulation will be evoked.

Internal migration and the BoerenBond. From the nineteenth century till the 1960s, an internal migration from the poor Flemish countryside to Walloon industrial basins had happened notably because of the decline of 'at home textile manufacture' (Quairiaux, 2006). These people were seasonal workers in Walloon agriculture or for a longer term in the prosperous Walloon industries (coal mines and steel factories). In the 60s, many migrants from Flanders took over farms in Wallonia. Dany's dad told me that it was hard for him to get more than 15 hectares at that time, because Flemish migrants got loans and support from the BoerenBond which is the largest (Belgian then) Flemish catholic farmer-entrepreneur association. At the beginning of the twentieth century, the Catholic Church and political party were afraid that peasants would get tempted by socialist ideas; they founded the "BoerenBond" "a strong catholic peasant movement". After World War II, its slogan was *"Vergroten, investeren, moderniseren, specialiseren"* i.e. enlarge, invest, modernize, specialize (BoerenBond, 2013). This large association became a strong driver of agriculture modernization, even in Wallonia. *"De economische afdelingen van de Boerenbond"* i.e. the related companies expanded in different domains of farming: insurances, animal food, loans, and the process of agricultural products (BoerenBond, 2013). The farmers I met now consider the BoerenBond as the largest institution that supports (both politically and economically) conventional farming at the national level. The BoerenBond is still tightly related to the powerful Flemish Christian "pillar" represented by the Christen-Democratisch en Vlaams (CD&V) in Belgium and European People's Party (EPP) in the European institutions.

Figure 18 Poster of the BoerenBond - source (BoerenBond, 2013)

Farm subsidies are an important institutional driver of agriculture modernization. Since the creation of agricultural common markets in 1962, European Institutions have designed farm subsidy schemes to support agriculture productivity, competitiveness and sustainability (European Commission, 2013). The objectives of the CAP evolved over time and are still discussed. At the moment, farmers in Wallonia can get different types of subsidies. Firstly, farmers can get investment grants to take over a farm, increase farm scale or 'modernize' the equipment (e.g. milking parlour or robot, tractor, machines). To be valid, the application must answer positively to several criteria. For instance, the farmer must have basic knowledge and experience about farming, the business model must be profitable in the short term, the investment must increase farm productivity and/or help the farm to respect environmental norms. These criteria are defined by the Ministry and change quite often. The farmer can ask a registered accountant to help him to write the application -*"le projet de reprise"* i.e takeover project or *"le plan d'investissement"* i.e. investment plan- and to design the business model. The business model takes into account the expected gross income, costs and subsidies (investment grants, CAP). If the application is accepted, the farmer can get *"subventions en capital"* (i.e. cash) or *"subventions en réduction d'intérêts"* (i.e. reduction of interest rates). The bank also controls the "quality" of the project and bases its decision on the business model. Thus, the more subsidies the farmer gets, the more money he can borrow from the bank. Secondly, farmers get subsidies from the Common Agricultural Policy of the European Union. There are subsidies to sustain particular types of production calculated per object of labour (e.g. x euros per hectare of cereals or per suckler-cow). There is a premium for organic producers and another to incite farmers to make "agri-environmental" efforts (e.g. planting hedgerows, sowing flower strips, planting cover crops in winter). Different types of efforts are compulsory to get paid; they are called "conditionality". European civil servants define and control the respect of conditionality. Farmers must declare what they do (fill-in forms) and be able to proof that they actually did it. It happens that farmers apply for investment grants to realize environmental obligations (conditionality), *"pour se mettre aux normes"* (lit. to stick to the norms) as they say. Farm subsidies are still an important source of income for farmers; they represent more than 70% of farm labour income on average in Wallonia (DGARNE - SPW/DGO 3, 2013).

> *"The CAP has its roots in 1950s Western Europe, whose societies had been damaged by years of war, and where agriculture had been crippled and food supplies could not be guaranteed.*
>
> *The CAP aimed at encouraging better productivity in the food chain, ensuring fair standard of living to the agricultural community, market stabilization and ensuring the availability of food supplies to EU consumers at reasonable price.*
>
> *Incentives to produce were provided through a system of high support prices to farmers, combined with border protection and export support."*
>
> History of the CAP - Early years (European Commission, 2013)

Science. In the modernization project, helpful and true knowledge means scientific knowledge. Science in constructed as a distinct space, distanced from practice (i.e. farming). It is materialized in experimental fields (different from farmers' fields) and in class room and laboratory walls -see [Fig. 20] a former abbey became agricultural institute. Science is the space where particular rationality and ontology are reproduced; where pure and true knowledge is produced. Agriculture modernization fostered the division between conception, fine-tuning, diffusion and use of new means of production (Mazoyer & Roudart, 2002). There are two main types of scientific knowledge "centers": public institutions (agricultural schools, universities and research centers [Table.1]) and private institutions (research and development departments of private companies). Although their modes of funding are different, they converged to the same goal: the achievement of modern agriculture. Thus, the agricultural research community, its scientific and technical manpower are considered as the drivers of agricultural progress (Hayami & Ruttan, 1985). Their role is to teach farmers (educate, diffuse scientific information and language) and to produce innovative technologies. According to Paul Hebinck, the modern regime is characterized by stable networks that manage to constantly reproduce themselves; the direction of progress is contained in scripts of technological packages (Hebinck, 2001, p. 134). The regime thus contributes to agricultural development through knowledge and technology transfer. Although secondary schools educate a lot of future farmers, most of agricultural colleges and universities students do not start farming afterwards, they rather work in ministries, research centers and agro-industry.

Figure 19 Gembloux Agro Bio-Tech, old buildings (former abbey) - source (Gembloux Agro Bio-Tech - Université de Liège, 2012)

Tableau 1: Four agriculture-related public scientific institutions of different types located in Wallonia

Denomination and location	Institut technique Saint-Eloi (Centre éducatif Saint-Pierre), in Leuze-en-Hainaut	Centre pour l'agronomie et l'agro-industrie de la Province du Hainaut, in Ath	Centre Wallon de Recherches Agronomiques, in Gembloux	Gembloux Agro-Bio Tech - Université de Liège, in Gembloux
Founder (and funder) institution	Catholic education (Christian pillar)	Provincial administration (Hainaut) in 1950	National government in 1872 and ruled by Walloon government since 2002	National government in 1860, part of Université de Liège since 2009
Type of institution	Agricultural secondary school	Research centre, laboratory and experimental farm (70 ha)	Research centre with experimental fields (450 pers., 300 ha)	Agronomical higher education and academic research

Data sources : (Centre Educatif Saint-Pierre de Leuze-en-Hainaut, 2013), (Carah asbl, 2013), (CRA-W, 2012) (Gembloux Agro Bio-Tech - Université de Liège, 2012)

Industries "autour de l'agriculture" (literally industries around agriculture). Modernization and externalization did not only give birth to public scientific institutions but also to a wide range of agro-industries. These private and commercial institutions are located either upstream or downstream of the farm. Their main activities are trading (buying or selling commodities to farmers) and doing 'research and development'. This type of research consists in using agricultural sciences and economics to improve the commodities (seeds, machines, fertilizers, etc.). In the next table [Table. 2], I gathered pieces of information about four agricultural companies located in Belgium I heard about during fieldwork. Claeys, Jorion, Rosier, and Lutosa started "local", "together with local farmers". Today, all of them are still active in the municipality they were founded in spite of economic globalization and free trade agreements. Let's see their evolution and in what direction they are "farming technologies of tomorrow".[3]

Tableau 2: Four agriculture-related companies located in Belgium

Name of the company	CLAEYS	JORION SEMENCES - ZADEN - SEEDS	ROSIER	LUTOSA
Foundation	1906, Zedelgem. Leon Claeys started to make threshing machines in this cropland area.	1902, Frasnes-lez-Anvaing. Valère Jorion started to produce horticultural seeds	1880, Moustier. Alfred Rosier started to produce "superphosphate" for local farmers, using the reaction of sulphuric acid on phosphate	1978, Leuze-en-Hainaut. Van den Broeke family took over a small potato transformation manufacture.
Domain of activity	Agricultural machinery (combine harvesters)	Seeds (wheat since 1957, maize since 1972, forage crops and grasses since 2002)	Mineral fertilizers	Potato processing into different frozen food products
Group	New Holland Agriculture since 1964 (now part of CNH Industrial N.V.)	JORION S.A. The company took over another one. Partnership with Philip-Seeds	Boreal Group chemical division (owned partly by TOTAL Group)	Mc Cain Foods Limited since 2012. Lutosa itself has 10 branches.
What the R&D department does?	Optimizes the design of combine harvesters & other NH machines and tractors	Seed treatment (pesticides), develops new varieties of grasses and cereals	Develops different types of mineral fertilizers (powder, granulates, liquid)	Develops and optimizes different potato-based frozen food products

[3] « Farming technology of tomorrow » is also a slogan of New Holland Agriculture

Other data	The group: 67000 jobs, 64 plants, turnover: 25 €Bn. The "Claeys plant" in Zedelgem: 2800 jobs incl. 400 in R&D dpt., 36ha.	Registered reseller for Cargill. The company has its own experimental farm.	Exports in more than 100 countries. Classified as "SEVESO II - high level". Rosier S.A. 'consolidated' turnover is 278,4 €M	Processes 800 000 tons of potatoes / year. 88% of its production is exported in 111 countries. 800 jobs. Turnover: 240 €M

Data sources (New Holland Agriculture, 2013), fieldnotes, (Jorion S.A., 2008), (Rosier S.A., 2013), (Lutosa S.A., 2013)

Actually, all the agro-industries that were founded at that time did not survive. These four companies evolved and they still exist. Here are three lessons from these four cases. Firstly, these four companies had to extend their activity (their turnover grew) and to export a part of their production; they got connected to international product markets. Secondly, these four companies had to take over others and/or be taken over in wider groups, at least partially; they got connected to global finance. Finally, two of them (Claeys and Rosier) stopped dealing directly with farmers; resellers and other types of intermediaries play in between.

Long food supply chains. This last manifestation of modernization as a process is still a battlefield that often makes newspapers headlines. Agriculture modernization lengthens food supply chains on both sides. Upstream: animal food, pesticides, and animal medicines are manufactured by specialized companies that may be located wherever on the planet. These inputs are transported, transformed and traded by many different companies on international markets. These markets are often criticized for not being clear. For instance, it is impossible for the farmer to know the exact provenance of each coponent of chicken food bags bought from a provider. The wheat may come from neighboring farms while the soy may come from Brazil, the maize from the USA, the vitamins, minerals, and palatability enhancers from other industries. Some components may even be by-products of food processing industries (i.e. downstream). Downstream: the development of food processing industries (e.g. dairies, slaughterhouses, can factories), international distributors, and retailers (e.g. supermarkets, fast food restaurants) distances farmers from eaters. Thanks to this two-sided process, farmers do not have to worry about producing inputs, processing products nor selling them.

Stephen Sherwood often says that we can talk about "modernized agriculture" when producers and consumers cannot know each other (Sherwood, et al., 2013). Indeed, institutional substitutes to this direct relation had to be creatively imagined; the growth of food trade and its internationalization increased their necessity (Oosterveer & Sonnenfeld, 2012). Thus, state and even EU hygiene norms, traceability system, labels (contractual rules), industrial standards (ISO), registered private and public control agencies, certification companies were all attempts to regulate the food supply chain again. They changed the definition of food quality while distancing the "reality" of farmers from the "representations" of eaters. This process had different consequence for the two extremes of the chain: marketing companies scrutinize

consumers' wishes but farmers receive these market trends as unavoidable new realities. In spite of this large institutional apparatus, trust crises occur regularly in the food supply chain.

In the late 1990s, food safety crises (Dioxin and Mad Cow) occurred in the agro-food sector in Belgium and provoked the resignation of two Ministers. The media and people at stake framed the crisis as the consequence of a lack of transparency and dialogue among different stakeholders in food chains (Houins, 2007). The federal government then created a single federal agency for food chain safety (AFSCA) that would ensure strict controls and better communication toward consumers. AFSCA is an "autonomous agency", responsible towards the federal state but partly funded by the state and partly by other stakeholders of food sector. Agro-industry actors, associations of consumers, major farmer unions and representatives of other public institutions (incl. Flemish and Walloon Regions) are invited to take part in the "participatory" "multi-stakeholder" consultative group that decides the frame of food safety policies (Houins, 2007). At the moment, AFSCA is still criticized by farmers for imposing industrial standards to small-scale production units and consumers' trust in food chain is low. In a recent poll, seven citizens out of ten thinks that the way of producing and consuming food should be entirely rethought and renewed (Van Ossel & Ryckmans, 2013).

MODERNIZATION: THE PRACTICES

Agriculture modernization can also be studied at the level of social actors' practices. Modernization affected agriculture as a set of multiple activities, knowledge and techniques. Disconnections, new connections, rationales, relationships and practices entered farmers' daily life. Here are five illustrative manifestations of the modernization of practices.

Pulling force, machinery and farm scale. The historical pulling force in Belgian agriculture is the "Brabant" [Fig. 21]. Farmers used to work with horses since Middle Ages. Working horses' history is made of centuries of evolution; people kept on breeding them, mixing 'indigenous' with oriental horses, selecting types in different cities then crossing them. In 1830s, one of the most important policies of the young Belgian state was to improve working horses. They were the most exported product in Belgium in the 1920s (Wolfs & De Greeff, 2013). This national proud was deeply rooted in the local culture and even in the language. Many people were involved in the breeding of two major types: the Brabant in the farms and the Ardennes in the forests. Farmers also took care of the reproduction; extra foams were sold to colleagues or transporters. These horses were fed with oats and kept in a specific farm building *"l'écurie"* (horse stable). Until World War Two, many machines adapted to these horses had been developed by farmers and artisans in the villages.

In the 1950s, Marshall Plan and modernization agricultural policies favoured motorization. Some farmers, "early adopters", sold one of their horses to smaller farmers and bought a tractor. At the beginning, they plowed with the tractor but they still sowed with horses as they would not drive on *"le labour"* (i.e. plowed land). They progressively adapted horse tools to tractors. In Ferme Saint-Michel, my maternal grandparents stopped milking cows and started selling tractors to fellow farmers. They had a partnership with FIAT and they learnt about engines and machinery. Tractor industries published books *"instruction de service"* (i.e. directions for use) for farmers that describe the functioning of tractors and how to use and maintain it properly [Fig. 21].

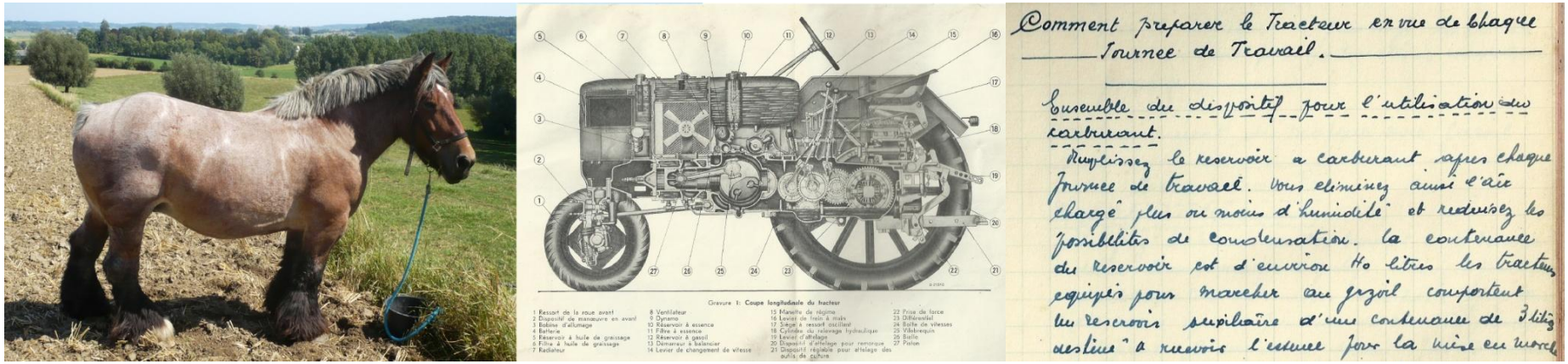


Figure 20 Pictures from family archives: Brabant mare (CHV) and my grandpa's books (1950s)

In the 1980s, machines were adapted to average farm size; smaller farmers shared tools or started *"faire l'entreprise"* (i.e. doing tasks for others, selling farming services). During the next decades, industries offered bigger tractors and machines that made both possible (work speed) and necessary (pay-off) for the farmer to take over more land. *"Il faut s'agrandir"* (i.e. one must expand). Smaller farmers could not afford these instruments which development was seen as the future of farming. The land parcels are still often named after their former farmer. The horse stables lost their function; village artisans progressively stopped their activities or became resellers. The new tractors and machines are now designed for *"gestionnaires"* (managers of capitalist farms) and *"entrepreneurs"* i.e. very large and expanding farms often mounted as companies and that sell farming services. However, there are working horses and harnesses in four out of the nine farms I went to; they are kept mostly for hobby or agri-tourism activities. It is also quite common that retired farmers still produce food at a small-scale for their family as a hobby (e.g. taking care of hens and chickens, *"faire le potager"* i.e. growing vegetables).

Meat vs. milk cattle breeding and farm specialization. At the end of WWII, demographic trends and food consumption habits changes increased the demand for meat and dairy products. Cattle merchants and dairies came to the farms to buy raw products. The farmers could then focus on mass production. As prices were given by downstream "markets", farmers had to produce more liters of milk and kilos of meat to earn more. To reach that goal, there were two main strategies to adopt: on the one hand, to intensify livestock management in external inputs (medicines, concentrates, hormones, minerals, vitamins) and to select cattle that could value these large quantities of concentrates into milk or meat on the other hand. This selection fostered the distinction between two types of cattle: meat cattle and milk cattle. By the way, cattle pulling capacity disappeared as a criterion for selection.

To develop their dairy farm, farmers could buy Holstein sperm imported from Italy and Canada. The Holstein Association organized classes for farmers to learn to inseminate [Fig. 22 & 24]. This training programme ended by an exam and allowed farmers to inseminate their own cows themselves. Consulting companies (spin-offs of agricultural universities) offered their services to monitor and analyze animal performance (e.g. GARBO cattle reproduction management programme) [Fig. 24b]. A nutritionist came to the farm to design and optimize the food ration. Many farms adopted a *"DAC"* (incl. at home in 1986), an automatic concentrate distributor that allowed making the ration specific for each cow according to its needs and performances. Each cow is identified with a magnetic medal [Fig. 22]; a computer registers cow's milk performances and customized ration. Dairy intensive production also required expensive and specific equipment such as cubicles and a parlour. Farmers could apply for investment grants for such equipment. People stopped milking by hand; the parlour was told to be the most efficient milking system as it would reduce workload. The first milking robots appeared in the 2000s in the area. Moreover, farmers had to get a quota (right to produce milk) and to buy shares in the dairy to be allowed to sell their production. These many details of dairy

Figure 21 Pictures from family archives: Holstein cattle and the parlour (CHV), summer harvest (FSM)

farming intensification leaded to farm specialization in many cases. Meat cattle breeding also evolved along the same lines. In this area, *"Blanc-Bleu Belge"* white-blue cattle (BBB) first considered as abnormal cows became more and more bred for their massive meat production. Their development leaded to an increasing use of cesareans translated into vet costs and antibiotics use. However, some farmers kept on mixing races and developed the *"Blanc-Bleu Mixte"* cattle (BBM) that is more resistant and gives milk. In the same vein, many farms in the area (and 4 farms out of the nine) have *"deux troupeaux"* i.e. two separate herds for milk and meat. The term *"ferme mixte"* (mixed farm) means a farm that combines cattle breeding and commercial crops. This half-specialized type of farm has been quite common in this area until now and allowed medium-scale farms to cope with market price fluctuations -see next section.

Maize and commercial crops. Farmers in the area started to plow grasslands and grow maize as a fodder in the late 1950s. This crop produces a big quantity of energy-rich dry matter per hectare. Growing maize requires a lot of work but only at two moments in the year: when planting and when harvesting. At the beginning, farmers helped each other to carry the harvest and make the silo. Over time, specific machines and trailers were developed (cutting, carrying, packing); *"entrepreneurs"* invested in them and sold their service to other farmers. On the contrary, making hay requires a lot of care, observation, flexibility during all the summer; *"tu n'as jamais fini avec le foin"* i.e. you're never done with making hay. In the food ration, the maize had to be compensated by protein-rich concentrates made of linseed cake (industrial by-product) and soy imported from the USA. International trade agreements and transport systems made it possible. As the maize is poor in nutrients, farmers also had to buy minerals and vitamins from the merchants. Food ration became quite complex and the calculations of the nutritionist (advisor and traveling salesman from the animal food company) became necessary to value these inputs properly.

By reducing the necessity of grasslands, fodder maize cultivation made land available for commercial crops: wheat, potatoes and beetroots. Wheat is often sold to a merchant in the village. Beetroots were sold to sugar factories via a quota system that may be cancelled in the near future. There were many sugar factories in the area (Brugelette, Fontenoy, Frasnes, Warcoing, and Wez) but only one of them is still buying beetroots to farmers and there are only three sugar factories in Belgium today. The concentration of beetroots processing increased transport costs but in spite of this, the price is good thanks to price premiums (CAP, until new reform). Potatoes were sold mostly to *"Madame Van den Broeke"* (Lutosa); this company is still the main buyer of potatoes in the area. Farmers can get contracts (fixing the price and the quantity) in advance for a part of their production; this system reduces income variation. Maize, wheat, beetroot and potato cultivation are increasingly mechanized and require many external inputs: selected (even hybrid) seeds, herbicides, pesticides and fertilizers. The prices and quality standards of commercial crops, concentrates and other external inputs are given by the traders ("the market"); the farmers cannot do anything about them. However, the more sloping grasslands are not plowed but fertilized and used for grazing or making haylage.

Relationships with specialists. Many specialists of different kinds started to come in the farms. These specialists are often high-educated from agricultural schools and universities and they all have a lot of knowledge about a specific aspect of farming (plant health, fertility, economics, nutrition, mechanics, etc.). They often speak another "language", i.e. they use not only other words but also other meanings to talk about this aspect of farming. These actors also bring their truth with them, their normative framework that they translate into pieces of advice and recommendations - "you should do that". Thus, they suggest "better" practices, more efficient, scientific, rational techniques according to their own framework. For instance, *"ingénieurs de l'état"*[4] made my grandpa pull down three kilometers of hedgerows because they would "steal fertilizers". Despite the fact that agricultural education taught scientific vocabulary to farmers, "science is not the theory of the practice of farmers" (Darré, 1996, p. 130). Farmers' knowledge cannot be entirely translated in the language of specialists; farmers deal with all the aspects of farming at the same time and experience them through daily work. Thus, farmers knowledge cannot be replaced by scientific knowledge, scientific knowledge is not enough to conduct their practices (Darré, 1985, p. 150). The encounter provokes more than knowledge acquisition or substitution, the farmer has to re-conceptualize a new framework that integrates his practices, experiences, and their associated concepts, the new techniques and their associated new conceptions. By doing so, the farmer avoids to adopt the technique without mastering its meaning (Darré, 1985, p. 148).

There are four types of specialists that come to the farm. Firstly, *"les marchands"* (the vendors, "those who have something for sale in the trunk of their car") come and offer new technologies designed by their company. This technology is often framed in a well prepared discourse as a miracle, i.e. our solution -end product & associated knowledge from our industrial and expert space- to your problem -lacks and needs of your farm. Vendors are actually known for talking a lot and listening a little. The associated "truth" to be sold to the farmer is that his problems (whatever they are) call for "our" solution; "our" solution will fill "your" gap and will bring even better. The technologies have particular codes that contain the idea of the perfect farm system according to their (specialized) space. The more the farmer "listens to them", adopts their technology, the more he will tend to their model, enter and adopt their farm system (become a farm of reference, an example for others, a*"vitrine"*). For instance, mineral fertilizers are told to make the manure redundant for reproducing soil fertility; according to the vendors, this technology makes possible (even desirable) the disconnection between livestock and crops. On a single farm, many vendors from different spaces come and they all have their own idea on how the farm should be. Thus, aligning the farm to the discourse of one of them means redesigning the farm and its resource flow, i.e. changing the way the workforce, gross income, subsidies, premiums, and loans are used. The farm is thus a source of business for them; it is a big issue to convince the farmer not to listen to other

[4] They were the state agricultural engineers that advised farmers in the 1950s.

vendors and that the miracle technology they offer is the actual solution *"d'avenir"*. The farm is a bit the battlefield between industries that try to graft -and sell- their technologies wherever it is possible. A last element about vendors, their technologies and associated discourse contain normative standpoints: what is normal to do and what should be done. These normative elements are sometimes sources of disagreement with farmers. It also partly explains why salesmen are often farmers or farmers' sons. For instance, the discourse of pesticides vendors says that it is normal to use toxic products in the fields. But farmers do not always accept everything and some of the shifted to organic as they do not believe in nor agree with that discourse.

Secondly, *"les contrôleurs"* (controllers, "those with a checklist") come to check whether the farm respects the standards it is supposed to. These standards may be either state rules or contractual rules (e.g. organic certification). It has happened that contractual rules became almost compulsory as all the dairies demanded their respect (Quality of Dairy Chain -QFL). These rules are still negotiated between the major farmer unions (the Boerenbond and its Walloon twin FWA) and the national confederation of dairy industries. Usually, controllers come to the farm with a checklist i.e. a list of items formulated by their institution that are meant to assess farm compliance [Fig. 23]. Their framework assumes a particular way to reach the goals: "good practices" and "proper equipment" i.e. an ideal and virtual functioning of the farm. Controllers do not have anything to sell but they are supposed to give farmers tips for improvement. They have control on farm resources (right to produce, label) and they can enforce their schemes with fines. The "reality of the farm" rarely matches perfectly the schemes; tough negotiation often occurs to balance farmer compliance and controller comprehension.

MONITORING DE LA DURABILITE DE LA PRODUCTION LAITIERE

Catégorie	pt.	Initiative de durabilité	application	validation
Santé animale	1.1	Le producteur laitier a conclu un contrat de guidance avec son vétérinaire d'exploitation		
	1.2	Le taux cellulaire des vaches individuelles est déterminé de façon structurée : * contrôle laitier ou * mesure individuelle des taux cellulaires par robot de traite ou * de la propre initiative du producteur à l'aide d'analyses individuelles au Comité du Lait		
	1.3	Moins de 15 % des vaches requièrent une attention particulière : contrôle laitier		
	1.4	Un plan d'approche argumenté pour une utilisation responsable des antibiotiques, révisé chaque année, basé sur des analyses bactériologiques et des antibiogrammes		
	1.5	Rapport de contrôle et de mesure de l'installation de traite datant de moins de 3 ans, et basé sur une mesure dynamique de la machine à traire		
	1.6	Participation active au programme de contrôle de la paratuberculose: niveau de suivi attribué par l'ARSIA et les vaches positives sont éliminées dans les délais prévus * Niveau de suivi A * Niveau de suivi B		
	1.7	Participation active à la lutte extra légale contre les maladies du bétail: participation à au moins un programme, démontré par des rapports d'analyses ou preuves de vaccination:		

Figure 22 Checklist and explanatory booklet of the Sustainability Monitoring of QFL (contractual standards of the dairy chain)

Thirdly, the vet comes when the farmer calls him. In general, it either means that an animal is sick and the farmer does not manage to cure it -"the farmer is the first vet"- or an in-calf cattle needs a caesarean. In other words, the vet often comes when something is going wrong in the farm. In the area, there are two kinds of vet: vets for pets *("petits animaux")* and vets for big animals (*"gros animaux"* horses, cattle and other ruminants). Thus, the vets that go to farms are used to the complex realities of the farms. The vet is often good at system thinking and asks many questions about the food, the living conditions, the care of the farmer and the behavior of the animal. Farmers often like the fact that the vet is from *"du milieu"* i.e. that (s)he is farmer son/daughter, lives in the neighborhood or belongs to the (extended) family; on this aspect, the vet is the opposite of the controller. Vet visits and medicines are expensive; intensive livestock management often induces regular treatments (antibiotics, vaccines) that cost a lot. Insemination can only be done by the vet or the farmers who followed the course. These farmers could buy the required tools directly from the Holstein Association [Fig. 24c].

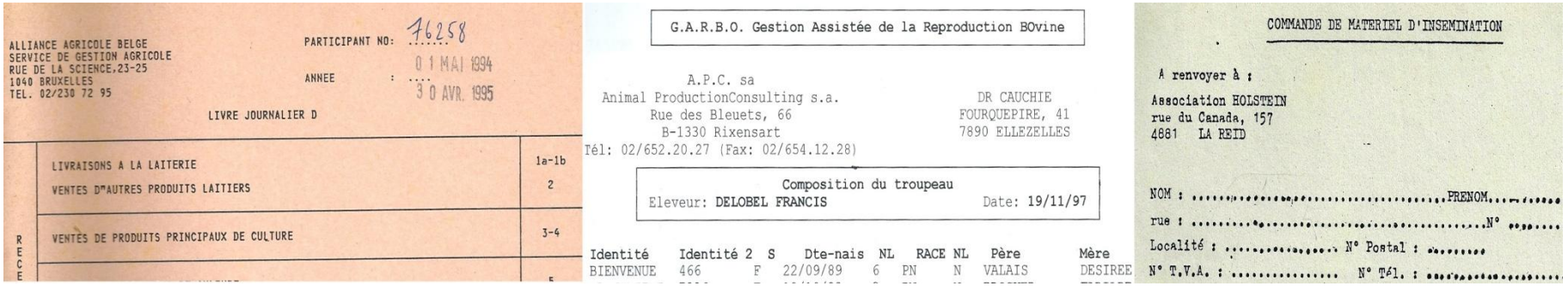


Figure 23 a) Account book, b) GARBO report, and c) Association Holstein order form - from family archives (CHV)

Finally, the accountant comes regularly to the farm and knows the financial situation of the farm. The farmer chooses to subscribe and pays for this service. It is compulsory only when the farmer asked for investment grants -it is a condition to get subsidy. The accountant goes in many farms and is used to deal with the intimate and complex realities of the farms, a bit like the vet. In the area, farm accountants come from farmer unions and use standard accountancy grids designed by this institution [Fig. 24a]. In a certain extent, the accountant conveys the normative and prescriptive "modern" discourse (one should produce more, take over, expand, "evolve" to survive) and translates the market trends into terms applicable to the farm. On the other hand, the accountant plays the role of wise advisor, *"garde-fou"* (safe-guard) as (s)he sees the financial reality of the farm (pay-off capacity, debts, income); (s)he would help to *"garder les pieds sur terre"* (lit. keep the feet on the ground) and prevent from doing "disproportionate" investment.

Added-value and labour issues. Eventually, farmers can buy fertilizers, concentrates, sperm, and buildings; the dairy's truck and the cattle merchant come to the farm (farmers stopped making butter and selling cattle to butchers), and mechanical technologies increasingly populate the farms. GPS guided tractors and milking robots are the latest newcomers in the area; these are techniques farmers are not the experts anymore and have to learn or pay for advice. Farmers quickly understood that the fact that many tasks left the farm means that many ways to value their workforce -and the skills they already have- disappeared. Thus, the only way to still get labour income was to expand [Fig. 25] or to (partly) quit farming. In many farms, the wife stopped working on the farm *"la femme travaille à l'extérieur"* (lit. the woman works outside); this is even more the case in young couples where sometimes the man has also a part-time job elsewhere. The expansion was also favoured by dairy industries that pay a better price to larger quota holders (often larger scale farms).

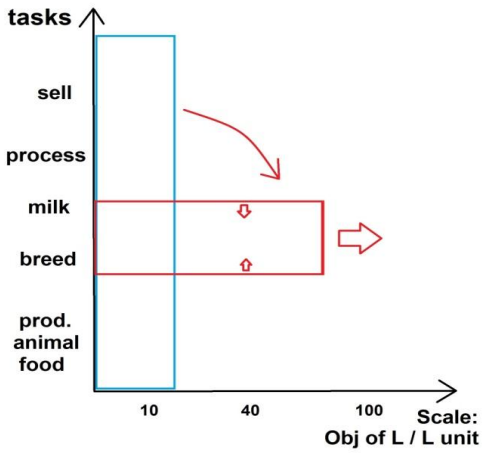


Figure 24 Farm activity, tasks and scale (i.e. # objects of labour [cows, ha, etc.] per labour unit)

However, the tasks that are supposed to stay on the farm -i.e. not externalized- are not the ones that generate more added-value in particular. Industries are leading the externalization process; thanks to their economic and negotiation power, industries decide where to stop doing themselves and what tasks they let to the farmer [cf. two small arrows on Fig. 25]. In other words, the tasks that are not externalized are those that industries do not want to do. It is more a matter of equipment and access to resources (land, capital, -relatively cheap - workforce) than skills, know-how and knowledge. In the area, this process induced political resistance and leaded to the emergence of an alternative farmer union that sought to defend *"les petites exploitations"* (small farms) against *"les gros et l'industrie"* (the big ones and industries). This new union, *Fédération Unie des Jeunes Agriculteurs* (FUJA, united federation of young farmers) was the dissident youth section of the major farmer union. Its wishes were that small farms should not disappear but rather benefit from modernization and new technologies. Thus, Jean Frison and his colleagues started to group inputs purchases and negotiate better prices. In the same vein, the *"Groupement de Producteurs Laitiers"* (GPL, dairy farmers' group) compared the price calculation formula of different dairies and tried to foster competition among them. Dairy farmers also gathered to obtain to be paid for fat & proteins contents and that the analysis would be done by a laboratory independent from dairies: the *"Comité du Lait"* (milk committee). Few farmers went even further and started to process and sell their own products via a cooperative *"Agrisain/Coprosain"* (NB: *"sain"* means healthy) that is still working and even expanding today. By controlling and fine-tuning 'the whole chain', these small-scale farmers tried to pocket the added-value of their quality products and established distinctive criteria of production. I will come back to this cooperative in a next section.

Parole d'une agricultrice du Nord

(2001) Christiane Delobel-Faux -my mother-

Nous avons marché, un bandeau sur les yeux.
On nous a dit : « Investissez ! Produisez !
Le progrès fera de vous des dieux…
Produisez plus et plus encore. Allez-y à fond !
La performance ou la disparition… »

Nous avons suivi les consignes.
Les emprunts, les machines.
-Les emprunts pour payer les machines
Et les machines pour payer les emprunts.-
Gagner du terrain,
Avaler son voisin…
Débrider son moteur,
Grossir les montagnes de beurre,
De sucre, de viande et de blé
Et puis regarder,
Impuissants,
Les prix dégringoler
Sur l'autre versant…

Un seul moyen pour t'en sortir :
Force la dose, force la vache,
Force le sol… Cravache !
Ou tu vas mourir…

We walked, banded eyes.
We have been told: « Invest! Produce!
The progress will raise you to gods
Produce even more. Go all the way!
Perform or disappear… »

We sticked to the rules.
Loans, machines.
-Loans to pay for machines
And machines to pay back loans-
Get more land,
Take over neighbour's…
Boost the engine,
Make mountains of butter,
Sugar, meat and wheat always bigger
And then look,
Powerless,
Prices decrease
On the other side…

The only way to cope with that:
Force the dose, force the cow,
Force the soil… Go ahead!
Or you will die…

Mon époux, réveille-toi c'est un cauchemar !
Tu trimes la tête en bas,
Tu engraisses ceux qui t'écrasent…
Abruti, ne vois-tu pas
Qu'ils ont dénaturé ton labeur ?
Parfois cependant, tu le dis si bien :
« Descendu de mon tracteur,
Je ne suis plus rien… »

Comment avons-nous cru aussi longtemps
Qu'en détruisant la mère
On nourrirait les enfants… ?
Comment n'avoir pas compris auparavant
Que la paix sur la Terre
Passe par le respect de tous les paysans ?

Rebelles et solidaires,
Puissions-nous amorcer un virage salutaire,
Nous détourner des circuits
Qui nous tiennent asservis
Et bannissent, au Sud, les paysans, nos frères.

Qu'à nos propres yeux apparaisse notre vraie grandeur
Et notre urgente raison d'exister :
La Vie -toute vie- est sacrée…
Soyons ses irréductibles défenseurs !

Darling, wake up, it is a nightmare!
You pain and look down,
You feed those who lay on you …
Idiot, don't you see that
They altered your work?
However, you sometimes say:
« Out of the tractor,
I am not anything anymore… »

How could we believe for such a long time
That we would feed the children
While destroying the mother… ?
How did not we understand before
That peace on Earth
Requires the respect of all peasants?

Rebel and united,
May we engage a salutary shift,
Quit circuits
That bond us
And ban, in the South, other peasants, our brothers.

Let's consider our intrinsic value
And our urgent reason to be there
Life -any life- is sacred…
Let's be its irreducible defenders!

MODERN PROBLEMS

During the fieldwork experience, I met farmers who -partly- disagree with modernization discourse, had different projects, and who were looking for something else. Thus, they frame modern changes as -source of- problems and they formulate critiques that call for stepping out of these processes and rethinking their logic of farming. They have their own categories to talk about these connected problems; the four next sub-sections gather thoughts, stories, standpoints, and worldviews that show both threat and critical thinking and that call for creativity.

INDUSTRY? WE DON'T FIT!

Farmers I met consider their relations with upstream and downstream industries as problematic on different aspects. First, industries prevent them from *"décider nous-mêmes"* (lit. deciding on our own). Some farmers told me stories about other farmers who adopted innovations (farm systems) offered by industries and that reduced their room for manoeuvre. *« Ils se mettent dans des systèmes impossibles »* (lit. they put themselves in complicated systems) for instance they install automatic calf feeders but they have to buy milk powder, they grow commercial crops (potatoes and vegetables for can industry) but they must *« tout acheter »* (lit. buy everything) for cattle. Another farmer told me that dairy industries make new kinds of contracts with farmers in Germany. The dairy *"dicte comment il faut faire"* (lit. lays down how to do), *"dicte le prix"* (lays down the price), *"ils ont investi, ils sont coincés"* (the farmers have invested, they are stuck). In the same vein, farmers are fed up with vendors that try to convince them to invest in larger buildings, machines, tractors than what they actually want. The vendors *« embobine le fermier dans la folie des grandeurs »* (lit. enrolls the farmer in delusions of grandeur), then *"le fermier a du mal"* (the farmer has difficulties). *« Les marchands nous manipulent, l'agriculture n'est qu'un prétexte pour le business. On la fait vivre pour ça »* (lit. salesmen manipulate us; agriculture is just a pretext for doing business. They make it live just for that reason). Farmers formulate vendors' offers as dangerous traps or risky options. *« Quand est-ce qu'ils vont comprendre? »* (when will the farmers understand ?) ; *« il ne faut jamais faire confiance à tous ces représentants »* (one should never trust in all these vendors).

Secondly, they consider that industries make them work in ways they don't want to. Farmers disagree with the normative framework of industrial technologies and farm systems. Farmers I met position themselves in opposition to industrial farming i.e. farming along the lines of industrial codes and prescriptions. For instance, a farmer told me that his neighbor, industrial pig farmer, had a problem with the ventilation system during few hours. The next day, sixty tons of dead pigs were lying in the courtyard; *"ce n'est pas un problème"* (lit. it is not a problem [for those farmers]), the insurance intervened. On the opposite, I have been told many times *"nous, on n'aime pas les robots"* (lit. we don't like milking robots); « *je respecte mes vaches »* (I do respect my cattle), *"je ne supporte pas le gaspillage"* (I can't stand waste).

Although farmers I met are still in relation with industries in a way or another, they say they would not accept to do everything, *"je ne fais pas n'importe quoi »* (I don't do random things).

Thirdly, they think that industrial systems are responsible for malfunctioning world (hunger, climate change, social inequities, deforestation, etc.). For instance, a farmer told me that he doesn't like that his milk *"parte à la laiterie"* (lit. goes to dairy industry) and to supermarkets, he feels guilty and responsible for the *"agressivité économique"* (lit. economic aggressiveness) of these companies. Farmers don't want to take part in systems that produce a world they don't like to see. Agro-industries and the farmer union keep telling *« vous faites bien »* (lit. you do well) *« les gens extérieurs n'y connaissent rien »* (the rest of society does not know about farming) but *« on n'y croit de moins en moins »* (we believe less and less in this discourse). *"La société nous envoie des signaux"* (lit. society sends signals to us); these farmers consider these signals and they want to rethink their ways of farming instead of following the codes, the prescriptions and the rules. In the same vein, they try to be receptive to signals sent by surrounding living nature in order to design alternative farm systems *"nous essayons de sentir les besoins de la terre, des bêtes et ils le rendent, un contact s'est rétabli"* (lit. we try to feel the needs of the earth, of animals and they give back, there is a contact again).

Finally, industrial projects do not match their own projects and may even undermine them. Agro-industries *« ouvrent et ferment comme pour rire »* (lit. open and close as for fun), *« ils vont nous faire creuver de faim »* (they will make us die from hunger), *"elles nous laissent tomber"* (they let us fall, abandon, or deceive us), so farmers do not trust in industries for long-run projects. New technologies makes "labour that pays back" redundant *« dès qu'on ne va plus devoir mettre nos mains dessus (...) on ne va plus rien gagner »* (lit. as soon as we won't have to put our hands on it anymore, (…) we won't earn anything"). Many of technologies industries offer don't help them to reach their goals. For instance, the newest machines are neither affordable nor adapted to their needs *"ce n'est pas pour nous tout ça"* (lit. all this is not for us).

CONTINUITY IS THREATENED

Although most of farmers I met are farming *"de père en fils"* (lit. from father to son) for decades, the continuity of this activity is not evident and is even threatened. Market forces make farming hard and risky; inputs prices (*"les charges"*) increase faster than outputs'. Statistical data confirm this "economic squeeze" and shows that many farms are still running thanks to the fact that farmers are not paying wages to themselves (DGARNE - SPW/DGO 3, 2013, p. 61). As farmers cannot do anything about output and input prices, the only way to get an income is to enlarge the farm (reduce labour input per object of labour) and to increase farm "competitiveness" with high-tech and

specialized equipment. Then a new problem emerges in farm families: *"la reprise"* (i.e. when the son/daughter takes over parents' farm) is really difficult because of too large and specialized investments *« ça tue les jeunes »* (lit. it kills youth). The young generation gets in debt at a high level and for a long time; it's often considered as insane *« il faut garder une pomme pour sa soif »* a farm accountant told me (expr. one should keep something for rainy days)

Thus, the threat comes from outside: *"les marchés"* (markets), *"les factures à payer"* (invoices to be paid) threaten their labour income. *"Il faut reconnaitre notre travail"* (our labour must be acknowledged) *"il est grand temps qu'on s'en aperçoive, sinon les jeunes ne vont pas continuer"* (it's really time to be aware of this, otherwise children will not continue). Farmers then warn their surrounding environment that their own disappearance would be damaging. *"À côté de nous, on fait vivre le vété, le marchand d'aliments, etc.; on donne du travail"* (we make the vet, animal food provider, etc. live besides us; we give them work). If there was only one big farmer per village, there would be *« du gros materiel et un chauffeur, et puis c'est tout »* (big machines and a driver, that's all) *« ils coupent la branche sur laquelle ils sont assis »* (they are cutting the branch they are sat on).

"LES RAPACES"

The threat of *"les rapaces"* (lit. the raptors or the rapacious) comes from different but entangled processes: scale enlargement, global market competition, farm and region specialization, and CAP premiums. One should keep in mind that this threat is both an issue of land access and land use. *"Les rapaces"* are taking over land everywhere it is possible to grow commercial crops (wheat, potatoes, beetroots, vegetables for can industry). *Rapaces* are called by their family name and farmers often talk about them. However, farmers rarely see them as they live further from their fields and they work fast with big machines. *Rapaces* almost never come to their fields except for intervening (planting, fertilizing, spraying pesticides, and harvesting). They are known for not respecting social norms *"les bonnes pratiques entre fermiers"* (lit. good practices between farmers) and making non-sustainable use of the land.

Rapaces are either *"les gros fermiers du village"* (lit. the big farmers of the village) i.e. 'remaining' farmers that seek to expand their farms because of the economic squeeze - *"la fuite en avant"* (lit. headlong evasion) - or *"gestionnaires"* (lit. managers) of hundreds of hectares who work for large land owners (incl. private companies, local industries, banks). These farms are often mounted in *"sociétés"* (lit. companies) in order to gather capital (land and machinery -incl. investments made by non-agricultural entities), make the transfer of ownership easier and pay less tax. Their practices are described as immoral; farmers I met experienced them as ruptures towards the social norms that have regulated land access and land use until now.

Attachment to land has a long history in this area, particularly in the *"Maugré"* stories. For centuries, around Tournai, village communities revenged former tenant who had to leave the land *"de mal gré"* (i.e. against his will, according to owner's will) by sabotaging undercover new tenants' belongings. Indeed, the former tenant would lose the land *"enrichie de son travail et de son expérience"* (lit. enriched by his work and his skills) (Ravez, 1975, p. 471); village members acted as Robin Hood characters around the contested notion of land ownership. This practice sought to frighten newcomers, prevent rent increases, and witnessed a kind of solidarity among village members against landowners. The last manifestation of *"malédiction du Maugré"* happened in the late 1970s but it is still one of the major mysterious local stories. Thus, the local custom slowly but hardly disappeared despite repression (public death penalty executions) and new tenure laws.

Today, the law organizes the *"bail à ferme"* (agricultural usufructuary lease) as the general rule. This frame guarantees land access for at least nine years to the farmer. In this frame, the rent is often cheap and the contract is renewable implicitly - it may even not be written at all. When a farmer retires, there is either *"reprise par un enfant"* - the right is transferred to the son/daughter - or *"remise à un confrère"* - i.e. to a colleague. The law also authorizes the *"location à l'année"* (i.e. rent for a year); this right is negotiable every year and the rent is often much higher. The law foresees that the new tenant gives a certain amount of money to the former for *"graisses et fumures"* i.e. to pay for investments made by former tenant in field fertility. The law provides the formula to calculate this relatively little amount of money. Besides the legal frame and since the mid-twentieth century, it became socially accepted in this area that in case of *"remise"*, the new tenant gives *"un chapeau"* (lit. a hat) i.e. extra money "under the table" -not declared- to the former tenant -in addition to *"graisses et fumures"*. Since the 1970s, the *"chapeau"* increased and became the source of many conflicts within and between farm families. Flemish migrants could offer bigger *"chapeaux"* thanks to the support they got from the Boerenbond; it has happened that fathers chose to sell the farm to Flemish migrants rather than to their own children. Obviously, local farmers find it immoral that newcomers offer *"chapeaux"* that they cannot afford.

It is said that *rapaces* take an active part in the *"surenchère"* (lit. overbid); they are looking for land whatever the price and they offer higher *"chapeaux"* than what farmers can afford. Thus, they gather land from deactivated farms i.e. when the farmer retires, goes bankrupt or dies, *"c'est un monde de rapaces"* (lit. it is a world of raptors); farmers say they sometimes lie and bribe to get the pieces of land. Farmers complain that there is no solidarity among farmers anymore; they describe this economic battle for land as *"un jeu d'échec"* (a chess game) between huge farmers they are not part of nor playing in. Rapaces negotiate short-term tenure agreements with landowners *"l'agriculture à contrats"* (lit. contracts agriculture). Indeed, under the *"bail à ferme",* the land owner cannot increase the rent during the covered period; landowners try not to *"tomber dans le bail à ferme"* (lit. fall -as in a trap- in the usufructuary lease) i.e. to be stuck for nine years with the

same tenant. To do so, they must change of tenant regularly. *Rapaces* promise to leave the land whenever the landowner wants but demand lower rent than *"location à l'année"* as a counterpart. *Rapaces* give a part of the *"chapeau"* to the land owner also.

Rapaces are also considered as 'the opposite camp' in terms of land use; they are 'entrepreneurs' *« on fait en fonction du marché »* (lit. they do according to the market), they are considered as CAP premiums hunters and practice monocrop farming of commercial *"speculations"* e.g. *« blé sur blé »* (wheat after wheat). Such short-term calculations are considered as 'pillaging' rather than 'cultivation'. This way of farming is considered as easier and *« on serait plus riche »* (lit. we would be richer) if 'we' did like 'them'. Most of *rapaces* do not have livestock so they don't spread manure *« il y a de moins en moins d'éleveurs »* (lit. there is less and less livestock farmers). A farmer told me: *"je suis trop vieux mais toi tu vas en voir"* (lit. I am too old but you will see) *"toutes ces sociétés qui cultivent et qui vendent la paille (...) au noir, ils veulent leurs sous"* (all these companies that cultivate and sell straw … 'in black', they want their money) *« ils ne devraient pas »* (they should not). As they don't have manure, he thinks they should at least keep their straw to maintain soil structure. As they manage huge number of fields, they have less time and must work faster « *rouler plus vite* » (lit. drive -instead of work- faster) with bigger tractors and machines. *"La force de frappe des gros, c'est le pulvé*" (lit. the core strength of big farmers is their pesticide sprayer). *« Ils démolissent plus le terrain »* (lit. they destroy more the land) « *les tâches sont réalisées n'importe quand* » (tasks are done at random moments) *« ils ne produisent pas spécialement plus »* (they don't really produce more) *« avec l'agriculture par contrats, les rendements stagnent »* (in contracts agriculture, yields stagnate) *« c'est une dérive point de vue environnemental »* (it's a drifting into environmental degradation) as they cause floodings and soil erosion. Farmers sometimes blame them for starting plowing along the street, not letting grass strips between parcels, spraying herbicides on ditches, removing hedgerows with bulldozers, plowing and draining wetlands & meadows while pocketing subsidies for draining.

As long as the *"bail à ferme"* runs, farmers are not directly threatened by *rapaces*; the problem only occurs at the end of the agreement -e.g. when the landowner decides to sell the land- or for farmers who rent *"à l'année"* -they are in direct competition with *rapaces*. Thanks to their economic (incl. subsidy) and technological forces, *rapaces* can buy land more easily and farm fields further in other villages. In some cases, *rapaces* prevent farmers from getting more land *"ce n'est pas evident au village (...) quand on a des gros machins ainsi (...) c'est lui qui a mis le grappin sur tout*" (lit. it is not easy in the village … when there are such big [farmers] … he got everything in his grips). When it is possible, farmers try to buy the land they use and avoid letting 'their land' go in the hands of *rapaces*.

Another threat on land are the land use management changes *« gens qui décident dans les bureaux »* (lit. people who decide in offices) *« faudrait leur faire enfiler des bottes »* (we should make them put on farm boots). A farm I went to sees its grasslands being converted into

housing projects -villas with private gardens. Landowners and real estate companies want to value the constructible land and try to put an end to the tenure agreement. *« Il faut toujours se battre »* (lit. we always have to fight), as soon as they were done with paying back « *la reprise* », they had to buy land. « *L'avenir est menacé* » (lit. future is threatened) « *ça nous tracasse* » (we are worried about that) *"qu'on nous laisse ce dont on a besoin pour vivre!"* ([we wish] that they would let us enough land, what we need to live). This last kind of threat involves non-agricultural agents and non-agricultural land use but also provokes a rupture in terms of land use and access regulation -both legal and non-legal. In the same vein, a group of Belgian NGOs is working on the phenomenon of land grabbing and also takes together land use and access changes as threats to peasant agriculture (CNCD-11.11.11; 11.11.11; SOS Faim; Oxfam-Solidarité; Réseau Financement Alternatif; FAIRFIN, 2013).

LA CAROTTE ET LE BÂTON

Last but not least, farmers are fed up with being 'subsidized farmers' i.e. stuck between premiums -the carrot- and conditionality, criteria and controls - the stick. *"Tout ce système au dessus de la tête"* (lit. all this system upon our head) makes them do an agriculture they did not really chose, and enrolls them in projects of others. Far from being democratic, this system demands farmers' compliance: to stick to public rules -perceived as changing dreams of politicians- and to industrial standards. *« Ces aides, ça te conditionne à beaucoup de choses, se préparer pour les contrôles : la compta, le contrôle bio, la déclaration de la PAC, les MAE… On se mord la queue. Avant les aides, les fermiers étaient trop indomptables. Nous, on est encore indépendants, plus libres mais il faudrait l'être encore plus »* (those aids, it conditions you to do a lot of things, get prepared for all these controls: accountancy, organic certification, CAP declaration, agri-environmental measures… We're biting our own tail. Before the aids, farmers were too indomitable. Us, we are still independent, freer, but we should be even freer). Agriculture modernization brought about the design of institutional systems meant for guiding, piloting virtual units. Thus, the responsibility of system well-functioning -matching with expected outcomes- is located in the 'rationality' of the units - they think as they should and adopt the new rationale - and in the design of the system -premiums and criteria induce proper behaviour. In the same vein, some farmers also criticize agricultural schools that kill curiosity *« on ne peut pas penser autrement »* (lit. one must not think otherwise) and train young farmers to be good and compliant managers.

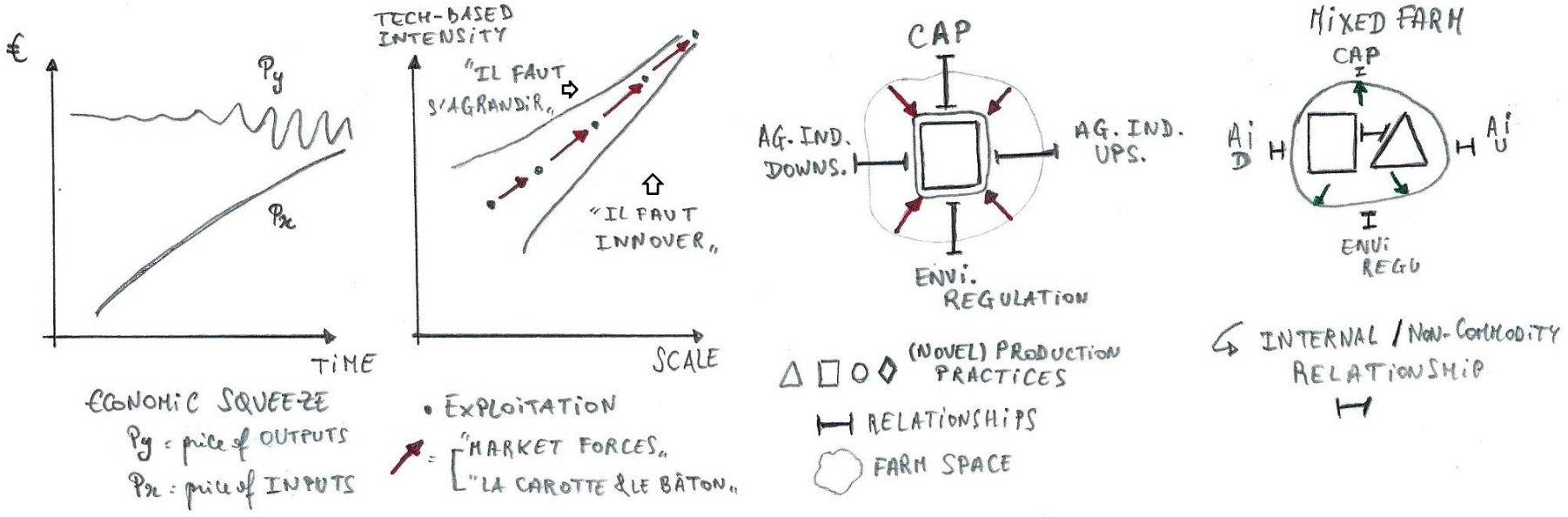
During the fieldwork, I could feel farmers tiredness of following changing prescriptions, chasing after illusionary and virtual farm functioning. They have the feeling that public rules are aligned with industrial standards and that they will never really fit. They are always 'special' and if ever they reach a satisfactory level, it is never the case for a long time. Only the well-equipped specialized farms fit. Although farmers do not agree nor want to comply with all the criteria, 'the stick' is always there. *"Une nouvelle checklist, ça nous casse les*

bras" (lit. a new checklist, it breaks our arms); it reaches such a point that farmers sometimes wonder whether these institutions still want them to exist. Farmers blame this institutional apparatus for being exhausting and killing farming attractiveness in the eyes of their children. But Arthur told me: *"Nous on va se battre, on ne va pas s'arrêter"* (lit. we will fight, we won't stop) …

THE PEASANT SPACE: RELATED NOVELTIES BEYOND AGRICULTURE MODERNIZATION

This short section is aimed at giving few theoretical insights that allow further understanding of novelty production, current manifestations and emerging properties of the peasant space -how people do construct new knowledge, new relationships and new landscapes. These are simple tools to analyze grassroots projects and associated desired futures beyond agriculture modernization (global markets, standards, premiums and regulations). These ideas come from courses followed during this MSc programme, readings of Jean-Pierre Darré books and fieldwork experience.

From the historical overview (previous sections), farmers increasingly experience conventional farming space -that some would call 'regime'- as threatening their room for manoeuvre. They feel being reduced to buyers, adopters, always being guided, constrained, and taught. I will try to illustrate what happens both at macro and micro (farm family) level in few drawings; two drawings on the left illustrate macro phenomena, two drawings on the right illustrate micro phenomena.



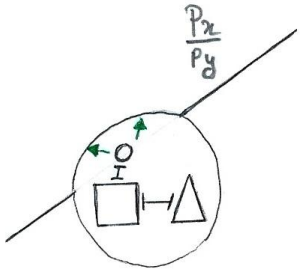
On the first darwing, I reproduced the well-known 'economic squeeze' on modern agriculture: the expansion and concentration of up and downstream agro industries make prices relations unfavourable for farmers; output prices (P_y) stagnate or even decrease while farm expenditures (P_x) constantly increase. Moreover, globalization of inputs and outputs markets tends to increase price fluctuations -see Annexes 2-4. The second drawing shows the direction farmers feel guided, driven to. To survive, *"il faut innover"* one must innovate (i.e. adopt external technologies and production systems designed by experts) and *"il faut s'agrandir"* one must enlarge. Market forces, premiums and regulations (cf. *"la carotte et le bâton"*) drive *"exploitations agricoles"* (lit. agricultural exploitation units, official word for 'farms') toward an increased number of external technologies per object of labour (technology-based intensity) and an increased number of object of labour per labour unit (scale enlargement). Each trend favours the other: managing large-scale farms requires more support from high-tech devices and investing in such equipment demands greater pay-off capacity. The third drawing illustrates what happens at the level of the farm, for instance in a specialized farm that adopted high-tech intensive dairy farming system. Geometric shapes represent (novel) production-related (pattern of) practices. Commodity and prescriptive (TATE) relationships with CAP, environmental regulation apparatus, up and down stream agro industries tend to reduce farm's room for manoeuvre and to mould the farm according to their own patterns. The example of mixed farms [see fourth drawing] gives another situation where farmers pay attention to defending some room by combining two types of production on a single farm -e.g. dairy and wheat production. Farmers 'connect' both productions by a non-commoditiy, internal relationship (cattle manure fertilizes cropland). The farm is half-specialized in terms of equipment; cattle manure is spread on larger area (to match easily environmental regulation); fertilizer expenditures are reduced and farm gross income relies on two different output markets (milk and wheat) instead of one.

Before going further in the analysis of novelty production, I would like to expand a bit more on family farms as spaces. Van der Ploeg (2013) offers great tools for such analysis, along the lines of Chayanov; I will not copy/paste this input here, one would be better off reading the book "Peasants and the Art of Farming". In short, the core idea is to focus the understanding of agriculture on the micro-level of farm family, i.e. to start studying the internal balances (production/workforce - consumption/mouths to feed; utility-drudgery, etc.) and dynamics of farms in-depth to understand what happens at aggregate level. They want to study agriculture within the real, daily life of peasant families. The author defines the Art of Farming as "the deliberate and strategically grounded construction of farm" (van der Ploeg, 2013, pp. 69-70) while mastering, fine-tuning, and creatively combining its different balances. Such internal mechanics can be distancing, anti-market devices and explain particular properties of peasant farms, for instance how they "can survive without the oxygen of profit" (van der Ploeg, 2013, p. 16).

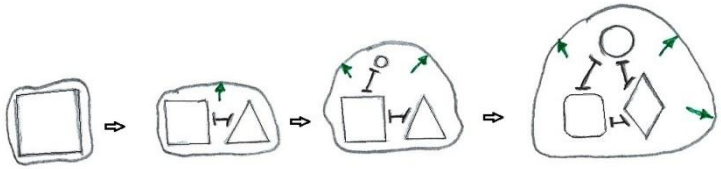
Thus, I would like to build on that input and develop about on-farm knowledge and novelty production issues in particular. During fieldwork, I noticed that farm families have specific properties that may make them fertile constructed nests, niches, for novelty production.

Farm families are composed of relatives who have to different statuses, interests, skills, experience, and ways of talking about things (e.g.: husband-wife, children-grandparents). Thus, there are knowledge encounters between what children study at school, stories and experience of grandparents, what they read in newspapers, and obviously the different experiences they all respectively have on the farm, for instance through *"tour des champs"* (go walking around and observing fields), milking times, and feeding times. Family members have different knowledge about other related spaces. I could also notice that eating times are often particular moments of discussion (even debate) about farming -how to do well, what should be done, but also judgements and claims about neighbours' practices (both positive and negative). Thus, family relationships contribute to the reproduction of cultural repertoire that may include religion and ancestors. Farm family shares historical background and economic reality; members may be economically dependent from one another. Thus, there is an internal legitimacy and economical control on what is *"raisonnable"* (reasonable) to do and to try; farm families all have particular decision-making process. As farm (partly) relies on family patrimony rather than bank capital (loans), farmer creativity and *"inventivité"* (inventiveness) are not strictly bounded to being *"rationnel"* (rational, i.e. stick to financial rationale). In addition, farmers can mobilize occasional or temporary extra work-force via (extended) family relationships. This makes it possible to try something new even if extra workforce is required. Finally, farms are locus for the formulation, definition of problems and all have their particular scope of relevance (what is important, true, interesting, relevant). However, farmers know that the list of parameters to be taken into account is not fixed but rather constantly evolving. Farmers often say that each farm family is walking on its own never-ending path *"chacun fait son chemin"* (everyone walks on his/her own path), continuously looking for answers to particular problems they encounter and define. All these elements make me consider family farms as interesting niches, protected spaces for novelty production. There is room for change within farms.

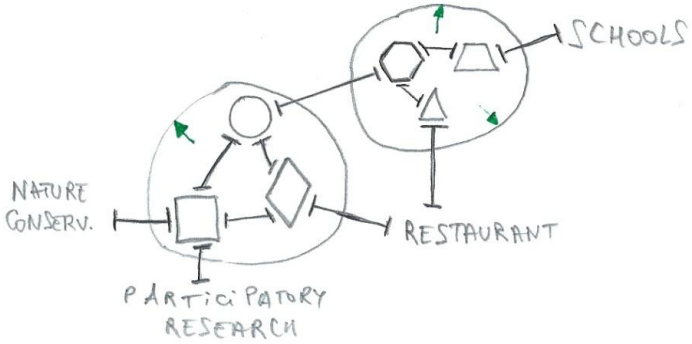
It is time now to define ***"novelty"***. Let's start with what it is not. A novelty is not an innovation developed in expert environment (i.e. elsewhere than it is supposed to work) that promises breakthrough change and that farmers have to adopt. However, a novelty is neither intrinsically meant to settle autarky, to put an end to relationships, nor to adopt technical devices of the past. In short, novelties are social practices that are new in their own context. In farms (spaces), these social practices are often related to the production of food or other farm outputs (incl. services). Novelties are 'new' because they are part of meaningful projects of social actors. A project is a narrative actively constructed by social actor in order to position his/her role, resources, future, and relationships with others (incl. family, village, eaters); it also contains his/her desires, expectations, wishes, and dreams. Farm project contains vision of the farm in the past, today and tomorrow so that novelties make sense through farmers' own visions of 'better future'. In other words, novelty production is about building new relationships and occupying peasant space in a new way. It may bring about coproduction and continuity (i.e. finding pieces of answers in living nature and in historical, cultural repertoire), both disconnections and new connections within and with outside the farm.



Farmers actively create room, intimate, protected, and distanced space that can be a ***nest*** for novelty production on their farms. For instance, farmers try to limit debts but rather save money and cultivate family patrimony. They are often proud to say they may be poor but they are not in debt. Farmers do not seek to be super-equipped for every task; many tasks are still done by hand. This allows adjustment over time. Moreover, some of them even say they are more reflexive when they work 'manually' -rather than with machines; it makes them (re)think (to) *what* they do, *why*, and *how* they do. Farmers also spend their free-time (hobby) on renovating farm buildings, beekeeping, training draft horses, or visiting farms in France. They allocate and reinvest available resources on the farm and to something they like in particular. Through these diverse sorts of strategies, farmers create room for trying new things, for novelties that (they hope will) then allow further space, ***push boundaries further*** i.e. allow them to survive -without expanding or getting in-debt but rather by getting better prices, reducing costs, and increasing added-value of farm products [see fifth drawing] - and to develop their own way of doing things that matches better with their local resources, personal wishes, pereferences, norms, believes - that some would call heterogeneity of practice. Farmers spend much more time on that than on imploring the elite.



With novelty production, farmers engage in the ***continuous evolution*** of agriculture; ***cascades*** of novelties may bring about actual farm transitions over time (Roep & Wiskerke, 2004). Farmers may start to process a small part of total farm production but then increase this share and be led to adapt both crop rotation and animal food ration [see sixth drawing].



Finally, novelties may push farmers to ***connect*** with other farms and in new ways. In addition, they may be led to get connected not only to other farms but also to participatory research, artisans, *"revendeurs"*, and restaurants, i.e. new actors involved in the ***(renewed) peasant space*** [see seventh drawing] and so, brokers of rural development too. Thus, new types of relationships may emerge besides regulation, prescription and commodity ones. Farmers gain self-governance and control on internal balances *"décider nous-mêmes"*.

REDEFINING THE FUTURE: NEW RELATIONSHIPS AND NEW LANDSCAPE

From previous sections, we can understand that farmers I met define new problems on their own and are looking for new connections and new projects. In this empirical chapter, I would like to describe the repeasantization of the landscape, i.e. to look closely at how they reshape materiality and relationships, how they put contestation into practices. This chapter consists in three sub-sections: farm profiles (brief description of the nine farms), description of novelties, and feedback on multiple projects these novelties are part of.

FARM PROFILES

Before describing the novel practices *per se*, I would like to give you a bit more information on the background of these nine farms: their context, their story and their new combinations or farming systems. There is a comparative table in Annexe 5.

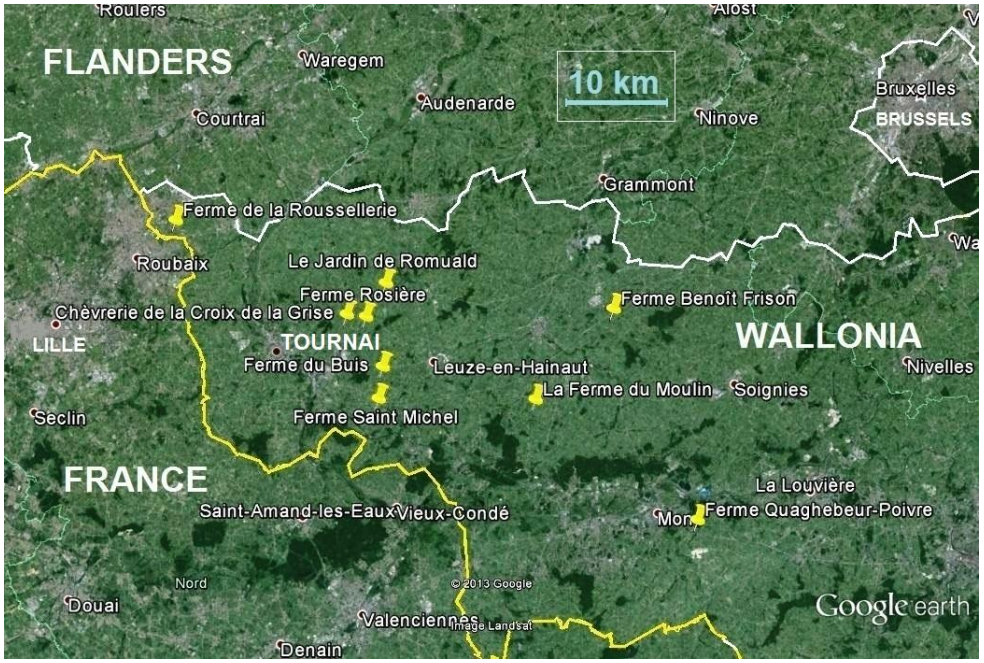


Figure 26 The nine farms, screenshot Google Earth

FERME DE LA ROUSSELLERIE

The most western farm is located just few steps away from French border in Herseaux (Mouscron). In 1984, Francis and Christine Dumortier-Velghe took over Francis parents' farm which is organic for more than forty years now. They turned the constraint of being in a densely populated area (between Lille, Roubaix, Kortijk) into an opportunity for direct selling. Thus, their farm shop is provided with their own production (potatoes, flours, breads, and eggs), vegetables from a market gardener settled on the farm, 'local products' from surrounding organic colleagues, and other goods supplied by a distributor. The farm is equipped with

Figure 25 Website header

a mill and a potato packaging chain. Francis and Christine participate in many fairs all over the country to sell their products; they also deliver goods to groups of consumers (*GACs*) in surrounding cities. The farm also produces animal food (chicken grains, haylage, hay, horse bean, straw). Since they stopped milking cows, farm buildings have been reassigned into cottages for tourists, a multipurpose room (for seminars, workshops), a little bakery and a farm shop. In addition, this family wants to develop further renewable energies: they set up a wind turbine and they installed Pantone system on tractors engines. Francis and Christine have three children and are already grandparents. Their two sons and their son-in-law work with them on the farm. They also hire extra workforce to run this seventy hectares farm.

http://www.lafermedelaroussellerie.be - 101 rue de la Roussellerie 7712 Herseaux (Mouscron)

CHÈVRERIE DE LA CROIX DE LA GRISE

Figure 27 Nature camp for children - (c) Ch. Degallaix

My parents' farm is located on a hill in Havinnes (Tournai). They started to build an intensive dairy farm in 1982 on my grandparents' land; they grew maize and ryegrass on twenty-three hectares and bought concentrates and minerals. They had partnerships with specialists for Holstein cattle selection and food ration optimization -they installed a computerized system in 1986. They had forty milking cows and 250 000 liters quota. Over time, they considered weeds resistance to herbicides, soil compaction and cattle health weakening as important signals nature was sending to them. In 1997, they shifted to organic farming and targeted food autonomy -they started to produce cereal-legume mixes and temporary grassland forages. At that moment, a French dairy accepted to give a premium and to collect certified organic milk apart. Few years later, the dairy was taken over by a bigger one and this agreement ended. My parents then decided to sell the cows and to buy a goat herd in France. During four years, we delivered organic goat milk to a dairy in Flanders. As demand for organic cheese in supermarkets increased, herd size reached 210 milking goats; we had to buy organic animal food on the market. (Un?)fortunately, the agreement with the dairy stopped and we had to sell most of the goats. My dad went working 'outside' for few months while my mother started to process milk and sell cheese. When he came back working on the farm, they started to welcome schools during school year and other children groups during holidays. At the moment, we produce all the food for our sixty goats and our horses, ponies and donkeys. We process all the milk on the farm. The cheese is sold either directly on Saturday market in Tournai or via a network of 'local producers' (i.e. other farmers) and resellers. My parents have five children and four grand-children. Most of us work in agriculture or food-related sectors and I plan to take over the farm in two years.

http://chevreriedelobel.over-blog.com/ https://www.facebook.com/LaChevrerieDeLaCroixDeLaGrise - 231, Rue du Bois de l'Allemont 7531 Havinnes (Tournai)

FERME ROSIÈRE

Figure 28 Farm court, dairy and cellar

Jean and Thérèse Tetelain-Seynaeve's farm is also located in Tournai's hills, in the village of Béclers (Tournai). They farm sixty-three hectares and 170 cattle in total. They have two herds: a dairy herd and a meat herd. Milk cattle are mostly Holstein cattle but Jean started to cross them with Swedish Red. They milk fifty cows but they plan to reduce this number by ten in the near future. Meat herd consists in white-blue cows (BBB and BBM). Jean and Thérèse have a *"ferme mixte élevage-cultures"* (lit. mixed farm) i.e. they grow commercial crops (wheat, beetroots) and livestock on a single farm. Thus, an important part of the land is allocated to fodder production: grazing (more hilly grasslands), haylage (temporary grasslands) and maize silage. As a counterpart, Jean values straw-rich manure for fertilizing croplands.

Figure 29 Label of their cheese

Thérèse does not come from a farm family and she is nurse. At the end of her maternity leave, she did not want to go back working 'outside' and she started to process a small part of their milk into cheese. They renewed old farm buildings of the XIIIth and XVIIth century; they expanded them with a new dairy and use the old cellar as maturation room for cheese. They sell their cheese on the farm -there are hiking circuits passing by, people can order cheese by phone or e-mail -, via local shops (bakeries, butcheries) and farm shops of colleagues. Some groups of consumers (*GACs*) also order cheese every week. Jean's father helps to deliver cheese to other farms. *"Avant, Thérèse, c'était la femme de Jean Tetelain. Aujourd'hui je suis le mari de la fromagère!"* (lit. In the past, Thérèse was considered as the wife of Jean Tetelain. Today, I am the husband of the cheese maker!) Jean says. As demand increases, Thérèse processes more and more milk. The rest of the milk is sold to dairy industry. Meat cattle are also sold to merchants although *"le commerce de viande ne va pas"* (lit. meat trade is not going well). They have four children and one of them is willing to continue; he took agriculture and bakery classes.

91 Rue Rosière, 7532 Béclers (Tournai)

LE JARDIN DE ROMUALD

Romuald Wille is a young organic market-gardener in Forest (Frasnes-les-Anvaing). Agricultural engineer, he worked as travelling salesman for pesticides and fertilizer company for twelve years. During this period, he met a lot of farmers in our area. Then he quitted this job and started to grow organic vegetables. He invested his savings in some equipment (different tools) and he managed to get access to 1,2 hectare just close to his house. At the moment, he is converting these pieces of land into organic; he already subscribed to certification controls. He adopted 'permanent beds system'; he is tansforming old machines and making new ones adapted to this cropping system. Romuald has an arrangement with a livestock farmer close by to get cattle compost. In the same vein, he gets ramial chipped wood (RCW) from natural park managers. He is planting hedgerows and trees around the garden also. He goes regularly to Flanders to visit colleagues, learn about new techniques and get inspired of what they do over there.

Figure 30 Le Jardin de Romuald (lit. Romuald's garden)

Romuald sells vegetables on Tournai market every Saturday, at his place every Friday and to groups of consumers (*GACs*). He grows 'ancient' varieties and vegetables together with 'common' ones according to consumers taste. Thanks to direct interaction with them on the market, Romuald can make people (re)discover these vegetables and their authentic taste. Growing vegetables and selling them give him a full-time job. He occasionally hires extra workforce and his farther helps him in rush periods. His wife, Virginie, works in social help office and they have three young children.

http://www.lejardinderomuald.be https://www.facebook.com/jardinderomuald - 9 Rue Preys, 7910 Forest (Frasnes-lez-Anvaing)

FERME SAINT-MICHEL

Jacques and Anne-Marie Faux-Vandeputte run a mixed farm in Wasmes-Audemez-Briffoeil (Péruwelz). They farm Limousin cattle (meat cattle), poultry (chickens, ducks, guinea fowls, turkeys) and few pigs. Until recently, Limousin cattle were not common in the area; white-blue cattle were dominant on the market. Thus, they quickly became aware of the importance of producing tastier and distinctive products by designing food rations on their own. Jacques has a background in agricultural science (doctor in agronomy); he designs experiments and

trials on his farm. Their farm is even registered as centre of reference and experimentation (CRE) by Walloon government for developing farm fodder autonomy. Jacques settled rotational grazing in permanent grasslands; he grows fodder maize, alfalfa and temporary grassland mixes to get hay, haylage and silage for his cattle. Besides this, he also grows peas, wheat and grain corn for poultry that do not eat soy anymore. A *"Moulin mobile"* (lit. Mobile mill) comes to the farm to prepare poultry food with farm yields. Jacques also grows cereals (spelt, rye, triticale, oats) as concentrates for cattle. The rest of their forty-eight hectares are dedicated to commercial crops: wheat is sold to a merchant in the village, beetroots to sugar factory, and they have contracts with industries for veggies.

Figure 31 Farm gate and court - Postcard from family archives

Anne-Marie started to develop direct selling of poultry a long time ago; they recently arranged a little farm shop and a cutting workshop. They carry poultry and cattle to slaughterhouse themselves. They also have partnerships with groups of consumers (*GACs*) and the local cooperative 'Coprosain' to sell their products. At the moment, they are renewing old stable (XVIIIth century) into cottage for tourists. Both of them are working full-time on the farm. Jacques and Anne-Marie have five children.

22, rue Haute 7604 Wasmes-Audemez-Briffoeil (Péruwelz)

FERME DU BUIS

Figure 32 Farm logo

Pierre and Véronique Cossement-Monnart live on the edge of a village named Barry (Tournai). As soon as he finished his studies in agricultural school, Pierre took over his dad's farm (65 hectares) in the nineties -first in part, then completely when they got married. Thus, they started running a conventional mixed farm; they farmed dairy and meat cattle herds together with commercial crops (potatoes, wheat, beetroots) sold to industries. Since they heard about deforestation and climate change, they wanted to avoid soy and they were looking for alternative systems that could increase farm animal food autonomy. Few years later, they stopped growing maize and buying soy; they developed grass-based food ration. As they consider that grass is the best way to get good milk, they settled rotational grazing, they included temporary grasslands and cereal-legume mix (diversified seedmixes) in the crop rotation and they invested in a hay drying system. Pierre and Véronique also decided to shift to organic farming; they

are officially certified since April 2013. Cattle herd changed also, they reduced its size -they milk forty cows at the moment- and they are crossing their Holstein cattle with Montbéliarde cattle, more adapted to grazing and grass-based food ration. Véronique processes more than the quarter of total milk production into bottled milk, butter, yogurts, and cheeses. Extra milk is sold to dairy industry. In the same vein, extra cereal yields are sold to a merchant; they stopped growing other commercial crops.

In order to diversify their production, Pierre and Véronique started growing organic vegetables on one hectare; they adopted 'permanent beds system'. Their vegetables and dairy products are sold in the farm shop and to groups of consumers. A network of 'local producers' completes farm shop's offer. They also built a cottage for tourists. Véronique was teaching in a college until recently but now they are both working full-time on the farm. Moreover, they hire one full-time and one-part time workers. Pierre's dad and their four children also help a lot.

http ://www.lafermedubuis.be - 2, rue Bois de la Haye 7534 Barry (Tournai)

FERME DU MOULIN

Figure 33. Salers cattle

Dany and Nathalie Dubois-Renault are organic farmers in Grosage (Chièvres). Dany's parents used to breed white-blue cattle (BBB, BBM) and to make butter. When he got graduated from vet school, Dany and Nathalie took over family farm. At that time, Dany worked full-time as vet "*gros animaux*" (for cattle) and Nathalie ran the farm. In the 2000s, they decided to convert the farm to organic farming; Dany still continues to work as a vet but only for pets and as a part-time job. They are now breeding two herds -Jersey (milk cattle) and Salers (meat cattle)-, pigs, chickens, and laying hens. They had the opportunity to take two small deactivated farms in the village recently; they have eighty-two hectares now. Dany is renewing old farm buildings -they plan to rent them- and settling rotational grazing to value meadows on the edge of the village. Thus, they combine a multi-site farm and resistant breeds. They harvest hay and haylage from diversified temporary grasslands and cereal-legume mixes as concentrates.

As there is no "market" for Salers meat, they sell it directly to consumers. Nathalie processes Jersey milk into ice cream, butter, yogurt, cheese, and bottled milk. Milk production surplus is sold to dairy industry. They settled a farm shop where they sell a broad range of 'local products'. They have arrangements with other farmers to complete the offer and with an artisan butcher for cooked meats and pork products.

They also sell their products to groups of consumers (GACs), bakeries and at village fairs. Dany and Nathalie are involved in *"Saveurs paysannes"* (lit. peasant flavors), a non-profit organization that promotes local and peasant food products. In addition to the help of Dany's dad and their two children, they regularly hire extra workforce and welcome interns.

26, rue des Héros de Roumont, 7950 Grosage (Chièvres)

FERME BENOIT FRISON (LE POULET DE GIBECQ)

Frison family farm is located in small village called Gibecq (Ath). Jean and Monique launched the cooperative 'Coprosain' more than thirty years ago. Today, Benoit -their son- is running the farm which became famous in the area for its free-range chickens labeled *"Le Poulet de Gibecq"* (lit. the chicken from Gibecq). He produces about 27000 chickens per year. Besides this, he also breeds guinea fowls, ducks, and turkeys. At the moment he still buys chicken food on the market but he would like to produce it himself; he lacks of land for doing so. On the farm, there are different types of poultry housing: mobile huts in the grasslands, and both old and new farm buildings. Benoit has also eighty *'Ile de France'* ewes that give 150 lambs per year. This meat sheep herd is organic certified. He manages to produce all the food for them on his ten hectares thanks to rotational grazing and crop rotation -cereal-legume mix, temporary grasslands. His farm is registered as centre of reference and experimentation for farm animal food autonomy (CRE). Benoit also plants a lot of trees to shelter chickens, shadow grazing sheep, and produce firewood. Benoit sells his products via Coprosain, the *"hall-relais"* (farm shop in the village) and to restaurants. He hires a full-time worker in addition to the help of his parents.

Figure 34. Mobile hut for chickens

https ://www.facebook.com/pages/Le-poulet-de-Gibecq/544461005606543 http ://nplatiau.wix.com/fermefrison# ! - 12, Chemin du Bonla, 7823 Gibecq (Ath)

FERME QUAGHEBEUR-POIVRE

Arthur and Christine Quaghebeur-Poivre run a mixed farm of sixty-two hectares in Saint-Symphorien (Mons). They farm two herds: milk cattle -mostly Holstein but not only, they mix races to get better milk- and meat cattle -white-blue (BBB, BBM). They value cattle manure for commercial crops. They grow sugar beetroots, potatoes, and vegetables (peas and beans) for industry. Wheat and winter barley yields are sold to a merchant. An increasing part of their land (about 25%) is dedicated to permanent and temporary grasslands. Arthur grows fodder maize and experiments new ways of covering silage without using plastic sheet. They also buy extra beet pulp to feed cows. Arthur avoids plowing as much as possible, notably by growing frost-susceptible cover crops. He is curious and willing to always 'do better' *« Il y a encore beaucoup de choses à améliorer »* (there are still many things to be improved) but *« il faut tenir la route, pas délaisser le reste »* (the farm must run, I must not forget the rest) *« je préfère aller par petites étapes »* (I prefer going step by step).

Figure 35 Arthur's cattle and stable

Arthur's parents already started selling farm products directly in *"le petit commerce"* (lit. the little shop i.e. the entrance of their house). Actually, the farm is located in a densely populated area, on the edge of Mons (province head city); this is a major constraint for getting pastures but it is good for direct selling. Thus, Christine kept on processing milk into butter, yogurt, fresh cheese, and bottled milk. They also sell fruits from their orchard as well as chicken eggs and meat. They have partnerships with other 'local producers' to get extra food goods. As there is a university campus nearby, they rent six student rooms. According to seasonal needs, they get occasional help from neighbors. Arthur and Christine have six children.

NB: This 'sample' contains diverse types of farms: crops, livestock, and mixed, organic and conventional, from 1,2 to 80 hectares large. However, as you can see in Annexe 5, these nine farms can all be considered as "small-scale"; they are all under Walloon average in terms of SAU/UT i.e. number of hectares of 'usable arable land' per labour unit. There are different ways to interprete this fact -does the small scale make it possible and/or necessary to look for novelties or do the novelties make it possible for small-scale farms to survive; the debate is open.

DESCRIPTION OF NOVELTIES

In the few months I spent on this MSc thesis, I think that fieldwork was the richest learning experience. The strong interactions I could have with farmers while working with them the whole day -sometimes from 6am to 11pm- allowed me to enter a bit more in the 'backstage' and the multiple aspects of the farms. Thus, in this particular section, I'd like to allocate a special space to dense and detailed description of novelties located in farm projects, in farming as a set of multiple activities, techniques, and relationships. In the following pages, I will describe fifty novelties I listed across the nine farms. For each of them, I will provide you with four types of information: the description of the novel practice itself, the list of related novelties (grey case), their combination with other novelties and their manifestation in farms, and finally illustrations, quotes, or drawings. To make it easier, the nine farms are labelled as follows:

Ferme de la Roussellerie	FDR	Jardin de Romuald	JDR	Ferme du Moulin	FDM
Chèvrerie de la Croix de la Grise	CHV	Ferme Saint-Michel	FSM	Ferme Benoît Frison	FBF
Ferme Rosière (Tetelain-Seynaeve)	FTS	Ferme du Buis	FDB	Ferme Quaghebeur-Poivre	FQP

Investing in renewable energies

Investing farm savings (and labour) in sources of energy that rely on (living) nature for their reproduction. This energy may be used for family and/or farm consumption.

Agroforestry
Keeping and selecting seeds

- Solar panels to heat water (FDB)
- Solar panels to produce electricity (CHV, FSM, FQP, JDR)
- Biomass heating system: can use grains or pellets s (FDB)
- Wind turbine to produce electricity (FDR)
- Firewood (e.g. Tulkivi fireplaces) (FBF, FSM, JDR, FDM)

Picture: installing solar panels on the roof of the barn (CHV)

Agroforestry Planting and/or valuing woody vegetation on the farm.	Valuing *"l'existant"* Investing in renewable energies Settling (rotational) grazing Ramial chipped wood

- Planting fruit trees (FQP, CHV, FDM, FTS, FDB) for family food provision and/or to sell fruits. Most of these farmers are going to plant even more fruit trees in the future. Pierre plants fruit trees, *"pour celui qui veut"* (lit. for anyone who wants): he doesn't know yet who will benefit from them but he is already planting.
- Sheltering grazing livestock (cattle, sheep, goats), poultry, or vegetables (FBF, FDM, FSM, CHV, JDR, FTS). Woody vegetation helps to create a proper environment for plants and animals (windbreaks, shadow). It also protects greenhouses from wind. For instance, farmers build *"prairies entourées"* (lit. surrounded grasslands) by planting trees (e.g. walnuts, oaks, willows), hedgerows (e.g. maple, viburnum, dogwoods), groves. It is also common to plant trees around the house when a child is born.

- Producing firewood (FSM, JDR, FDM, FTS, FBF). The most common tree is pollard willow that farmers prune regularly (every five years). They cut wood at least one year before burning it and they store it in a shelter (e.g. the former "carrie" (old farm building) or under a sheet). Children often help for these tasks.
- Alley cropping is a way to combine these objectives with crops cultivation. Woody vegetation adds organic matter for crops: alder is N-fixing, willow is the best biomass producer. It also prevents nutrient leaching in croplands (safety net).
- Fostering biodiversity and favouring starlings because they are eat worms. Beside planting trees and hedgerows, farmers install nests (partnership with natural park PNPC) and they dug ponds. *"Les voisins devraient être reconnaissants"* (lit. neighbours should acknowledge [what we do for biodiversity]).
- Accumulating patrimony for next generations (trees are the bank of the farm)
- Producing ramial chipped wood
- Learning about and developing agroforestry: farmers attend conferences on more complex farming systems that combine livestock, crops and trees. For instance, Pierre wants to develop complex systems *"mais à notre portée"* (lit. but that we can afford) in terms of workload. It makes him reconsider his own role *"le metier de paysan"* on his farm. Farmers also seek support and/or advice from scientific institutions (e.g. Université Libre de Bruxelles, Centre de Développement Agroforesterie Chimay)

Collecting rainwater Collecting rainwater and either storing it in cisterns or using it directly.	Growing vegetables, New ways of breeding cattle

- Using rainwater for farm maintenance (FTS, FBF, CHV, FQP, FDB, FSM, FDR, FDM) i.e. cleaning machinery, stables, feeding & watering systems, housing units (during *"vide sanitaire"* fallowing period), and material for transport: chicken boxes, truck, trailer, the trunk of the car (washable). *"Nous avons plein d'eau"* (lit. we have plenty of water).
- Irrigating vegetables (JDR, FBF). Romuald would like to set a pipe between his home and his fields to bring rainwater but he first has to get the agreement of the landowner.
- Watering cattle (FDM). Dany asked neigbors to collect rainwater from their garages in order to water cows in grasslands far from the farm.
- Farmers do not consider rainwater as the best nor the only source of water on the farm. For instance, Jean (FTS) made a forage (44m depth) to get water that costs much less than *"eau de ville"* (tap water) but it is ferruginous. So, he only uses it for watering cows, neither for the parlour nor the dairy. Jean does not use rainwater for watering cows *"il y a des pigeons sur le toit"* (lit. there are pigeons on the roof) so there may be shit in the water. *"Eau de ville"* is expensive so it is used for cleaning the parlour (milking system) and the dairy. To get the permit to build the new stable, he had to install cisterns. As they converted grassland into built area, rainwater would go faster in the river and may cause floods downstream. *"Une bonne idée des politciens"* (lit. a good idea of politicians) he had to put a cistern to collect rainwater and prevent water from going directly in the river. He event put two cisterns instead of one (more than required). He has a friend who works in the construction sector -*"ils ont des bonnes idées que nous on n'a pas"* (lit. they have good ideas that we don't have)- and who told him to install a 'basement drainage pump' in the cistern commanded by a pressure-meter so he always gets water with pressure. Jean also gets inspired when he goes on holidays to France in the Alps, he finds it interesting how livestock farmers manage water over there.

Reducing fertilizer purchase and valuing (green) manure Reducing purchases of or even stopping buying fertilizers on the market.	Ramial Chipped Wood Grates and slurry Composting Growing cover crops
Farmers seek to reduce purchases in general and look for alternative ways of reproducing soil fertility (FSM, CHV, FQP, FBF, FDM, FTS, FDB, FDR, JDR): ramial chipped wood, slurry, compost, and cover crops (see detailed sections). However, even some organic farmers still buy fertilizers (FDM, FDR, JDR) because they do not have cattle and/or they want to boost plant growth at certain moment.	

Ramial chipped wood

Using small pieces of wood (by-products of tree and hedgerow pruning) to improve soil health and structure.

Agroforestry
Composting
Reducing fertilizer purchase

- Romuald (JDR) says that *"on n'efface que lentement l'histoire du sol"* (lit. we can hardly -only slowly- erase soil history). His piece of land had been *"massacré par la culture de pommes de terre"* (lit. destroyed by potato cultivation) in the past. Romuald asked natural park managers to bring 15m³ of ramial chipped wood. He sowed oats and clover (N input) on Sept 15th while he spread it -1m³/are i.e. layer of 1cm. He wants to *"rétablir l'équilibre sain du sol"* (lit. recover the healthy equilibrium of the soil) by favoring fungi. He hopes to reduce soil diseases -vernicilium of strawberries in particular. He is convinced that soil structure strongly affects vegetable growth.
- Ramial chipped wood may also be added to the compost (CHV) to slow down its decay, improve soil structure and prevent nutrient leaching.

Composting

Valuing animal excrements as fertilizer and intervening on its decay process to obtain better end product.

Ramial chipped wood
Reducing fertilizer purchase

- Most of farms do so (FDM, FSM, FQP, CHV, FBF, FTS) but the ways of intervening vary: mixing compost to homogenize, prevent anaerobic decay, and overheating; storing in concrete silos to prevent leaching; using different kinds of spreaders; adding ramial chipped wood (http://www.youtube.com/watch?feature=player_embedded&v=R_CcaC7u3XA)
- Sorting different kinds of 'farm fertilizers'. For instance, Jacques (FSM) makes two different ones:

"Fumier pailleux" (straw-rich manure)	*"Compost"*
= cow manure with straw	= mix of chicken (1/3) and cow (2/3) manure
decomposes slowly	decomposes fast
spread on crop fields just after summer harvests	spread on grasslands in March

- Romuald (JDR) buys compost -cattle manure mixed by the farmer- from a friend, as the cattle go outside, its manure is accepted for organic farming. On the contrary, Benoit (FBF) sells compost. He spreads sheep and a part of chicken manure on his own fields but he sells the rest 15€/ton. As he buys chicken food (entering the system) he has no fertility problem and he can export manure.
- Jean (FTS) says that there will be *"un fossé"* (lit. a ditch, a gap) between farmer who have cattle and those who don't as straw-rich manure is important for soil structure. *"Il faudra 30 ans"* (it will take thirty years) to fix it as soil structure involves slow and long-term processes.

Grates and slurry Collecting and valuing liquid manure as fertilizer.	Home-thought arrangement of the stable Reducing fertilizer purchase
- Slurry is an important source of fertilizer on cattle farms (FTS, FDB). Farmers told me the advantages of *"caillebotis"* (grates) are that it saves straw, it is cleaner and that you don't lose manure on the road. - Pierre (FDB) says that *"il ne faut pas une trop grosse quantité"* (lit. one should not have big quantities[of slurry]) because it is *"pas facile à valoriser"* (not easy to value). Thus, he dilutes slurry by 50% with rainwater and grey water from the dairy. As slurry releases nitrogen rapidly, Pierre sprays it on cereals *« pour appuyer le tallage »* (to boost tillering) and *« pour le démarrage »* (for the early growth) of potatoes. As it is diluted, it requires more transport but *"brûle moins le couvert, moins asphyxiant"*(it burns the cover less, it is less asphyxiating). - Slurry use is quite controversial. Arthur (FQP) does not like grates and liquid manure because slurry injectors make tracks in the grassland so it's not plane for the scythe, farmers need access to land to get rid of slurry (environmental rules *"il y a un calcul savant de charges à l'hectare"* there is a complicated calculation of livestock density per hectare), grates cost a lot and make it impossible to change the stable afterwards. Morevoer, grates may bring about *"problèmes de pattes"* (hooves problems).	

Reducing tillage Reducing soil tillage and/or avoiding using the plow and the rotary harrow. Farmers seek to foster soil life and rely on biological processes to get better growth conditions for crops.	Adapting crop rotation Adapting machinery Growing cover crops *"couverts"*
- Improving crop rotation. For instance, my dad (CHV) grows cereals two years in a row instead of one in the past. Thus, he only plows 2,5 ha per year instead of five. - Farm experimentation (FQP, CHV, FSM). Farmers feel like doing research on their own because technicians do not bring about new techniques -at least in the direction they want. *"C'est la même chose depuis quinze ans"* (lit. it's the same thing for fifteen years). For instance, Arthur (FQP) dethatches maize just the day after harvesting it. *"J'ai essayé sur deux terres, je n'avais encore jamais fait"* (I tried on two parcels, I had never done it before). He just wants to move soil blocks made by harvesters. *"Il fait sec, la structure est bonne, je veux en faire bénéficier les moutardes »* (wheather is dry, soil structure is good, I want mustards [cover crop] to benefit from that) so he will not plow and he will sow *"sur les chaumes"*(on crop residues) with a discer-type seed driller -there are discs in front of each coulter that can cut crops residues. *"Quand c'est fini ce n'est pas beau"* (when it is done, it is not beautiful) as residues lay on the topsoil, the parcel has a messy appearance but *"j'ai vu qu'avec mon mazout je fais beaucoup plus de travail"* (I noticed I could do much more work with the same fuel). He thinks he could even use a smaller tractor. In spring, when mustards will be frozen, he will spread manure that will get mixed with crops residues. This is how Arthur obtains *"un bon sol"* (a good soil), *"sol travaillé par les moutardes"* (soil tilled by mustards -cover crop).	

Arthur also found another way to avoid plowing. After harvesting winter barley, he spreaded manure and fertilizer when it has re-grown *"les repousses portent l'épandeur"* (lit. new growths bear the spreader). Then he dethatched and *"laisse murir la terre"* (let the soil maturate). In spring, he just used the rotative harrow once to move new growths and he asked a company to plant maize -he did not plow. He says maize was *"beau même quand les autres étaient jaunes"* (nice even when others [of neighbours] were yellow) *"la terre n'était pas froide"* (soil was not cold); crop residues protected maize from the cold. At home (CHV), we also tried not to plow to convert temporary grassland into cereal-legume field. Our goal is to reduce impact on soil layers and life, and avoid nutrient leaching.

- Adapting machinery (FDM, FDR, CHV). Farmers use and combine different tools designed before the introduction of rotative harrow (S-tine harrow, rotary hoe, dethatcher, discer-type dethatcher [first picture]). Farmers also try other uses of tools they already have before buying a new one -e.g. under different soil moisture and wheater conditions. They also transform machines, buy second-hand ones -incl. on internet-, and borrow some from neighbours.
- To learn about soil and tillage, farmers do *"tour des champs"* (go and walk around the fields, i.e. observe regularly their own fields), visit colleagues who develop alternative solutions -e.g. we visited Emmanuel Demasy who develops direct sowing and cover crop mixes [second picture]-, and read books -e.g. Claude Bourguignon. Last time we went to Agribex Salon, there was only rotative harrows; we could not find any solution there.

Adapting machinery Making new tools or transforming and valuing old ones in order to match particular needs. Instead of buying new equipment on the market, farmers are fine-tuning and sometimes even making their own tools.	Settling Permanent Beds System Reducing tillage Self-provisioning of animal food

- Farmers say buying new is expensive and hardly affordable. Romuald (JDR) told me *"c'est impayable, même le petit materiel simple"* (it's priceless, even for small and simple tool), *"c'est en faisant qu'on se rend compte de ce qu'on a besoin"* (you become aware of what you actually need only while working). In other words, he would not risk investing such big amout of money without being sure the tool will actually match his needs. Moreover, farmers criticize new and heavy machinery for compacting soil while not bringing better yields. Pierre (FDB) remembers that his father bought a new plow and a new tractor (100hp) for 1 million FB while the wheat was sold 9 FB/kg and they harvested 7,8t/ha. As he says, if we compare to current situation, yields did not increase as fast as tractors' hp's.
- Farmers seek for help; Romuald (JDR) says *"ça prend du temps, il faut pouvoir en discuter à plusieurs*" (it takes time, one should discuss with others [while doing it]). Farmers seek support from artisans incl. for making pirate copies or welding. Some farmers are able and equipped to weld.
- Saving energy (FDR). Francis installed "Vulcano Pantone system" on two of their tractors. It's a system that uses heat from tailpipe to add

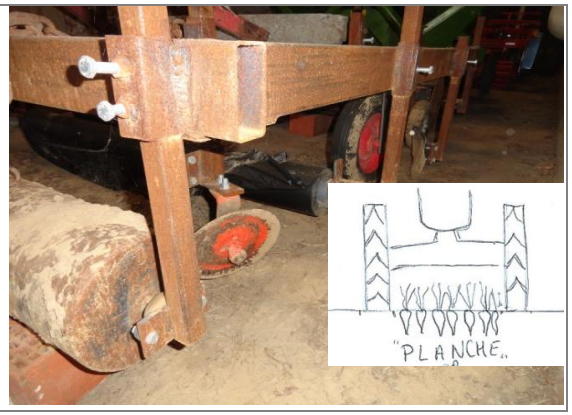
water steam in the injection and reduce fuel consumption (Francis said by 15%) and NOx emissions (Hugo -their son- wants to prove that in his thesis). They read about it in a magazine "Nexus" (https://www.nexusmagazine.com/) few years ago; Hugo studies automotive technology in Mons and would like to understand better this mechanism.

- For the *"Goût du travail bien fait"* (lit. taste of well-done work) as Pierre (FDB) says. Pierre has his own combine harvester that he uses to harvest fodder cereals, bread cereals, seeds. *"Une de 74"* (made in 1974), *"pas besoin d'une plus grosse"* (I don't need a bigger one), *"adaptée à mes besoins"* (it fits my needs). Thus, he can try different things the entrepreneur wouldn't take the time to do -e.g. harvesting clover seeds. He bought a vertical blade to harvest peas though it was a bit expensive. Pierre has is own potato harvester also; compared to new ones, it is a small-scale harvester. He says these machines were made when farmers could get their own equipment, machines were designed for farms like his one. In the same vein, Dany (FDM) reversed the wheels of an old tractor to widen inter-wheels space so that it fits the alfalfa windrow truner. Thus, he does not drive on the windrow before turning it.

- Specific equipment and tools are sometimes hard to find on the market or even do not exist anymore. To cope with that, farmers borrow tools from each other (CHV, JDR) and scrutinize second-hand websites to buy these tools -sometimes even before needing them, you can find a finger weeder for 50€. For instance, Romuald bought ground heating system to grow soil-grown chicory, potato hiller, onion toppers second hand via internet *"on n'en trouve pas ailleurs"* (we cannot find them elsewhere) *"de récup', car ça n'existe plus neuf"* (second hand, because it does not exist as new anymore).
- Learning about machinery (FDB, JDR). Farmers go to exhibitions in Belgium and France. Romuald and Pierre told me about ADA-Bio association of "self-constructors" i.e. farmers who develop their own tools. This association also designs tools adapted to "permanent beds system" and promotes *"travail du sol non-violent"* (non-violent tillage). The plans are open access and the association gives formation on designing tools and welding *"avec une forte philosophie de partage des connaissances"* (with a strong philosophy about knowledge sharing). Romuald showed me their book that includes a preface written by Pierre Rabhi and all the plans of the tools they designed *"machines qu'ils ont fait évoluer avec la pratique"* (machines that they make evolve with their practical experience). Farmers can even take part in forums on their website.

Settling Permanent Beds System *"Système de planches permanentes"* Managing vegetable cultivation in beds (or lanes) of same width so that the tractor always runs in the same tracks. Inter-wheel distance determines bed width [see drawing].	Adapting machinery Growing vegetables
- When they started to grow vegetables, farmers (FDB, JDR) quickly noticed important soil compaction due to multiple maneuvers. To avoid such soil degradation, they will settle permanent beds systems 1m50 to 1m70 wide that corresponds to about three lines of veggies with 50cm in between. Thus, they can manage each *"planche"* individually and design complex rotations.	

- Constructing tools adapted to bed width with second-hand ones. Romuald finds it interesting to get different hand finger tillers that he adjusts for different tasks in winter -less busy period when he has time to prepare the machinery- so that he'll just have to change tools in summer.
- Adapt tractor's wheels and reverse them. For instance, Romuald asked tractor vendor to do so in order to get 1m68 between wheels. The next issue is to weed tractor's tracks; he is looking for a new technique -for instance making a front finger weeder.
- Biodegradable plastic sheet (JDR) that prevents weeds and pest (fungi) to colonize. Romuald made a tool to put it: discs that open the row, the plastic roll, a blade that closes the row, a roll with different spikes (different densities) that makes a mark where he has to prick out the seedlings. There are two problems with this system: it gets moist under the sheet when it's raining and the sheet decays fast only when it is cut is very small pieces.



Keeping and selecting seeds

Saving a part of the harvest to sow it the next year. Thus, farmers avoid buying seeds every year. As the number of seed producers decreases, price of seeds increases. It is even more the case on organic seed market. There is no selection of varieties in organic and/or crop association conditions. Farmers try to do it themselves though they know it may bring legality problems in the future.

Investing in renewable energies
Growing vegetables
Adapting machinery
Covering silage without plastic
Growing catch crops *"cultures dérobées"*

- Sorting different varieties or associated crops (FSM, FDB).
- Catch crops: farmers keep oats to sow them either together with fodder colza -mixed in the bucket of the tele-handler- after peas to get extra green fodder (FSM) or together with temporary grassland seed mix after cereal harvest to protect the new grassland during the first winter (CHV, FDM).
- Arthur (FQP) keeps winter barley grain [picture] to cover silage without plastic
- Some farmers invest in a seed sorter (FDB), they value leftovers in the biomass heating system of their house
- Pierre (FDB) followed training on vegetable seed production organized by Kokopelli; he also keeps and multiplies tomato seeds. Last year, Pierre tried to harvest seeds of crimson clover. He asked his father how he did in the past for white clover: let grow the first cut *"coupe de nettoyage"* (cleaning cut) i.e. get rid of weeds and then let clover grow till it gets dry seeds and harvest them with combine harvester. But it did not work; crimson clover does not go to seed again after one cut as white clover does. He shouldn't have done the *"coupe de nettoyage"*; Pierre will try again next year.

Developing shorter food supply chains Spending time and labour on shortening the distance with end consumers. Constructing a new kind of -nested- market means engaging in new relationships and new dependencies. While they experience global market trends as fatalities, farmers are looking for new and sustainable opportunities to sell the fruits of their labour. Farmers seek to negotiate a new deal with consumers.	Arrangement among producers for selling Direct selling, Farm shop, Cooperative Promoting our products Diversifying farm production Developing distinctive quality products Arrangement with resellers

Direct selling Allocating a part of farm workforce to selling farm products to end consumers. As there is a direct contact between producers and consumers, there is room for discussion, questions, degustation and even more.	Redefining performance Arrangement among producers for selling Farm shop, Diversifying farm production

- Selling in salons, village parties and craft fairs (FDR, FTS, JDR, CHV, JDR, and FDB). Farmers spend week-ends on holding market stand in occasional events. For instance, Francis and Christine (FDR) go to four fairs per year: Brussels, La Louvière, Namur, Arlon organised by Nature et Progrès (non-profit organization). Thérèse (FTS) goes every year to *"Les Potes iront à Thimougies"* and other village parties. Farmers help each other by selling products of colleagues on their stand. For instance, this year Francis and Christine offered three other producers to go and sell with them. In a single stand, there were four farms under the banner *"du producteur au consommateur"* (from producers to consumers). Our products were complementary: flours, potatoes, pies (FDR); yogurt and fresh cheeses (FDB), butter and hard cheese from Raucq (a third farm) and goat cheese -soft and hard (CHV). Christine wanted us to help her to sell -they would have been too busy, they're already busy with their own products-, so I went on Friday and Véronique (FDB) went on Sunday. Visitors liked that we sold together and we got congratulated for that; the Minister even came at our stand. The Ministry launches initiatives toward "local producers": a label *"Agriculture de Wallonie"* and a new website where collective kitchens can order our products.

- Going to weekly local and/or farmer market (JDR, CHV, and FDR). Farmers go to the marketplace in nearby city once a week; they meet regular consumers there. For instance, my mum (CHV) goes every Saturday from 7.30am to 1pm in Tournai with fresh cheeses in iceboxes and hard cheese balls (from CHV and FTS), transportable cooling counter, a small table, a scale, knives, paper bags, and coins. It is a relatively low-cost and simple point of sale in the city. These regular encounters mean more than meeting clients on the market; they may lead to quaint scenes *"le folklore du marché"*. In nested markets, farmers meet 'real' people *"les copines du marché"* (friends from the market). Anka -Rom girl begging on the market every Saturday became mum's friend over time- helps to settle the counter, children who went to the farm during holidays come and help to give the coins back, Christiane asks for biodynamic straw for her garden, Saint-Nicolas asks for the donkeys to visit schools with him on Dec 6th, other people ask to visit the farm with their grand children in the afternoon. We get a lot of support, people liking the cheese and encouraging us to continue.

- Selling to groups/grouped orders of consumers *GACs* (JDR, FDB, CHV, FSM, FDM, FDR, FTS). Jean Frison (FBF) told me that groups of consumers started in the seventies but then disappeared and gave way to local markets. Today, people start that kind of group again *"il y a un creux dans l'histoire"* (there is a gap in history). There are many kinds of groups which mean different modes of order, delivery, and payment. *"C'est une gestion terrible"* (it induces terrible management) Nathalie (FDM) says. Some farmers deliver -and get paid for that; there are many arrangement among producers to save transport. New solutions sometimes come from 'consumer side' also: *L'Heureux Nouveau* (JDR, CHV) come from Brussels with their van to the farms; we just have to send an invoice at the end of every month.
- Farm shop (see detailed section). Some farmers (FTS) don't have an actual shop but still sell on the farm *"Vente à la ferme"*. *"Les habitués"* (regular customers) come to the farm to buy cheese; people phone, send text message or e-mail before.
- Selling to restaurants and bakeries (FDM, CHV, JDR). Direct contact with food professionals leads to discuss and test/taste novelties. It may give way to new opportunities of valuing high-quality farm products.

Arrangement among producers for selling Exchanging sale services among farmers.	Cooperative Farm shop Direct selling

- *"Ce sont des services qu'on doit pouvoir se rendre"* (these are services we must do for each other) Véronique (FDB) says. Development agencies and major union push farmers to sell their products in 'local shelf' of supermarkets. Farmers do not trust them anymore *"ils vont nous lâcher"* (they will drop us). Nathalie (FDR) is afraid that farmers will invest to process more, hire workers (relying on the volume sold to supermarkets) and that then, supermarkets will *"faire jouer la concurrence"* (play with competition) for lower price and farmers would get stuck. *"C'est tentant mais il n'y a pas de garantie"* (it's tempting but there is no guarantee). Thus, farmers are willing to organize in order to avoid supermarkets.
- Cooperative (see detailed section). Some farmers do not like cooperatives as it would be too constraining, you have to swear in advance, and you cannot change your plans. *"Nous, on est indépendants"* (we are independent) *« C'est mieux d'avoir son propre atelier, même s'il est plus petit »* (it is better to have our own workshop, even if it's smaller). They are also afraid that food supply chain would get longer again. However, farmers help each other but in new ways:
- *"Tournée"*: farmers share transport and delivery tasks. For instance, Grandpa Tetelain (FTS) carries cheese from FTS *"Rosière"* and CHV *"Cabriole"* to Brasmenil (reseller), FDB and FSM -provision for their farm shops and GACs. We take *"Rosière"* for us and for *'Fromages d'ici'* (reseller) to sell on Tournai markets. I pay Thérèse for her cheese and she pays me for my cheese -she will get paid when delivering it. Regal people (*GAC*) pay by bank transfer.
- *"Dépôt-vente"* (FTS, FDB, FSM, FQP, FDR, FDM, CHV) Reselling each other products -in the farm shop, on the market, in village fairs or local markets- and taking little or even no margin -anyway much inferior than classical intermediaries. Colleagues are *"plus solidaires"* (more united), more aware of the volume to be sold. Farmers are proud of *"la bonne entente entre fermiers"* (good relationships among

them) that allow better income. Until now, this service was not subject to taxes but new governmental rules threaten these reciprocities. Farmers who sell less than seventy percents of their products themselves will not be considered as "small producers" for hygiene rules.
- Promoting each other to consumers *"Elle m'envoie beaucoup de clients"* (she [Véronique] sends me a lot of clients) Anne-Marie (FSM) says.

Cooperative Farmers are uniting and gathering shared instruments and equipments aimed at processing and selling farm products.	Arrangement among producers for selling

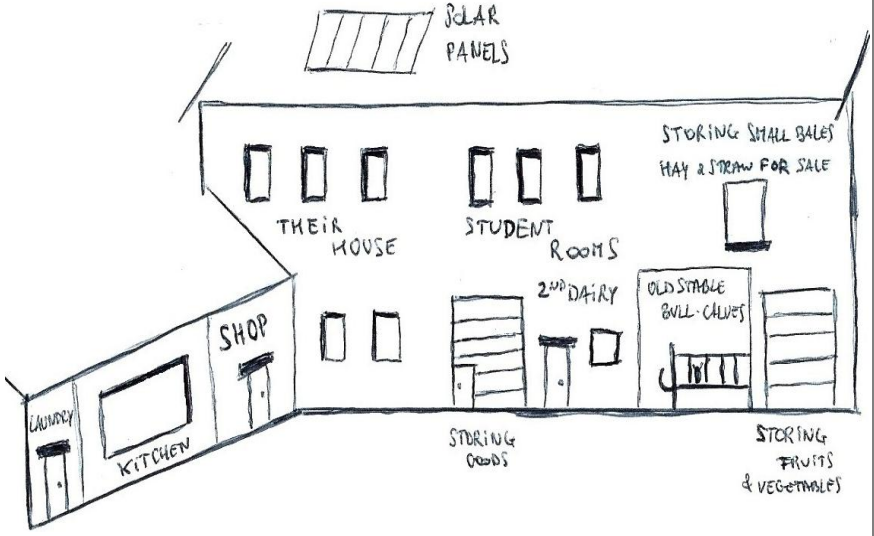
- One should keep in mind that most of milk factories are cooperatives but they also get rid of producers that are members. So, farmers are a bit critical toward cooperatives; for instance, some couldn't get their shares back when they left the milk factory for another one. They consider that bigger farmers decide and rule. However, thirty-five years ago, Jean Frison (FBF) started a fairer type of cooperative *'Coprosain'* together with two other 'small farmers'. In the beginning, they sold dairy products, chickens and *"progressivement d'autres produits"* (progressively other food goods) to groups of consumers from surrounding cities -even from Brussels- *"on vendait ici à la ferme"* (we were selling here, on the farm). Then, they sold in city centre on weekly market rather than on the farm; little farm shop was not appropriate anymore. Few years later, they mounted a cooperative to share a slaughterhouse and a shop -both workforce & equipment. Many farmers joined so that the cooperative has three shops (Ath, Braine-l'Alleud, and Mons) and few trucks that go on markets -three and sometimes four per day. Coprosain employs more than forty people today.
- Members must align their production to their commitment, be regular and have a constant outflow. As a counterpart, Coprosain guarantees a better price for producers (higher than global markets ones), *"permet à beaucoup de petits producteurs de s'en sortir"* (makes it possible for many small-scale farmers). In practice, it is not easy *"les producteurs ne se tiennent pas tous à leurs engagements"* (all farmers do not deliver what they promised to do).
- Since the beginning, they defined criteria of production that would ensure product distinctiveness. They swore to stick to *"Agrisain"* (lit. agri-healthy) rules: do not use hormones, do not use antibiotics as growth factor (regulate fermentation and digestion), do not use GMO-based, meat, bone nor fish meal. However, most of these criteria entered the law over time. In order to save their distinctiveness, Jean seeks to *« orienter, faire évoluer les producteurs de Coprosain vers l'herbe et plus d'autonomie »* (orientate, make Coprosain farmers evolve toward grass-based food rations and more autonomy).

Farm shop Assigning a farm building as point of sale in addition to allocating a part of farm workforce to selling farm products to end consumers (i.e. direct selling). Thus, farmers set a time (schedule) and a place (specific room) to meet consumers on the farm.	Direct selling, Diversify farm production Valuing *"l'existant"* Arrangement among producers for selling Developing distinctive quality products

- Room: Christine (FQP) welcomes consumers *"mes copines"* (my friends) in *« le petit commerce »* i.e. the entrance of their house [first picture and drawing]; Nathalie (FDM) also arranged the shop in a part of their house. In Herseaux (FDR), they settled the shop in the old stable where the calves used to be. As she needs more room to store products and the old barn burnt, they want to re-build it, improve its insulation, and settle the shop there so that they can use the stable as reserve. Pierre (FDB) built the shop in former garage. In Wasmes-A-B (FSM), they renewed an old farm building to settle a cutting workshop and a point of sale. Romuald (JDR) displays his vegetables in his garage. As the sales vary, he wants to mount cool room next to his house. Farmers often arrange their shop with second-hand or home-made shelves and counters. Square courtyards are used as parking.

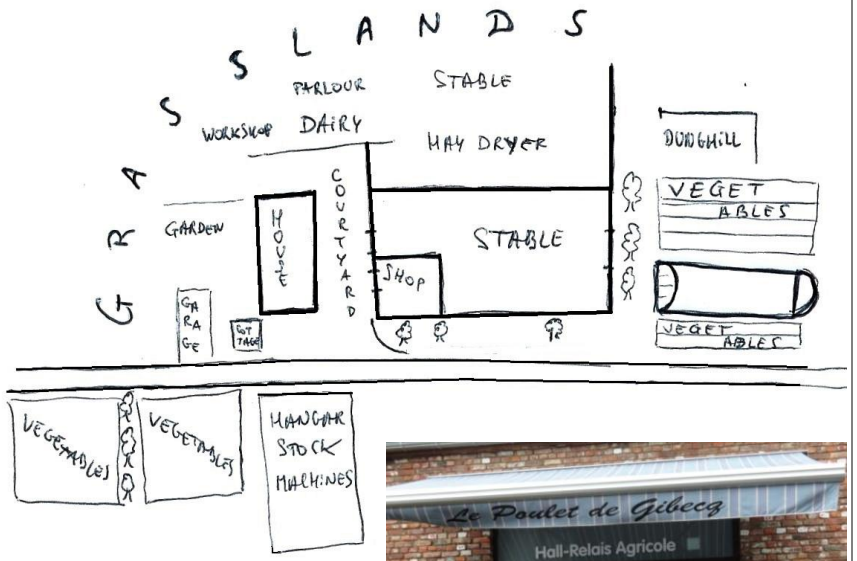
- Schedule *"le jour des clients"* (customers' day): farm shops are open from one to five days per week. Opening hours never start before 9am as farmers have other tasks to do before first clients arrive -e.g. making butter; farm shop usually close at 5pm, before milking cows.

- Opportunity of getting direct contact. In FQP and FDR, their parents already started to sell directly. As Arthur says (FQP), they are in the continuity of *« l'héritage des parents : la vente directe »* (parents' legacy: direct selling) *« c'est une opportunité »* (it's an opportunity) *« Christine a un emploi »* (Christine has a job) *« je cherche les alternatives »* (I am looking for alternatives) as he wants to *« proposer le meilleur pour les clients »* (offer the best to clients); there is a direct contact so *« je ne vais pas faire n'importe quoi »* (I won't do random things). Customers come with their own bottles, reusable bags and Tupperware boxes so farmers don't have to invest in a packaging system. Short distance with consumers allows them to manage products industries and supermarkets cannot (raw milk products, fresh organic vegetables). Pierre (FDB) says *"J'ai fait bonne chère à travailler"* (I enjoyed working) *"en travaillant, tu penses au plaisir que tu auras à vendre, et celui des gens en mangeant"* (while working, you think



about pleasure that you will have while selling and that people will have while eating). Véronique adds that they want their farm shop to be a place of social encounters around good food in the village [second drawing], *"un lieu qui crée du lien"* (a place that bonds), *"c'est parce que ça a un sens"* (it is because it makes sense) *"c'est de l'invisible mais ça peut aider à accomplir des tâches"* (it's invisible but it helps to do regular farming tasks).

- Different kinds of 'publics' come depending on the day of opening (young parents with children, retired persons), some people come walking. *« Il y a beaucoup de monde »* (there are many people) *« non-stop »*; farmers all witness affluence. People are often called by their first names and say both "hello" and "thanks and goodbye" to everyone.
- Serving: farmers serve consumers themselves, sometimes in couple or with an employee. Farmers seek to offer better service than what regular supermarkets do: they help people to carry their bags to their car, answer many questions about mode of production and origin of products, and serve food goods in packages appropriate to each consumer (from small to big quantities) *"pour ne pas gaspiller"* (to prevent food waste). There are posters announcing events (e.g. OXFAM breakfasts), ecology-related magazines, mobiles for children. Christine knows what people are used to buying. Some farm shops are equipped with cutting machines for bread and for cheese as well as bank card payment system.



- Diversify the offer: farmers know that selling a wider range of products makes people come. Diversifying farm production (see detailed section). Arrangement with distributor (FDR) that provides them with pork products, soaps, oils, wines. He delivers once a week. Arrangement with baker (FDR) from Laplaigne who makes bread with their flour. She also makes cramique, rye and spelt bread in the little bakery (in the back of the shop). Arrangement with market gardener (FQP) to get vegetables for sale; they arranged the old barn so that he stores his potatoes there. *"On s'entend bien"* (we get on well with each other).
- Particular case: Hall-Relais in the village of Gibecq (FBF) [second picture]. Combining registered meat cutting room and a shop to sell local products (open to different producers of the area). At the beginning AFSCA accepted that they cut chickens in the same rooms (Coprosain workshops) than other types of meats but few years later, AFSCA did not accept anymore and they had to build another -specific- workshop. In Ath, there was no room for that so Jean applies for subsidies to build the Hall-relais in Gibecq. Jean & Monique are working there the afternoons; they sell meat preparations made with Benoit's sheep.

Arrangement with *"revendeurs"* (resellers) Selling farm products to *"revendeurs"* small retailers/merchants that access wider audience.	Developing shorter food supply chains
Farmers cannot spend all their worktime on selling. Thus, they may sell their products to full-time working resellers. It makes it possible for farmers to sell bigger volumes of processed products. For farmers, this mode of selling is secondary and complementary; their general rule is to avoid intermediaries as much as possible. Resellers are provided directly by farmers and send directly to end-consumers. - *"Les fromages d'ici"* (FTS, CHV) and *"Le comptoir gourmand"* (CHV, FTS, FDM, FDB) buy processed products from local farms and sell them in four or five markets per week. Farmers make bigger cheeses in bigger moulds *"briquettes"* for resellers; these cheeses are more appropriate to make trenches so it can be sold in smaller quantities. - Resellers also help for long-distance sales or to reach restaurants (FDR). For instance, French reseller orders potatoes for restaurants in Paris -looking for Belgian potatoes. - Butcheries, bakeries and minimarkets of surrounding villages also resell farm products (FTS). Thérèse sells them 1kg balls for 10€, she *"laisse une petite marge"* (lets them a margin) *"je perd un peu"* (I lose a bit [compared with direct selling]). She says *"pas facile de calculer la marge des autres"* (it's not easy to calculate other people's margin). Most of them resell the ball 16€ but *"ça varie fort"* (it varies a lot), *"ça casse l'image"* (it breaks the image).	

Promoting our products Actively constructing a market for farm products. Farmers talk to people, value (extended) networks *"connaissances"*, and offer degustation.	Developing shorter food supply chains Direct selling Taking active role in public debate
- Labels: organic, *"Agriculture de Wallonie"*, Nature & Progrès (sustainable), Saveurs Paysannes (peasant agri.) - Partnerships with natural parks (PNPE, PNPC) and Nature & Progrès Belgique to organise open doors, weekly markets, advertisement and awareness-raising campaigns. - Websites and Facebook pages: they total hundreds of fans • http://www.saveurspaysannes.be/ • http://www.lafermedubuis.be/ • http://chevreriedelobel.over-blog.com • http://www.lafermedelaroussellerie.be/ • http://www.lejardinderomuald.be • http://coprosain.be • https://www.facebook.com/LaChevrerieDeLaCroixDeLaGrise • https://www.facebook.com/jardinderomuald • https://www.facebook.com/pages/Le-poulet-de-Gibecq	

Increasing the workforce

Responding to an increased number of tasks realized on the farm by increasing farm labour input. Farmers develop different and complementary strategies: relying on family, hiring employees, rebalancing pluriactivity, and engaging in other reciprocities.

Direct selling, Farm shop
Diversifying farm production

Christine prepares milk cream; Ernestine -her daughter- will clean the buckets

- Family (FDR, CHV, FTS, FDB, FSM, FDM, FBF, JDR, FQP). All farmers I met rely on the couple, their parents and/or their children to help them -at least occasionnaly, often daily. As Arthur (FQP) puts it: the farm *"tient"* (stands, holds) thanks to this *"esprit de famille à entretenir"* (family spirit we must cultivate) *"il faut entretenir les liens entre les ainés et les enfants"* (we must cultivate relationships between seniors and children). Everyone has his/her particular *"spécialité"* (favorite task) according to his/her abilities and availabilities. Farmers often really like working with relatives as task coordination is easier (language, know-how, norms, and habits). The "new" tasks also create opportunities (and necessities) for the couple to work together on the farm. But family relationships have their own limits and cannot provide workforce ad infinitum.
- Hiring employees. Farmers complain labour intensive agriculture is not favoured. Subsidies *"à l'investissement"* (i.e. for farm buildings and machinery) reach twenty percent so that investing in machines costs 80%. On the contrary, paying wages costs -to the farmer- at least 150% of what the worker gets. Farmers also say wage system is not appropriate for agriculture as tasks are difficult to delegate. *"On fait déjà des erreurs nous-mêmes"* (we already make mistakes ourselves) *"on apprend en le faisant"* (we learn by doing) proper ways of doing things. When it comes to manipulate food and work *"avec du vivant"* (with living nature) it is even harder. However, farmers do hire full-time, part-time and/or seasonal workers (e.g. student jobs). Farmers consider paying wages and social contribution as a *"grosse pression"* (a big pressure) for themselves and *"engagement moral"*(moral commitment) toward these people. A part of CAP subsidies and of their own income are allocated to these remunerations *"une partie de mes heures paient leurs salaires"* (a part of my working hours pays their wages). Farmers justify farm subsidies by producing such positive externalities for the rest of society: improving the environment, doing research *"à mon niveau"* (at my level), and providing jobs (incl. for invalid person). I could discuss with a full-time worker in one of the farm; he told me he really likes this job thanks to its diversity of tasks *"on apprend tous les jours"* (we learn everyday).
- Rebalancing pluriactivity: farmers reduce their work activities outside the farm. For instance, Dany (FDM) only works few hours per week as a vet for now on. *"Bien faire chez soi, ça prend beaucoup de temps aussi"* (do well at home, it also takes a lot of time). In the same vein, Véronique (FDB) stopped working in ISSHA college and my dad (CHV) stopped working in care farm when we started to welcome schools and other children groups.
- Engaging in other kinds of reciprocities. Farmers say everyone should have a role and farms can offer complementary, seasonal jobs; in

other words farms are potential source of additional income *"arrondir les fins de mois"* (make mothends easier) for poorer, non-graduated persons in the countryside. In the past, many travellers and poorer people found occasional jobs in farms where they were housed, fed and paid a little; farmers believe that working *"donne une dignité"* (gives dignity). However, farmers says current legal frame is not convenient to farms situations. *"On a du travail, on ne sait pas engager"* (we have a lot of work, we cannot hire) *"si le politique voulait…"* (if politicians were willing…). In the same vein, new forms of reciprocities are emerging; farmers welcome a growing number of volunteers, Woofers and interns *"logés et nourris"* (housed and fed) *"ici, c'est le dallage mais on mange bien*" (here it may be messy but we eat well). Farmers also look for partnerships with self-employed people (e.g. market gardener) who could settle on the farm and give a helping hand in return.

Diversifying farm production Increase the number of types of products that leave the farm. It induces starting new productions and/or processing raw products in different end-products.	Direct selling, Farm shop, Farm poultry Increasing the workforce, Processing milk, Growing potatoes, Growing vegetables, Sell by-products, Bread cereals, Valuing *"l'existant"*

- Process milk and offer different dairy products (FQP, FDB, FDM, FTS, CHV) (see detailed section)
- Sell by-products (see detailed section)
- Eggs (FQP, FDM, FDR): keeping laying hens requires collecting eggs, watering them, giving grains at least twice a day. It is important to pay close attention to egg-laying performance to know what they are missing -e.g. eggs are flabby so they miss Ca. Some farmers use their own grains but other buy chicken food. Hens have a outdoor space with some shrubs and fruit trees.
- Farm meat poultry (FQP, FSM, FBF) (see detailed section)
- Cattle meat (FSM, FDM, FTS, FQP). In general, farmers sell meat cattle to merchants. Jacques sells his grass-fed bull-calves and cattle to Coprosain: Dany (FDM) sells Salers cattle and old Jersey cows directly. He says there is not a lot of meat on old cows but it's really tasty so he wants to value them via short circuits.
- Vegetables (JDR, FDB) and Potatoes (see detailed sections). Farmers try to get many sorts of vegetables according to cook habits, preservation, *"les gouts des gens"* (people's tastes), productivity (weight/price *"acceptable"*). They say we need diversity but *"faut pas s'y perdre"* (ons should not get lost), it's important to *"attiser la curiosité, attirer le regard des clients sur le marché"* (stir up curiosity, people's eyes on the market). Romuald also says *« je me rends compte que certains légumes rapportent plus »* (I become aware that some vegetables are more profitable) *« il faut équilibrer »* (I have to balance). Some farmers also try to get an arrangement with a market-gardener (FDR, FDB). For instance, farmers give market gardener access to a piece of land and he has the priority to sell at their shop. It is a

way to diversify farm production while increasing the workforce and boosting land use labour-intensity. There are many deals possible but to find an agreement that runs in the long term is not easy.
- Fruits (FQP, FDB, CHV, FSM) from farm orchard are either eaten by farm family, given to people who give a helping hand or sold. *"On vend un peu de fruits"* (we sell a bit of fruits). Farmers pick the fruits in the orchard for instance with the tele-handler; they harvest different kinds of apple, pears, and plums -even some that are 'wild but tasty'. Some farmers (FQP) even make and sell fruit juice. They brought their apples in crates to "Ferme Legat" -a young farmer got equipped with a press, a pasteurizer and a packager (to pack 3litre-juice boxes) in the former stable of his family farm in Estinnes. They will get 900 litres of juice and they have to pay 1,6€/litre to him for the process. This young farmer sells the boxes 3€/litre to consumers as it is pure juice, no water, no sugar, no additives. Chistine will align her price to that one *"je ne veux pas le saboter"*(I don't want to undermine his work).
- Strawberries (JDR). Romuald asked a company to plant it but next year he wants to try with his homemade machine (that sets plastic sheet). He says selling organic strawberries makes people come.
- Bread cereals and selling different types of flour (FDR) (see detailed section)
- Pigs fed with by-products and farm products (FDM, FSM). Pigs are either fed with bran and *"petit lait"* (whey) or peas, wheat & triticale or lactosérum and barley. Mostly for (extended) family consumption.
- Animal food (FDR): Hay (lage) and straw for sale -to other farmers, merchant or retail; horse bean, triticale, rye, barley, corn, bran.

Processing milk Processing raw milk in different dairy end-products.	Direct selling, Self-provision of animal food Increasing the workforce, Valuing *"l'existant"*, Valuing by-products on the farm Diversifying farm production
- How they started. In all the farms I visited, grandparents used to *"faire le beurre"* (make butter) and sell it directly (FTS, FDM, FQP, CHV, FDB). Most of them stopped in the 1970s when milk industries started to collect milk in farms and process it themselves. As a consequence, milk cattle herds' size increased and farmers were not busy with milk process and sales anymore. Few decades later, some women farmers started to process a (little) part of milk production again; here are some of their stories. When Thérèse (FTS) arrived on the farm, she stopped her job of nurse. They have 4 children, *"j'ai choisi d'être à la ferme"* (I chose to live on a farm), she did not want to go back to work *"à l'extérieur"*. Although she's not a farmer daughter, she says she shares the same values: *"travailler et vivre simplement"* (to work and live simply). In 2000, she started to process forty litres at once and followed cheese-making classes in Ath. One year later, she bought a 500 litres vat. Now she *"transforme"* (processes) once a week in summer, three times a week in winter. *"Ça me plait de transformer"* (I like processing) *"je ne pensais pas en faire autant"* (I did not think I would process so big quantities). At the beginning, she *« chipotait dans mes bidons »* (rummage through my recipients); now *« c'est du boulot ! »* (it is [a lot of] work). In 2001, milk factory gave a good price for the milk, so Arthur and Christine (FQP) hesitated about continuing to sell directly *"le beurre c'était de la main d'oeuvre*	

peu payée" (butter was not paying back). But then she would have to work outside and their children were young. *"Si tout le monde arrête, c'est peut-être le moment de continuer"* (if everybody stops, it's maybe the opportunity to continue) said Arthur. Thus, they continued to offer the products Arthurs' parents never stopped to offer. When the dairy suddenly put an end to the agreement, my mother (CHV) started to make a living again by processing goat milk in about ten different end-products.

- Dairy (room and equipment). My mother (CHV) started to process milk in her kitchen pots. In the same vein, Nathalie (FDM) started making ice cream in the kitchen. Then they arranged a room in the house; now they plan to build a new dairy. She first had a non-professional machine, then a semi-professional machine and finally a professional machine; *"petit à petit"* (little by little). Farmers buy equipment (vat, pots, pasteurizer) often second hand via internet, *"petites annonces"* (small ads) or extended networks. Although most of them started in the kitchen, they built a specific room (dairy) themselves within existing farm buildings; they also take care of its arrangement themselves thought through experience. Farmers buy materials for the dairy (cheesecloth, moulds, utensils, etc.) even in the Netherlands.
- Relations with milk industry and quantities. *« On se sert d'eux »* (we make use of them) they use the milk factory as a buffer; they only sell surpluses. In the case of Dany (FDM), milk factory does not complain because they have a very high fat & protein content *"c'est nous qui mettons la matière grasse dans le camion"* (we fill the truck with fat). They're paid a better price for organic Jersey milk *"on gagne parce qu'on est économe"* (we earn because we farm economically) i.e. cattle graze from April to mid December without any concentrates, and then they give a bit of hay and cereals-legumes mix produced on the farm. As both production and demand vary, they prefer keeping more cows and selling the surplus to the milk factory. Christine (FQP) processes *"en fonction des besoins du commerce"* (according to farm shop needs). Jean (FTS) knows that the director of milk factory wants to *"sanctionner"* (lit. punish) variable productions. As long as the milk factory accepts, they have the *"liberté"* (freedom) not to process all the milk; they don't have to store the surpluses. *"Il faut garder la notion des volumes par rapport à l'effort de la vente"* (one must keep in mind the volumes regarding to sale work) Jean also told me *« nous devons réapprendre à être des vendeurs »* (we must learn to sell again); we used to sell a lot directly then we just had to produce as much raw material as we could and we lost *"la notion des volumes"*, we did not had to sell. Pierre and Véronique (FDB) obtained that the milk factory buys their skimmed milk but it is paid conventional price (not organic).
- Relations with AFSCA (federal food chain safety agency). Farmers try to stick to the rules as long as it makes sense for them. They say thanks to direct selling and consumers coming on the farm*"on a 80 contrôles AFSCA par semaine"* (we have eighty controls per week), *"si on fait mal, on perd le client tout de suite"* (if we do wrong, we lose the client straightaway). In addition to 'AFSCA contribution' (paying for controls), farmers have to pay for analyses to determine the use-by date and to confirm the absence of harmful bacteria. Farmers would like controllers to advise rather than fine. They are also angry against tracking methods of controllers *« ce qui est méchant, c'est la dénonciation »* (denunciation is immoral), *« ils devraient aller la veille »* ([if they know something will happen] they should go and advise before) instead of *« arriver là et tout jeter »* (come in and throw all the food away).
- Specific tasks for specific products. During fieldwork, I could collect detailed notes on milk process tasks; here is a very short overview. These tasks obviously vary depending on the type of end-product and of animal (cows or goats). Farmers start milking between 6 and 7am,

they go and catch the cows in the grasslands, make them enter the waiting room and the parlour. Then, they clean the udders with a wipe (extra care when they make cheese: once with soap then with paper) and put the milking clusters. Jean told me: *"tous ces gestes qu'on fait peuvent paraitre anodins, mais l'usine ne les fera pas"* (all these gestures may seem insignificant, but industry will never do them). Pierre says milking may seem monotonous, as it is *"tous les jours, même le dimanche*" (every day, even on Sundays) *« mais reste un moment particulier pendant la journée »* (however it remains a particular moment of the day). To make butter, they skim the milk, give whey to calves, and carry cream to maturation room in buckets. To make cheese, they must coordinate certain tasks into a particular timing that aligns milk temperature, specific quantities of ferments and rennet. Here is a bit more on the timing of Thérèse (FTS).

During the "caillage" (fermentation), Thérèse cleans the parlour and takes a second breakfast. When the timer of the oven rings, Thérèse says *"le fromage m'appelle"* (cheese calls me) and she launches the trenching. *"Je ne reste pas toujours à côté, j'ai autre chose à faire"* (I don't stay there, I've other things to do) *"c'est l'avantage d'être à la maison, on peut s'occuper du reste"* (it is the advantage of being at home; I can do other things in between). Then Thérèse empties the lactoserum and washes the cutters. She prepares the lunch while the cheese 'rests' so that lactoserum comes out the grains. Then she washes and mixes *"le caillé"*; she takes 50% of the lactoserum out, adds lukewarm water (31°C) and mixes - she must adjust water debit & mix speed and carry buckets of lactoserum out in the jugs. In the meanwhile, she goes to the house cellar to *"frotter les boules"* (brush the balls), she scrubs with a sponge and salty water every day. *"J'essaie de toujours être à jour dans la cave"* (I try to be always up to date in the cellar) *"c'est gai quand ils ne se salissent pas"* (It is more pleasant when they don't get dark). She says she must *"suivre"* (follow/keep up) otherwise she would be *"noyée"* (litt. drowned, get lost). They put extra shelves for winter (2nd hand rack trolleys from a bakery); as it's colder, the cheese ripens more slowly. There is an air dryer in the cellar. She also keeps some *"Vieux"* (i.e. 4 month-old balls), there is demand for that but it takes more room (stored longer) and they lose weight. She *"tapote"* (pats) on the balls to hear whether there are holes in it or not *"le son du fromage"* (the sound of cheese). She only chooses the best series for being the *"vieux"*. There are two basement windows, one on each side to het ventilation. She cleans the shelves regularly.

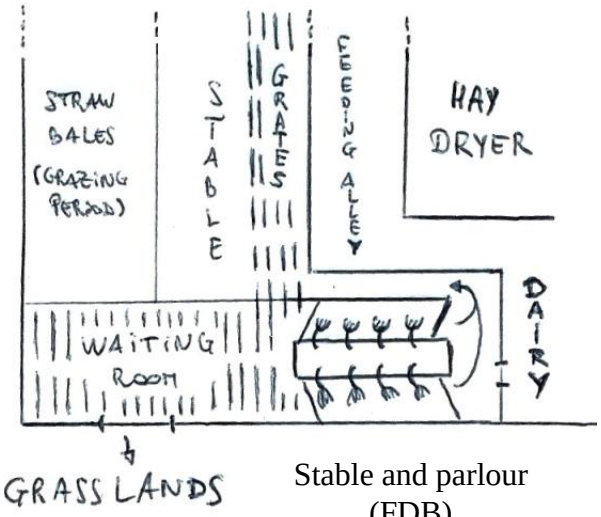
Just before lunch, Thérèse prepares moulds, spread spices with a spoon and fills the moulds. She sends a text message to Jean when she needs help to fill the moulds. Then she puts them in the press. She also washes the vat and utensils; she reuses this water to soak the cheesecloth and the moulds after 6pm so she lets the lid to keep the water warm. After lunch, she turns the balls, and puts them in the press again. She unfolds the balls that go in the brine for one night in the cellar. At the end of the day, she cleans the moulds.

In general, milk process is done in the morning; they often eat breakfast twice, before and after milking. One of them drives children to school and/or starts feeding calves and other cattle in the meanwhile.

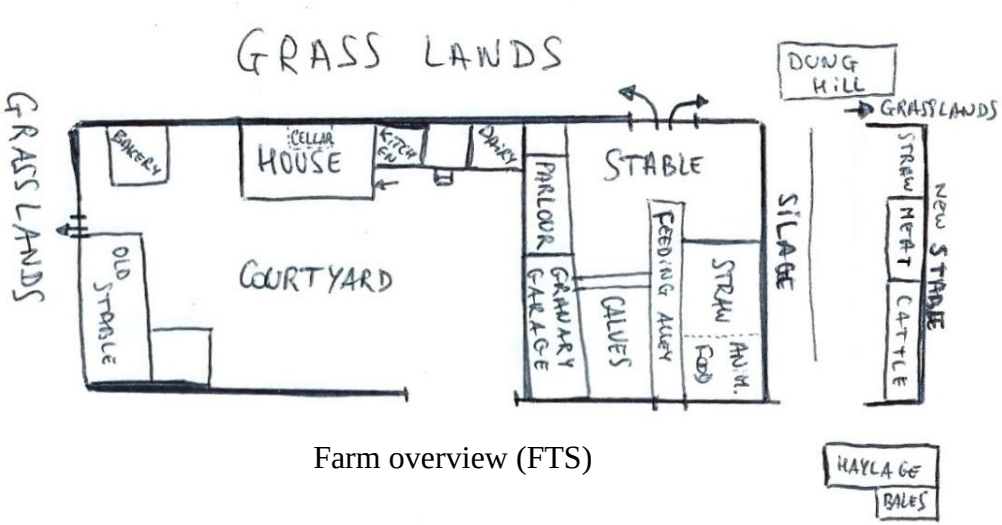
- *"Il faut chercher tout le temps"* (one must search all the time) to manage to get a nice crust and distinctive products. For instance, Thérèse tries to soak some balls in beer (La Thimougienne, La Bush) during few days. Farmers also consider changing cattle food ration; Pierre says *"on n'arrive pas à avoir meilleur que la prairie"* (we cannot get better than grassland) in terms of milk quality.
- Thus, these farmers sell various dairy products: bottled milk, buttermilk, ice cream, yogurt, butter, fresh and hard cheese in different formats -balls, crottins, faisselles, bûchettes, briquettes-, chocolate pasta, and even serum. For instance, Christine (FQP) gets these different

products from her cow milk:

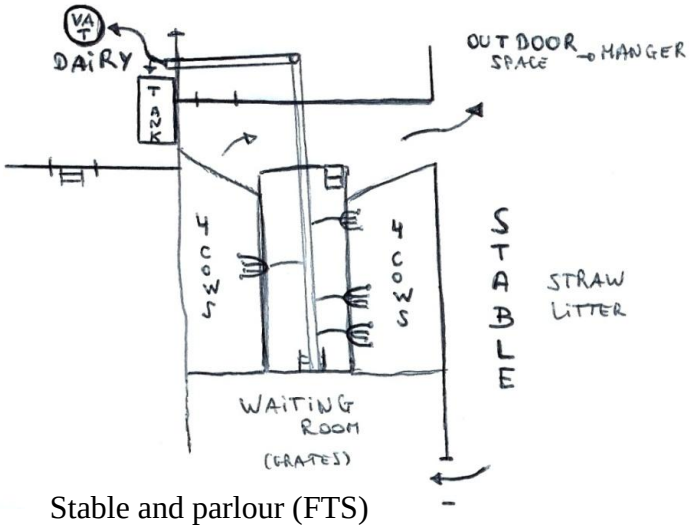
From the skimmer "la turbine"	End-product
"Lait entier" (full-fat milk)	in bottle
	cheese *"fromage blanc au lait entier"* (quark)
« Crème » (Cream)	raw « crème fraiche »
	butter « nature » or « salé »
« Lait demi-écrémé » (semi-skimmed milk)	in bottle
« Lait 100% écrémé » = « petit lait » (skimmed milk)	in bottle
	cheese « fromage blanc au lait cru écrémé »
	yoghurt (pasteurized milk)
« Lait battu » (buttermilk, from the churn)	in bottle
	cheese "fromage au lait battu »
"Sérum" (serum)	in bottle



Stable and parlour (FDB)



Farm overview (FTS)



Stable and parlour (FTS)

Valuing by-products on the farm Making use of by-products created by farm activity on the farm itself.	Self-provisioning of animal food Rethinking food ration, Peas Covering silage without plastic

- Dairy by-products are used to produce meat (FDM, FQP, FTS). Arthur (FQP) gives grey water from the cleaning of dairy containers and from the prewashing of milking system to the old chickens and the heifers. He gives milk from the filter and *"petit lait"* (skimmed milk) to calves; he has a little container on a trolley [first picture]. The price merchant offered for 15-day-old he-calves was so low *"le coût de la pailette"* (cost of insemination straw) that *"j'ai rué dans les brancards"* (expr. I rebelled, as an angry horse) i.e. he didn't sell them. *"Ils ne sont pas fragile"* (they are not weak) *"ils ne vont pas couter cher"* (they won't cost a lot) *"j'ai la nourriture donc ça va"* (I do have animal food): Arthur has grain and maize he harvested last year, pulps, and he has *"petit lait"*. He keeps them in the old stable. *« Je n'étais pas d'accord de travailler pour rien »* (I did not agree to work for nuts). As the quantity of skimmed milk varies according to farm shop demand, he sometimes stores *« petit lait »* for calves to *« le valoriser au maximum »* (value it as much as possible). Nathalie (FDM) also gives it to calves; they drink in teat buckets. She gives some also to pigs together with bran from FDR.
- Beet pulps (FSM, FQP, FTS). Farmers who grow beetroots have rights to buy a certain quantity of pulp for cheap [right to x tons of pulps = f(#ha of beetroots they grow)]. Farmers say it's hard to get moist pulps [second picture], *"pas moyen de s'arranger"* (we cannot negotiate) with the sugar factory although it is the cheaper kind of beet pulp (raw and still warm). Jean (FTS) spends the money he gets from the sugar to buy pulps -he buys more pulps than what he has right to. *"Quand même moins chères que dans le commerce"* (still cheaper than on the market); on the market there are only dry pulps (200€/ton) while the ones they get *« supressées »* cost 25€/ton for 22%dry matter. Farmers complain they cannot get beet tails anymore as the factory sells them with pulps or for biogas production, *"il n'y en a plus pour les fermiers"* (there is nothing left for farmers). Arthur used to cover maize silage with it.
- Pea straw (FSM, FTS). Farmers give it together with concentrates to (young) meat cattle.

Selling by-products Selling by-products created by farm activity	Processing milk, Growing bread cereals Direct selling,

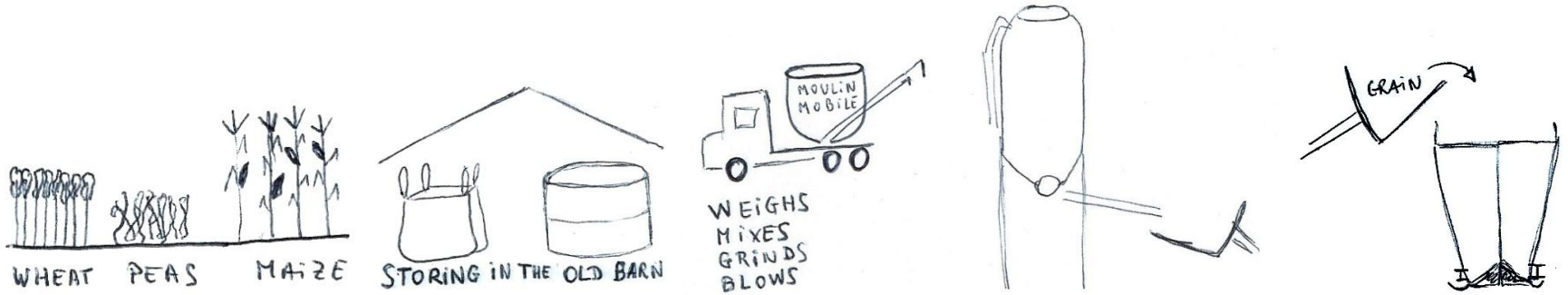
- Dairy products: e.g. buttermilk is sold raw and in cheese with (FQP)
- Bran (FDR) C8.5 bran is sold to livestock farmers (incl. FDM) instead of going to the compost.
- Small eggs (FQP): when the laying chickens are young (start laying eggs) their eggs are smaller. In industrial systems, these eggs are

thrown away as they do not match the standards. Here thanks to the fact they have direct contact with end-consumers, they can explain them why these eggs are smaller. They sell three for the price of two.
- Laying chickens' meat when they renew the lot

Farming meat poultry Farming meat poultry as a main or complementary farm activity.	Home-thought arrangement of the stable Diversifying farm production Valuing *"l'existant"* Self-provisioning of animal food

- Breeding: farmers I met (FBF, FSM, FQP) can chose between different strains of meat chickens, they often chose slow growing but tastier breeds. They also farm turkeys, ducks, and guinea fowls. All of them buy four week old chicks and keep them until they are about thirteen weeks old.
- Housing: Benoit (FBF) prefers mobile wood buildings; his father saw this system in France and brought it here. These housing units held on grasslands ground, under trees and it is well insulated for winter times *"on a moins de problems de temperature"* (they have less temperature problems). Benoit also has other types of housing: lots in the old stable and lots in the new (concrete) hangar. He has two kinds of heating system: radians (do not burn) or gas; ducklings require warm environment (31°C). He arranged his own watering system: there is a container in each room to reduce pressure, and then flexible pipes bring water to the troughs. He fixes and adapts a lot of watering, heating and feeding systems on his own. He buys wood shavings as litter for chicks; he stores these bales and big bags of grain in an old barn. In FQP and FSM chickens also run on grass in the shadow of fruit trees *"le jardin des poules"* (chickens' garden) *"les poulets rentrent et sortent tout seuls"* (chickens go in and out freely) *"ils ne sont pas bêtes*" (they are not stupid) Jacques says.
- Slaughterhouse: small-scale one close by and relatively cheap though opening days are not the best for producers. Farmers say it runs thanks to producers like them. Farmers catch poultry just before they go to the slaughterhouse. We gather a group in the corner of the room, close to the door with wire netting. Then we catch the chickens by hand (three at once) and put them in boxes.
- Food: until now, most of farmers buy it from a provider (FQP, FBF); Jacques (FSM) doesn't. In FQP, they buy *"mélange pour poules pondeuses"* (laying hens mix) *"solution de facilité"* (easy way) as they don't know a lot about chicken food production yet -they think about producing it in the medium term. The grains come from France; huge truck delivers directly in containers close to the chickens. Benoit (FBF) is looking for a more appropriate food ration. He used to buy chicken food from a reseller close by but it became too expensive, there were not producing it themselves and there were too many intermediaries. Jean and he are looking for more hectares to

grow cereals for their chickens. However, Jacques (FSM) decided not to buy chicken food anymore. At the beginning, they were buying chicken food, *"on en consomme beaucoup"* (we need quite big quantities); they had too much chicken to do it themselves (mixing by hand) but not enough to afford an integral chain (crushers and mixers). Jacques asked the provider (in the village) to include his own wheat in the mix but the provider did not accept. Then he heard about *Moulin Mobile* -a truck equipped with a mill that already came to my parents' (CHV). Jacques organized the storage of his wheat. He bought non-GMO soy and corn (later, he started to grow corn also). Jacques did not like that soy is cultivated on deforested land and that it has to be transported from Brazil (causing GHG emissions). Moreover, non-GMO soy was more and more difficult to find (less and less produced) and became more expensive (>400€/ton). So he questioned the use of soy. He says that in the 70s-90s, animal feeding relied more and more on soy and they selected strains of pigs and poultry that *"gonflent"* (inflate, cf. *plofkip*) i.e. respond well to soy and meat meal. ->Get rid of soy (see detailed section).
Farmers usually feed chickens with a wheelbarrow; they go from housing unit to others and fill the mangers with a bucket. Jacques found another system, home-made and with second hand material. He welded two metal sheets together so that he can fill it with the tele-handler using the same bucket than silage for cattle. In this 'new' manger, he can store 1500kg at once i.e. 150 chickens-lives. He can also ask Moulin-Mobile to fill it directly. He located them so that chickens must move and do exercise to get food.

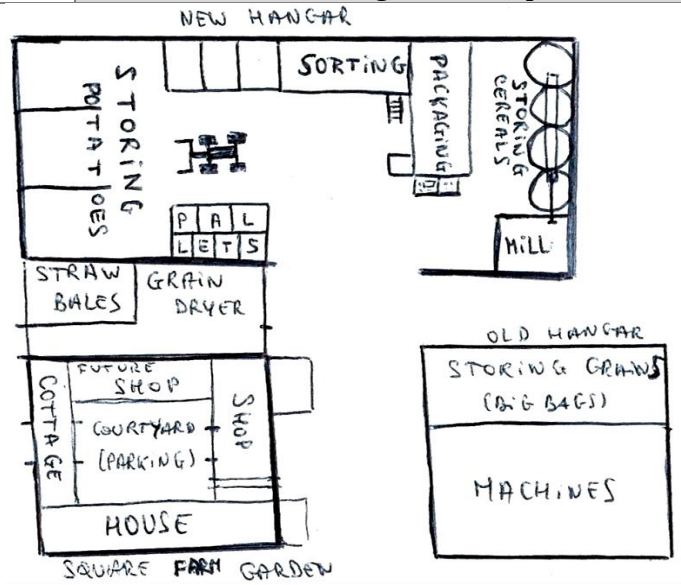


Growing vegetables Growing and retailing vegetables as a main or complementary farm activity.	Diversifying farm production, Adapting crop rotation, RCW, Collecting rainwater, Settling Permanent beds system, Composting

Two farmers (FDB, JDR) grow and retail vegetables i.e. in addition to vegetables aimed at family food provision. Both of them respect organic principles.
- Inputs: cattle compost is their main source of fertility. Romuald (JDR) has an arrangement with a farmer and buys organic certified fertilizer. They go and buy seedlings from a provider for most of vegetables. Some vegetables are rainfed; others are irrigated. They prefer

"sytème goutte à goutte" (drip irrigation system) as it disturbs less soil life and seedlings. Pierre mounted it: he made holes in two plastic tubes and screw drip pipes. Thus, he gets an irrigation unit that he can move along the greenhouse. Irrigation is supplied with rainwater.

- Greenhouses, tunnels and protection sheets. This equipment is quite expensive and second hand ones are not easy to find. Romuald (JDR) bought a new greenhouse but he wanted to mount it himself -enterprise would have done it faster but it would cost much more. As the plan was not clear, he went to a colleague's to see how an identical greenhouse is mounted. He is glad he could buy it second hand in Flanders. *"Je n'ai pas d'emprunt"* (I don't have any loan) *"c'est avec mes economies"* ([I bought it] with my savings); he reinvests all the profit in greenhouse, tools, van, etc. Virginie works in an office so she *"gagne les sous pour vivre, pour les dépenses familiales"* (earns money to live, for family expenses) and makes it possible for him. As soon as mâche is harvested, he uses the tunnel to protect strawberries *"pour rentabiliser le tunnel"* (to make the tunnel profitable). He also plans to mount storing facilities he bought second hand.
- Workforce: some tools (eg. to prick out seedlings, finger tiller -one driving, one guiding) require being two or three. They should be coordinated; there is a little bell on the machine used for pricking out seedlings so that people know when to put it (regularly). Romuald is helped by his parents and his children. He also hires a seasonal worker -up to two days per week; he tries to spread the help and organise the tasks on the week. Farmers often say that kind of work is more appropriate for self-employed. In FDB, Stéphane (full-time worker) and Pierre's dad help also in the market garden, e.g. to sort potatoes.
- Learning about vegetables. Farmers learn by experience and from many different sources. For instance, Romuald goes to visits of farms organized by CCBT *(Coördinatiecentrum praktijkgericht onderzoek en voorlichting Biologische Teelt*) http://www.ccbt.be near Roeselaere, in Flanders. *"On n'est pas loin"* (it is close to here) Romuald can speak Dutch *"je me débrouille"* (I get by with it) and he sends his children in Anvaing immersion school in Dutch. He likes going to CCBT *"très dynamiques"* (really energetic) *"orientés industrie et circuits longs"* (industry and long food chain -type) *"mais intéressants"* (but interesting) *"j'ai appris beaucoup par là"* (I learnt a lot over there). He also learnt from an organic but large-scale colleague *"guidé par GPS"* (guided by GPS). He goes to conference and reads the book of Jean-Martin Fortier (the market gardener). His background of agricultural engineer helps to notice, indentify weeds and pests quickly.
- Pest management: they use ramial chipped wood, design complex crop rotations (and associations), and opted for permanent beds systems (see detailed sections).

Growing potatoes Growing and retailing potatoes.	Diversifying farm production, Direct selling, Farm shop
Two farmers grow and retail potatoes (FDR, FDB); both of them are organic certified. In FDR, organic potato is one of the major crop and farm's specialty for two generations. They grow three sorts of potatoes: *Agria*, *Charlotte* and *Désirée*. They invested in specific equipment for harvesting, sorting, cleaning and packaging potatoes. They combine old and new equipment: the hopper is in wood and a new semi-automatic channel weighs potatoes (5, 10 or 25kg) and even sews little packs of 5kg. Next to the square farm, they built an insulated hangar for potatoes where they store the harvest and the pallets to be delivered [see drawing]. On the sorting chain, four people can work at the same time. Too big potatoes are kept apart. Soil blocks, green, damaged and too small potatoes are thrown away and go back to the compost. They fill pallets according to orders Christine receives. They even made a mould to fill the pallets properly; they wrap pallets with plastic sheet. They sell potatoes in the farm shop and fairs. They have their own truck and a van. They deliver orders in Lille, Namur, Louvain-la-Neuve (more than 100km away). Some retailers come to the farm to get their pallet.	

Developing distinctive quality products Fine-tuning the labour process to obtain food products 'that industry cannot'	Developing shorter food supply chain Direct selling, Farm shop Redefining performance
Pierre (FDB) says they have to manage products *"ingérables"* (lit. unmanageable) for supermarkets such as raw milk products and fresh organic vegetables. Nathalie (FDM) says *"il faut être different"* (we must be different). My mother says *"on doit essayer toutes sortes de choses pour obtenir un fromage comme personne d'autre"* (we must try all kinds of things to get a cheese like no one else) *"on doit viser la perfection"* (we must target perfection). She explains that selling medium cheese or very good cheese requires same workforce. But people are more willing to pay for the second. She tries a lot of things that may improve it as it is a way to ensure fair price. - Developing different process recipes (e.g. Christine's buttermilk cheese, FQP), defining distinctive criteria of production (Corposain), re-thinking the food ration (FSM, CHV, FDB, FDM), self-provision of animal food (quality and content control, all), mixing goat or cattle races (FDM, FQP, CHV, FDB), choosing chicken strains (see detailed sections)	

Redefining performance Taking active part -even the lead- in the redefinition of agricultural performance, of the normative framework that determines what are acceptable and desirable agricultural practices and outputs.	Developing shorter food supply chain Direct selling, Regional CRE Developing distinctive quality products

Food and agricultural products can be considered with many different lenses: growth speed, taste, richness, texture, flavour... Moreover, their properties are associated with many normative standpoints and claims. Farmers I met disagree with some of modern standards; they know that standards are moving and can be moved. Thus, they seek to legitimate alternative farming practices while promoting another appreciation of farm outputs. Is this bachelor's button a weed or an endangered species? [see picture]

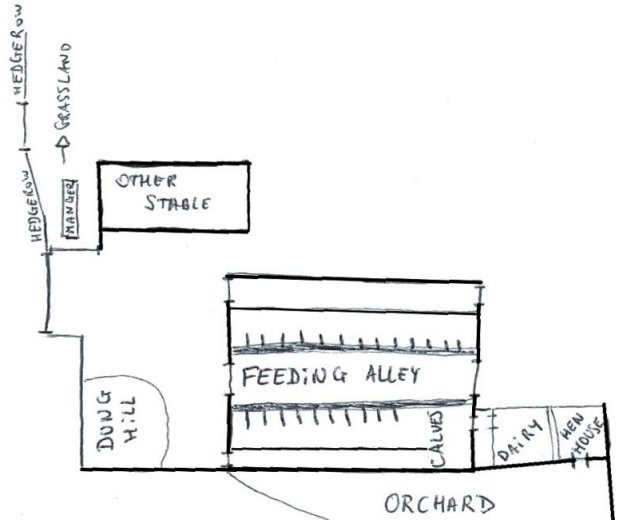
- Teaching consumer what is good and getting them used to this. First, farmers create space for learning (changing representations): they offer degustation, they make people test and taste their products in particular settings. For instance, during open doors (FDM, FDB, FSM, CHV, JDR, FDR), people see the products together with the well-kept animals, the farm and its story, the family, the rural landscape, enriched biodiversity. Farmers make them taste products while telling its associated story. Second, farmers seek support from restaurants, associations (e.g. Nature et Progrès), and cultural repertoires of older people (parents, grand-parents) to make the unique taste, strong smell and short shelf life of their products acknowledged as manifestations, proofs of authenticity.

- Defining the price when there is no "market". This is a new challenge for them: their products do not correspond to global food commodities; market prices and quotations displayed in farmers' newspaper are irrelevant. Farmers discuss with consumers on weekly market, compare their own products with relatively similar ones; local price fixation gives way to many claims, discussions, trade-offs and sometimes conflicts. For instance, Romuald (JDR) balances *"ce qu'il y à manger dessus"* (what we can eat on that), workload, taste, and attractiveness to fix gourds' price. He also adjusts by selling by €/kilogram or €/piece.
- Discussing with colleagues to (re)construct shared scope of relevance and quality norms. CRE group meetings (FSM, FBF) are nice manifestations of this point (see detailed section). Farmers discuss about causalities and try to identify factors that one *should* take into account. For instance: do different breeds of chicken respond differently to different types of food? Should I look for one that would respond better to my food? Do living conditions of chickens (running, eating grass and worms or not) influence meat texture? In the same vein, farmers question the quality of animal food (norm deconstruction and reconstruction) in general and the quality of animal food bought on the market in particular. Is the cost justified (in terms of growth speed, efficiency) ? *"Il y a protéines et protéines, et pour les céréales aussi!"* (expr. a source of protein is not worth another one, idem for grains). Farmers question what is written on labels of chicken food and start considering partial information as a lie and a source of problems for them. Here a positive example: *"le meilleur, c'est le foin"* (the best is hay), farmers' discussion ended up by saying that hay was the richest food, the most natural, the cheapest, the one animals prefer, the healthiest (vitamins are preserved). Some criteria are put aside while others are (re)considered.

New ways of breeding cattle Questioning what they have been taught about breeding cattle and trying new arrangements and new practices according to other sources of information.	Mixing cattle races, Hay dryer Rethinking food ration Learning about biodynamic agriculture
- Seeking other sources of information. Farmers often told me they can't stand *"concours"* (Holstein and BBB cattle breeding competitions); those farmers disregard other cattle races although their cows suffer from 'co ancestry' and are 'stupid' [sic]. Arthur (FQP) subscribes to *"Contrôle laitier"* (milk control: meter number of liters each cow gives) every 6 weeks *"pour savoir ce qu'elles donnent"* (to know what they give) *"c'est tout à fait libre"* (he is free to do so) *"c'est un bon outil pour moi"* (it is a good tool for me) but it costs more and more, it's less and less subsidized. He also told me *« Il faut voir la réalité de la vache »* (one must see the reality of the cow); accountantcy, profitability, *« les chiffres »* (figures) : *« si on les écoute, on ne produit plus »* (if we listen to them, we don't produce anymore). *"Je connais mes vaches"* (I know my cattle) *"chaque vache est spécifique"* (each cow is specific). French salesman came to their farm with buckets of organic certified anti-worm plants and he tried, *"les vaches aiment bien"* (cattle like it), he put it at their disposal *"celle qui en a besoin y va"* (the one that needs goes). He put it in the manger where they wait so they all have free access to it *"j'ai envie d'essayer"* (I want to try). He considers he has *"vaches résilientes"* (resilient cattle) so he can afford to try alternative systems. *"L'école d'Ath ne vas pas venir visiter"* (agricultural school won't come and visit) *« je vais à contre courant »* (I go against the flow). Pierre (FDB) starts using homeopathy (diluted and dynamized) for different problems; he tried and observed that it worked well: *"arrière-faix"* (afterbirth) that stayed in the cow, he gave homeopathy and it came out rapidly; he once had the feeling/intuition that the herd was *"déprimé"* (sad), he also gave homeopathy. He also seeks information from a vet Dr. Saelens *"branché biodynamie"* (knowledgeable about biodynamic agriculture). This vet came and wanted to *"faire le tour de toute la ferme, même les prairies"* (go all around the farm, even in the grasslands) *"il voit la ferme comme un organisme"* (he sees the farm as an organism), he spent five hours there. *"Les vétés ont perdu leur âme »* (vets lost their soul) because they usually focus less and less on diagnostic. - Reproduction and selection trends. Arthur (FQP) says he would like to keep cows for seven or eight years on average. He wants to keep on increasing the number of races (diversity). He selects cows that live longer and that are smaller to keep them longer; when they are big, they do not fit in the *"travées"* (stable system) [see picture] and they have *"mal aux pattes"* (hoof problems). He waits longer between two calves -1,5 year rather than systematically inseminating them every year- so that they *"tiennent le coup plus longtemps"* i.e. live longer; some cows *« expriment leur potentiel sur le long terme »* i.e. express their potential on a longer lactation period. *"Je ne tiens pas les méchantes, pour ne pas dégouter les enfants »* (I don't keep nasty ones, not to disgust children) *« ils savent tous traire les vaches »* (they [children] can all milk) *« je veux que tout le monde puisse traire »* (I want that everyone could milk). Dany (FDM) choses *« races économiques »* (economical races); he says a Jersey cow can give a calf per year till she's thirteen *« sans problème »*, he seeks to get a herd with a high average age *"c'est plus économique"* (it is more economical). On average, he keeps the cows for six lactation seasons, *"c'est déjà bien"* (it is already good). If the cow is still well, he keeps her till 13 or 14 year old. He likes small cows: it is a smaller capital and it destroys less the cover by *"piétinement"* (trampling). Moreover, as they are small, Jersey cows fit the old stable *"cour bâtis"* and as they have dark hooves they are more rustic. Salers cattle are *"race rustique"* (rustic race) *"elles ont des reserves"* (they 'have stock', as buffer);	

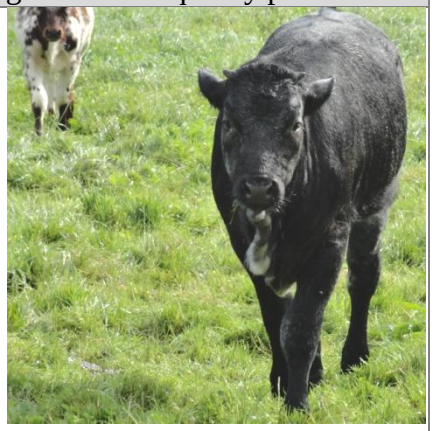
when they don't give milk, the get fat easily even only with grass. These cows *"donnent tout pour le veau"* (give everything to their calf) so when he removes the calf, the mother gets fat fast. Dany says that if you treat with anti-worms often, you destroy immune system; the best way to get rid of parasites (worms) *"l'immunité, il n'y a pas de secret"* (expr. immune system, there is no secret). Jean (FTS) is proud they have a thirteen-year-old cow, unfortunately she isn't in-calf this year, *"elle aura donné 90 000 litres"* (she will have given 90 000liters) *"c'est la vache de Bastien, quand il avait 7 ans"* (it is the cow of Bastien -their son, since he is seven). *"En bétail, j'ai horreur d'acheter"* (I don't like buying cattle), *"tu as tes problèmes à toi, tu les connais »* (you have your own problems, you know them), *« ramener de l'extérieur, c'est ramener de nouveaux problèmes »* (bringing cattle from outside means bringing new problems) so he selects among his heifers. Pierre (FDB) tries to get births in spring so that he gets a better lactation season (Δ= 500 to 1000 liters); he is inseminating less and less (but himself) and he bought a Montbéliarde bull. Mixing cattle races (see detailed section)

- Well-being. Dany (FDM) considers that a cattle lot should not exceed fifty cows otherwise they cannot recognize each other, they are lost, and it's more difficult to notice in-heat cows. Pierre and Véronique (FDB) invested in a hay dryer (see detailed section); with *"alimentation à base d'herbe"* (grass-based ration) *"quartiers"* (udder quarters) become less rapidly hard or inflamed and he has more time to try other treatments (than antibiotics) e.g. homeopathy. When one udder quarter is infected, he tries maximum two treatments with antibiotics, if it doesn't work, he gives up *"elle compense bien avec les trois autres"* (the cow will compensate with the three others). Arthur (FQP) *"je les lâche tous les jours"* (let them go outside everyday) so he can keep them longer. He told me that even when it's snowing, they lie on the snow *"ça leur fait du bien"* (it does good to them) *"elles sont bien"* (they are good). The manger (*"le bac dehors"*) is outside [picture] on a concrete base surrounded by hedgerows, it's easier to give haylage in this manger. In the evening, he gives oat straw; they eat it when they come back from the grassland and they have to wait (for being milked) *"elles sont plus calmes"* (they are more calm). Sylvain -their son- explained me *"le rituel des vaches avec la brosse"* (cows' ritual with the brush) *"elles font la file"* (they queue); *"elles sont beaucoup plus paisibles"* (they are more peaceful) because they *"libèrent leur énergie"* (let their energy go) Arthur says. He gives maize silage, pulps and a bit of cattle cake with the tele-handler *"pour qu'elles se lient"* (to make them come in), then he *"repasse avec le seau"* (comes back with the bucket) to give a bit more cake *"vache par vache"* (cow by cow). He keeps dry cows in the herd so that they *"restent dans le bain"* (stay in the mood)



"elles stressent moins" (they stress less) *"elles abordent mieux le vêlage"* (they deliver in better conditions), more than the half deliver in the grassland *« au milieu des autres »* (among others). His cattle lay on straw mattress, Sylain gives them straw with the skid-steer loader and removes shit with the fork then pushes it with the the skid-steer loader to the dunghill outside.

Mixing cattle races Gathering different cattle races in the herd and/or crossing cattle races to get a new type of cow.	New ways of breeding cattle, Direct selling, Processing milk Developing distinctive quality products



- Crossing different cattle races. Jean (FTS) crosses Holstein cattle with Swedish Red (Rödkulla) cattle that have dark hooves so they have fewer problems with it. *"C'est un paramètre important mais on fait peu attention à ça"* (it is an important parameter but we usually don't take it into account). On the opposite, these cattle have more problematic hips. However, *"j'en ai jamais vu une vêler"* (I never saw one delivering) i.e. they deliver on their own. Among sperm straws, he chooses *"des qui vêlent bien"* (those who deliver well). Jean says that *"le commerce de viande ne va pas"* (meat trade is not going well) meat prices are really low and he has too many Holstein heifers -he has to sell cows. He crosses his Holstein with BBB (white-blue) to get more meat than pure Holstein, but *"veaux pas trop gros"* (not too big calves) i.e. better than pure BBB. Thus, he gets 350 to 500€ for a male-calf (15 days old), 250-400€ for a female. To compare, pure Holstein is worth 200€ usually but only 80€ at this moment (prices are particularly low). Dany (FDM) crosses Holstein and Jersey cattle to get *"Kiwis"*; he told me they produce the same amount of *"matière utile"* (fat and proteins) than Holstein but they live longer, are more rustic, and have less problems with hooves. He also crosses Salers or Jersey cattle and BBB cattle to get more meat but better taste [see picture]. Pierre (FDB) crosses his Holstein with Montbéliarde cattle to improve their rusticity and decrease *"capacité laitière"* (milk production capacity). At the moment their potential is 9-10 000 litres/cow/year but as he targets fodder autonomy, these cows fed with grass *"plafonnent à 7000"* (reach a ceiling- -as they are not selected for grazing. He re aligns his cows to grass otherwise he would have to give corn and he doesn't want to grow it because of (i) cultivation's impact on the soil, (ii) hybrid seeds (iii) weeding conflicts with market garden timing (iv) decay of residues requires fertilizers or slurry. There would be a lot of disadvantages to get maybe 500l/cow/year *"tout ça pour ça…"* (expr. all that for this).
- Gathering different cattle races in the stable. Arthur and Christine (FQP) like mixing cattle races as they complement each other, they are sure it's better for butter taste *"c'est intéressant pour ce qu'on fait"* (it is interesting for what we do) *"vu qu'on diversifie"* (as we diversify farm production) but *"il n'y a pas de recherche là-dessus par ce que ça n'intéresse pas les sociétés"* (there is no research on that because it's not interesting for companies) *« ça ne plait pas aux autres »* (others don't like that) *« ils aiment l'uniformité »* (they like uniformity) *« chaque race a ses spécificités »* (each cattle race is specific). They don't want to 'intensify' vet and medicines expenditures. Thus, they

gather different races mainly for milk but also a bit for meat: Brown Swiss, Jersey, "Pie-Rouge" (Pezzata Rossa) and "Pie-Noire" (Magpie), Holstein, Normand, and Mixed-white-blue (BBM). BBM cattle give *« fort beau veau »* (really nice calf) and 3000l/year *"mais ne coute rien"* (but it is economical) and *"il y a de la viande"* (there is meat on) *"elle fait baisser la moyenne mais ce n'est pas avec la moyenne que tu vis"* (it decreases the [milk production] average but average doesn't make you live). Dany and Nathalie (FDM) want to get the best meat and milk so they chose Salers and Jersey cattle. Salers *"ça ne vaut rien"* (it is worth nothing) on conventional meat market; they combine unique meat, unique milk from fancy breeds with nested market (direct selling).

- Cattle insemination replaces the bull that may be dangerous and helps to cross races. Some farmers followed classes -notably organized by Holstein Association- Francis Delobel (CHV), Jean Tetelain (FTS), Jacques Faux (FSM), Pierre Cossement (FDB), and Dany Dubois (he is vet). Pierre and Véronique (FDB) want to inseminate less and less artificially; they plan to buy a second Montbéliarde bull.

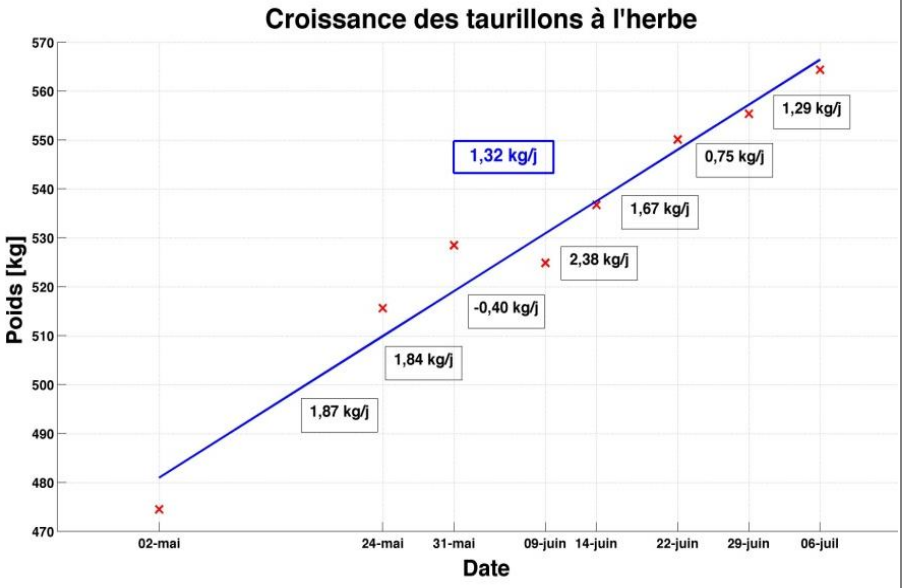
Rethinking food ration

Designing new animal food rations to match particular objectives: increase control on ingredients (be sure there is no GMO, meat & bone meal, dioxin) and contents (energy, proteins, vitamins, minerals, oligo-elements), increase self-provision and reduce costs (fluctuation), increase appetence, digestibility, and sustainability. Farmers think food ration together with crop rotations and target both agronomical sustainability (crop rotation more diverse, including legumes) and environmental sustainability (soil cover, reducing transport, increasing grassland, multiannual crops). They are trying new things on their farm and engage in new relationships with the vet, lab (food analysis), and participatory research.

CRE, Self-provisioning of animal food
Adapting crop rotation, Growing peas, Fodder cereal-legume association, Temporary grassland seed mixes, Settling rotational grazing, Getting rid of soy, Hay dryer, Valuing by-products on the farm, New ways of breeding cattle
Developing distinctive quality products

- Diversify the ration. For instance, Jean (FTS) gives his cattle linseed cake, soy, maize gluten, pea and colza straw *"pour faire ruminer"* (to make them chew), fodder maize silage, minerals, haylage, fresh grass (grazing), dried potato powder (by-product via a friend *"un contact à Lutosa")*. He wants to give the *"un apport plus diversifié"* (a more diversified food). He uses a TMR mixer although it requires a lot of energy [see picture].
- Improving the quality of *"fourrage grossier"* (gross fodder). Farmers associate more species and include legumes to get better fodder *"équilibré et riche en protéines"* (balanced and rich in proteins) and to decrease use of concentrates. Fodder protein content depends on the number of cut and the mode of preservation (hay vs haylage). Farmers order analyses to get more information on their fodder. Farmers say animals are more calm, quiet, ruminate more, in better health thanks to the diversity of vitamins, minerals and other components present in diverse forage -incl. wild plants.

- Settling rotational grazing, temporary grassland seed mixes, fodder cereal-legume association, get rid of soy, hay dryer *« le séchoir »* (see detailed sections)
- Less concentrates and concentrates *« moins concentrés »* (less concentrated). In some farms, concentrates become more 'exceptional', they are given *"au seau"* (bucket), *"pour la finition"* (for finishing stage -meat cattle). Pierre (FDB) reduces milk cattle concentrates to one kg of triticale-peas / day / cow, and gives maximum two kg *"au pic de lactation"* (at lactation peak). He says one should never give more than three kg to prevent from acidosis.
- Jacques (FSM) even designed a trial: to farm grass-fed bull-calves. He took the opportunity of CRE (see detailed section) to do that and he made a report at the end [this chart comes from his report]. His goals are to reduce costs and reach the highest level of autonomy possible. In spring, most of cattle are grazing and bull-calves wouldn't eat enough to keep the silo (silage) open; dry fodder (haylage, dry pulps) would cost too much. So he wondered if he could rely on grass to feed bull-calves. He had eight bull-calves (13 months old, average of 475kg). During the first months (May-June), they were fed 100% in grassland. He chose an old permanent grassland (white clover, english ryegrass, meadow-grass and other wild plants -dandelion, agrostis) where 15t of compost are spread every 2 or 3 years. He designed four parcels of 1-1,5 ha to settle rotational grazing. Bull-calves got *"la crème de l'herbe"* (lit. 'cream' grass i.e. the first cut, the best); another lot of cattle follows 'pushes them'. Doing a lot of exercise (running in the grassland) increases their intake capacity *"ça ouvre l'appétit"* (it opens up appetite) and their shape *"conformation"* (increases the expression of their genetic potential). He weighted them regularly, their average growth speed: 1,32kg/day *"croissance excellente"* (excellent growth) due to *"herbe de qualité"* (quality grass) Jacques says. Then he observed their growth rate slow down so he brought them to the stable (they were already 565kg). Jacques gave them haylage (clover, ryegrass) and fodder cereal-legume mix (spelt, triticale, peas). Then he observed it was not enough so he also gave dry pulps and colza he bought *"je n'ai pas encore trouvé d'alternative"* (I did not find an alternative for that yet). He also gave them rye straw to make them chew as there is a lot of fiber (from the farm). Thus, they have *"une bonne ration"* (a good food ration) but *"ils mangent encore beaucoup"* (they still eat a lot).



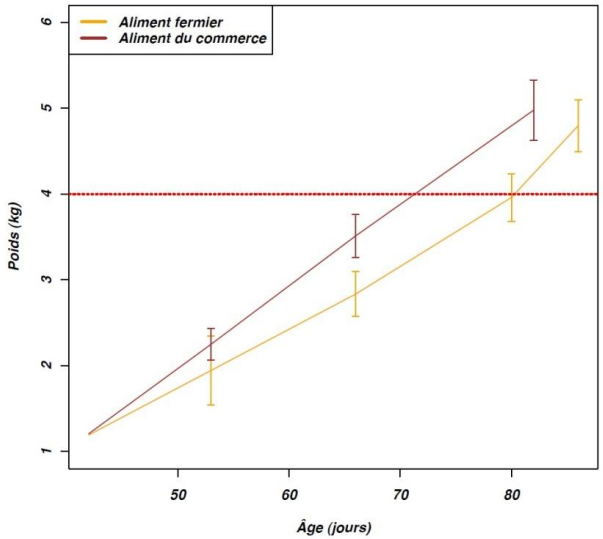
Getting rid of soy Reducing soy purchases and designing new animal food rations that replace soy (protein input) by other (farm) products.	CRE, Self-provisioning of animal food Adapting crop rotation, Growing peas, Developing distinctive quality products

- Feed farm animals without soy (FDB, CHV, FDM, and FSM). Pierre and Véronique (FDB) quickly considered soy as a problem as its trade favours GMO, big multinational companies, deforestation, and climate change. As a response, they wanted to foster fodder autonomy. Pierre first tried to grow lupin and horse bean to complement maïze -he didn't want to quit maize at that time. He adapted crop rotation but those plants were not rich enough to balance maïze and the yields were not satisfactory. So they decided to rely more on grass and later to shift to organic farming *"vision cohérente de l'agriculture qui me plait"* (I like this coherent vision on agriculture). Before that, *"je ne me voyait pas rester fermier toute ma vie"* (I did not think about being farmer all my life) and he planned to go to developing countries. Today he says he's aware that development is *"ici"* (here) and that his children can have a future here.
- Benoit (FBF) tries to decrease soy consumption, diversify food ingredients, foster farm autonomy (self-provisioning), and improve meat taste and texture. He looks for more land and to alternative chicken food on the market. He says it is hard to find no-soy chicken food that is still appetent and available in an appropriate format on the market at the moment.
- Jacques (FSM) attended a conference in Antoing about sources of proteins and he heard about peas. The lecturer gave him contact details of a specialist in Gembloux (agricultural university). Jacques also read articles on internet and some books about it *"c'est difficile de trouver quelque chose sur les volailles, et c'encore pire pour les poulets fermiers"* (it is hard to find references about poultry, and it is even worse for free-range chickens). He phoned to Gembloux and got advice on the ration and the percentage of peas he could give (up to 25%). But then, chickens would miss some Sulfur-containing amino acid so he complemented with colza. Thus, he started progressively to substitute soy by peas (15% to 25%) and to add colza *"par tatonnements"* (incrementally) *"je n'avais pas les moyens de faire de la recherche scientifique là-dessus"* (I didn't have means to do scientific research i.e. to run the risk with more chickens).Then, he observed that chickens were too fat so he thought to add alfalfa pellets to re-balance. Alfalfa has *"effet anti-graisse"* (anti-fat effect) it's really poor in energy and rich in calcium -it compensates well cereals: P>Ca- so he can decrease minerals purchases. He says chickens are still fatter than with soy but they are much better.
- Jacques (FSM) experiment: he took the opportunity of CRE to test his findings. Thus, he compared no-soy chickens (fed with farm food) and chickens fed with 'commercial' food (bought from provider). His goal was to test and assess the novelty; he wants to *"vérifier le bien-fondé de cette option"* i.e. test whether it's actually a good idea, *"prendre du recul; voir ce qu'on y gagne et ce qu'on y perd, au final"* (look back and assess advantages and drawbacks). To remind, Jacques and Anne-Marie farm chickens with small-scale equipment (complementary activity) and they sell them directly to consumers in their farm shop. Jacques listed and observed following parameters: growth, weigh, yield at slaughter, organoleptic qualities, content of the droppings. When chicks arrived, they stayed together in the same living conditions the first week. Then, he made two lots of chickens, banded them and sprayed color on them [see big picture].
  - ➔ **"ACom"** Chickens fed with commercial food: wheat, maize, soy (contains 48%prot., represents 20% of ration), yeast, vitamins, sugar molasses, => 19%prot. (control group). Jacques doesn't know 100% of ingredients, *"composition n'est connue que partiellement"*

(food content is known ony partially) [small picture on the left]

➔ **"Afer"** Chickens fed with farm food: wheat, maize, peas (25%) (all grown on the farm) + colza oil and cake (=32% prot.), alfalfa pellets, CMV *"concentré mineral vitaminé"* (bought) = > ration: 13%prot. [small picture on the right]

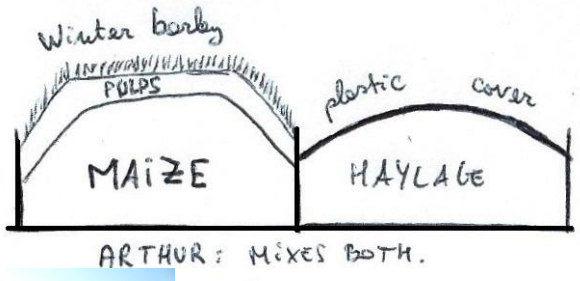
During the first experiment (February-March) Jacques observed that growth speeds are different. It takes one more week with Afer to reach 4 kilos. Although, at the end, Afer graph accelerates [see graph, from his CRE report]. The difference *"reste dans les limites acceptables"* (is acceptable) because Afer food consumption/chicken was lower. He says about Acom *"ils mettent des appétants dedans"* (they put appetence enhancers) *"les poulets se jettent comme des enragés"* (chickens are crazy after this food) *"il y a une consommation de luxe"* (they over-consume it). Jacques says Afer smells good but it's not that much attractive. Moreover, Acom*"coûte beaucoup plus"* (costs much more). There are two reasons: workload for the preparation is cheaper when I do it myself and Afer contains fewer proteins (what costs most). About workload and land to grow food himself (opportunity costs) *"tout ça, ce sont des calculs théoriques"* (that are theoretical calculations) *"quelle autre culture?"* (What else crop?) [i.e. would be more interesting]. Anyway, he likes diversifying crop rotation and he can value by-products (peas straw). Taste and texture of the meat is also different: Afer chickens are fatter though Afer food (1,8% fat) is less fat than Acom food (4% fat). Afer chickens are better (taste). Acom are too dry after being cooked; Jacques says they were too different so they couldn't sell it to their consumers; they would have lost clients. ACom were *"poulets à la gonflette"* (inflated chickens, *plofkip*) there is no fat, they were too dry. Finally, Afer droppings were dryer and contained less nitrogen (Afer 5,5% - Acom 10,3%); Jacques thinks they absorbed proteins better because food protein content was not that different (Afer: 13%- Acom:19-20%).



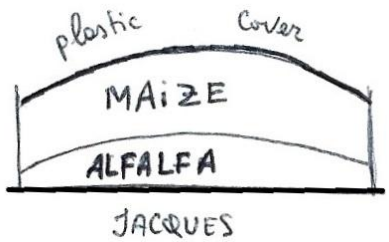
Self-provisioning of animal food Reducing animal food purchases to increase farm economic autonomy and food quality control. Animal food autonomy -complete self-provision of animal food- requires a balance between herd size and farm land (croplands and grasslands).	CRE, Adapting crop rotation, Peas, Hay dryer Valuing by-products on the farm, Temporary grassland seed mixes, Catch crops *"cultures dérobées"*, Settling (rotational) grazing Covering silage without plastic, Fodder cereal-legume association, Farming meat poultry

"Le facteur limitant, c'est le prix des nourritures" (animal food price is the limiting factor) *"le soja est trop cher"* (400-500€/ton, soy is too expensive), *"les prix fluctuent"* (prices vary).

- Cereals: farmers grow fodder cereals and sometimes associate them with legumes (see detailed section). Some farmers have an arrangement with François Lefebvre (farmer son from Bléharies); he invested in a *"Moulin Mobile"* i.e. a truck equipped with weigher, crusher/grinder, mixer and blower. He goes from farm to farm and can mix different ingredients from the farm (wheat, corn maize, peas) and bought (alfalfa and colza pellets, CMV). Thus, farmers keep a part of their (wheat) harvest and make it crush.



- Valuing by-products on the farm, adapting crop rotation, catch crops *"cultures dérobées"*, settling (rotational) grazing (see detailed sections).
- Getting land: Jean tries to get few more hectares to increase Benoit's autonomy (growing cereals to feed poultry).



- The Art of Hay-Making (FDR, CHV, FTS, FDM, FSM, FBF, FDB, FQP). Many parameters matter: number of tedder, work speed *"max 1250 rpm"*. One must *"laisser mûrir le foin"* (let it maturate) and go around parcels often to see when to cut, ted and harvest.
- Get some equipment for making and harvesting hay, haylage, maize silage, fodder cereal mixes. To plant, either farmer has his own plow and seed drill or he asks an entrepreneur to plough, till and sow. Benoit also borrows tools from friends. To harvest, farmers have scythe(s), tedder, windrower (CHV, FSM, FDB, FBF), specific windrow turner for alfalfa (*"retourneur d'andain"* FDM), loader wagon (FDB), baler (CHV, FSM), wrapper (CHV). Farmers do not all invest in all these machines so they ask an entrepreneur to harvest maize (FQP, FTS), to make bales and wrap haylage (FBF, FDM). Two farmers have their own combine harvesters (FDB, FTS). Some invested in a hay dryer (FDB, see detailed section) and in a grain dryer (FDR). Farmers invest in indoor storage facilities such as circular silo and big bags (FSM, CHV, FDM, FBF); old farm buildings are also used for that -e.g. 300-year-old barn in FSM. Besides this, farmers build outdoor storage facilities notably for fodder maize silage (concrete silos). Jean (FTS) makes them himself, he bought second-hand tools to make concrete walls. Arthur (FQP) experiments covering silage without plastic (see detailed section); Jacques puts maize silage on top of alfalfa silage [see drawings]. Arthur (FQP) sets silo of maize & pulp and silo of haylage close to

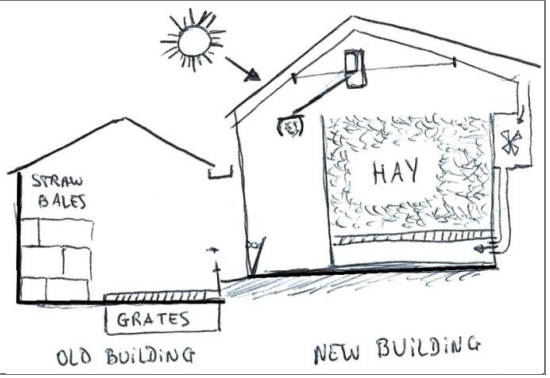
each other so that he takes a bit of each with tele-handler then mixes them [see picture]. As haylage is harvested in May, he cannot get beetroot by-product and covers it with a plastic sheet. Finally, all farmers have a handler; there are different kinds that match different needs: tele-handler with a fork and a mixing bucket (FDB, FSM, FQP, FTS) -it fits the new hangars and stable but not in the old ones so they use wheelbarrows; Weidemann or Schaffer (articulated) with little fork and bucket (FBF, FDM), it works for manure, bales, big bags, and it can go in the housing units of the new hangar and also in the old barn (big bags); skid steer loader (CHV) to carry manure, bales, grain, and others, it goes everywhere and it is really stable.

Hay dryer

Investing in a farm building equipped with a hay drying system: air warms up in the double roof and is blown under the hay.

Rethinking food ration,
Temporary grassland seed mixes

Pierre and Véronique (FDB) invested is such equipment to store and dry hay. They built a new barn in wood between two stables, where there were silage silos before. Their target *"objectif zero silo"*; they consider grass and diversified seed mixes as the best food for milk cattle. They prefer giving dry food rather than silage to get better milk and dairy products (less butyrics, better digestion). The hay dryer allows giving high-quality fodder even in winter. Pierre says it is harder to dry hay when it is *"jeune"* (lit. young, first cut in late spring) so he cuts less quantity at once. Grass dries only few days under sunlight so it keeps a nicer colour. Every time he harvest, he adds a layer on top. When he gives hay to cows, he takes by trench so he can mix layers with the crane to make *"cocktail de plantes dans la ration"* (plant cocktail in the ration). Pierre says it is *"un outil qui ouvre des perspectives"* a tool that opens doors, *« rentable? Oui, en gros… »*



(profitable ? yes, roughly) *« on avait les moyens de le faire, ça nous faisait plaisir de le faire »* (we had means to do that, we liked doing that) *« investissement qui ne perd pas de sa valeur »* (equipment that doesn't lose its value). Now, they want to try a new arrangement: to remove the current feed fences *"cornadis"* and replace them with two horizontal bars and put a slanting wood board in front of the cows that would keep hay close to the cows. Pierre thinks cows would be more calm (there would be less noise) and he could let the horns grow *"j'ai lu avec intérêt tes notes sur l'élevage Remeker"* (I read carefully your notes on Remeker farm).

-I went with Pierre on the crane, you can watch these short videos I took (uploaded on Youtube):

- ➔ http://youtu.be/_Fx1mPQ-6cQ
- ➔ http://youtu.be/X_zg1qavrbY
- ➔ http://youtu.be/XvTe3cU0y8E
- ➔ http://youtu.be/oje8bJvdK9M

Settling (rotational) grazing Settling fences and paths to make animals graze. Farmers plan timing, design parcels and animal lots to get as much grass as possible while never destroying the cover.	Rethinking food ration, Developing a multi-site farm, Agroforestry, Mixing cattle races Temporary grassland seed mixes
Farmers I met rely mostly on grass to feed their cattle (FTS, FDB, FDM, FSM), sheep (FBF), goats, horses and donkeys (CHV). Their goal is to *« avoir peu de bêtes à nourrir »* (have little animals to feed), in other words that animals feed themselves. They seek to reduce costs and workload with grass although *« on rit de nous avec l'herbe »* (people laugh at us with grass). When Dany (FDM) says *« on aura de l'herbe jusque décembre »* (we'll have grass until December), it means *« un mois de nourriture à l'étable de gagné »* (we saved one month	

of feeding them in the stable). Pierre (FDB) is proud that his TMR mixer is not used anymore.

- Getting access to land: grassland should be close to the farm, *"sol humide mais pas trop"* as Jacques says (FSM) but farmers do with what they have, even if they are *"parcelles humides et mal faites"* (wetlands with strange shape) as Dany says (FDM). Pierre (FDB) put second-hand slabs to make paths, farmers often have to negotiate and exchange parcels to get access to all their parcels. Milking cattle and goats must be close to the farm as they have to go the farm twice a day (FDM, FQP); horses, donkeys, sheep, meat and dry cattle can go in grasslands further. If it is not possible to get a path, farmers buy a livestock trailer or borrow one from colleagues. Dany and Nathalie (FDM) develop a multi-site farm (see detailed section).

- *"Aller chercher les vaches"* go and get the milk cows back to the stable from the grassland before milking them (FDB, FDM, FQP). *"Chez nous, elles vont encore en prairie"* (at ours', cattle still graze), the problem is that society misses *"main d'oeuvre qui se lève"* (workforce that wakes up) Dany (FDM) says. He is training his dog to group and drive the herd. When we went catching the cows one kilometre from the farm at 6.30am, Pierre told me *"j'adore aller chercher les vaches le matin, promener dans les prairies"* (I love going and catching the cows in the morning, to go walking in the grasslands); he prefers doing that than *"allumer le tracteur pour la mélangeuse"* (light on the tractor for the TMR mixer).

- Fences (permanent or temporary) must be appropriate: goats are not horses, whether calves are with their mothers or not. As Dany (FDM) says, *"on ne fait pas d'économies sur les clotures"* (we don't save money on fences) even if it costs 1000€/ha, it will last for 30 years; *"1000€ de mazout, ça disparait"* (1000€ of fuel, it disappears -comparison to maize). He also bought modular gates and fences to herd cattle within the farm (between buildings and to the trailer). *"Les Salers ont une mentalité de troupeau" "on se fait vite avoir"* (Salers cattle have herd-mindset, we can easily get stuck).

-Shelters: farmers plant hedgerows and trees; sometimes they improve this *"abri naturel"* (natural shelter) with an actual shelter in the central area so that it is used during various parcel-periods)

-Water supply points are old through in concrete sometimes fed with neighbour's rainwater. Farmers often also install automatic water through (arrangement with neighbour to get a separate water meter)

- Resistant breeding: mixing cattle races and new ways of breeding cattle (see detailed sections)

- *"Parcellement":* dividing in smaller parcels to prevent animals from trampling

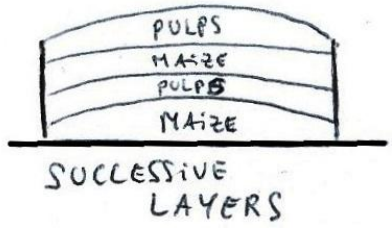
good grass and to manage gazing rotation more easily. Farmers design a central area to group them when they go in the trailer and where there is water access. For instance, Dany (FDM) designs small parcels according to number of cattle in the lot (1 are/ cow/ day); he changes them every 6 weeks so he can reduce anti-worm use (he almost does not use it anymore). Smaller cows (Jersey) *"piétinnent moins que des Holstein de 800kg"* (do less trampling than 800kg Holstein cattle). Thanks to improving grass management, he could decrease *"nourritures"* (given food) and increase *"pâturage"* (grazing) till Dec 15th; his cattle graze from April to mid December without any concentrates. Pierre (FDB) wants to keep fewer cows to adjust herd to his grasslands area.

- *"Complément"* food supply point: Benoit (FBF) brings hay and haylage by car to grazing sheep further in the village almost every day. There are hay racks designed in England; he told me how to fill it properly: a layer of haylage then a layer of hay (on top) so sheep have access to both. Dany (FDM) does not want to give food complement otherwise cattle would get used to eating hay and they would not eat the grass.
- *"Tour des prairies"*: go walking or by car around grasslands to check whether electric fencing works, all the animals are going well, they still have water and grass. This regular observation prevents from overgrazing. *"C'est beaucoup de surveillance, même quand elles sont en prairie »* (it is a lot of observation, even when they're grazing).
- Grassland maintenance: mowing *"refus"* (what they did not eat) and harrowing to spread manure and activate litter decay. In CHV, we do that with draft horses because of *« la qualité du travail »* (quality of work): horses do less impact the cover in hilly grasslands and allow to go when it is more moist so the harrowing is done more finely.
- Planning: what animal (priorities), where, when, and for how long (grazing vs. *"repos"*). In FSM, first the bull-calves (fast-growing) graze, then the cows with their calves & in-calf heifers (because "grass is rich"), then 2 weeks of *"repos"* (let it rest). In CHV, milk goats graze first, then "repos", then the horses, then "repos" and goats again (they eat horses' *'refus'*). Goats sometimes graze together with donkeys (prevent worms) and we try to alternate grazing and mowing also. Dany (FDM) makes different lots (age class & breeds). He avoids *"refus"* by making smaller parcels and letting a *"temps de repos"* between grazing periods. Farmers plan on the long term; Dany says *"je spécule"* i.e. he lets the grass grows in the parcels where there are (natural) shelters so cattle can graze later on, *"à l'arrière du bosquet, elles seront bien mises pour l'hiver"* (behind the grove, they will be fine in winter). One must have *"stock sur pied"* (grass stock) *"une avance devant toi"* (lit. a reserve ahead of you) to ensure grass volume for winter (grows slowly). One must also *"retirer les bêtes de prairies"* (take cattle out of the parcel) early enough to avoid destroying the cover. Farmers listen to cows' mooing to know whether they should *"changer les bêtes"* (change cattle to another parcel) or not.
- Learning about it while discussing with colleagues and experimenting; farmers also look for information on internet.

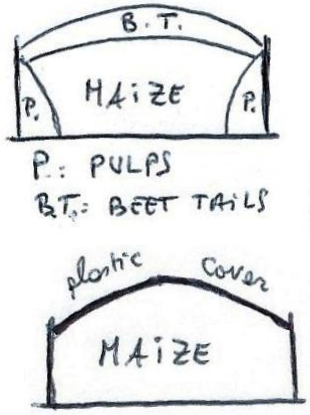
Covering silage without plastic Covering fodder maize silage without using plastic sheet but rather farm by-products.	Self-provisioning of animal food Valuing by-products on the farm

Arthur (FQP) does it for a long time; he read an article about it once. His main motivation: he had a problem of workforce; his dad was getting old and could not help him to extend the sheet anymore. The first year his father and he made silage thirty years ago, they observed that there was no rat in silo of beet pulps while *"rats pullulaient"* (rats proliferated) in the silo of maize. So, the next year, they put pulps on top of silo of maize and they mixed maize and pulps to make the rats go away [see picture and drawing]. The final layer was always pulps so it was not possible to drive on it (e.g. to spread beet tails).

- Trial: few years later, he wanted to do an experiment to test if they were doing right. He made a smaller silo of maize, he added pulps on the sides and *« radicelles »* (beet tails) on top [see drawing]; the control silo of maize was covered by a plastic sheet (common practice). He says he's lucky that his brother was the entrepreneur (harvesting maize) so he could tell how and where to unload trucks. *"c'est quand même toi qui le donne à tes vaches donc ce n'est que normal"* (you are the one giving that to cows so it is normal). Today his brother is not in the company anymore so *« il faut négocier un peu »* (he has to negotiate), the entrepreneur *« sait que chez moi il faut chipoter un peu »* (knows that it is a bit different here). This year he could not get *"radicelles"* -though it used to be a right- because sugar factories use it to put in the bottom of the truck that delivers brewing dregs (otherwise it sticks to the side) or sell it for bio-gas production. As a consequence, he had to do another trial



this year and use pulps again. *"J'essaie ici avec toi"* (I try here with you) *"il y a tellement de facteurs"* (there are so many factors: birds, germination of winter barley on moist and warm support) *« si je fait faillite, tu sauras pourquoi »* (if I go bankrupt, you will know why -kidding); this is *« pratique pas répandue »* (not common practice). Milk factory promotes another type of sheet that is very expensive. When the truck arrived with pulps, Arthur went by bike to show the driver where he had to unload. The next day, we spread the warm and moist pulps on the maize (layer of 10-15 cm), with the tele-handler and by hand -mostly on the sharp sides and at the end: wheels' tracks unpack and damage the layer. Then we made it plane where it was too crumbled so to obtain a bed for winter barley seeds to germinate. We sowed winter barley (from 2013 harvest, in a big bag, he put it on the top of the hill with the tele-handler) by hand *"pour qu'il y en ait bien partout"* (so that it will be well spread). This type of cover is permeable and pulps are good food for cows *"ce n'est pas tout à fait une dépense, ce n'est pas perdu"* (actually, it is not an expenditure, it is not lost) *« ça vient de la terre, ça retourne à la terre »* (it comes from soil, it goes back to the soil) and cattle value this.



Few weeks later, Arthur told me winter barley didn't grow very well on pulps *"ce n'est pas le même support"* (it is not the same support than beet tails). The pulps got a bit *"grasses"* (fatty), the silo was leaking a bit but the silage was good, *"pas de moisi ni de pourriture"* (there is no waste), conservation and appetence were good.

Cover:	Plastic sheet (common practice)	Beetroots by-product
Materials	- Plastic sheet: 3 rolls (30m) x 150€ = 450€ every year. Only reuses once as a second layer. - Tyres: can be re-used, bought them 30years ago and he will have to pay to recycle them	- Pulps = 60 tons. (This year, does not know the price yet). Beet tails = 100 tons = 764€ (last year). Mostly the transport, raw material is cheap. It is good food for cows and it will *"retourner à la terre"* (go back to soil) - Winter barley seeds: 100kg
Workload	- Make the slopes plane and continuous (: water flows out) - Extend the plastic sheet (tarp) and put tyres on the plastic sheet (and other heavy stuffs), need to be two at least - Unload the plastic sheet and the tyres progressively (every day)	- Spread the pulps - Sow winter barley, by hand, with a bucket - *"je sais me débrouiller tout seul"*(I can do everything alone)
Silage preservation	- Rats *"pullulent"* (proliferate) - Areas where the plastic cover did not match maize layer, there is air and mould (coloured spots)	With beet tails (last year): better in quantity and quality *"je ne jette rien"* (I don't throw anything), *"elles mangent tout"* (they eat everything) there was no mould With pulps (this year): we'll see!

For next year, Arthur will try to get beet tails again i.e. to ask a colleague to order to his sugar factory as the one where Arthur delivers beetroots doesn't give them anymore. Arthur has to ask for it a long time before. Anyway, he prefers beet tails but now he knows he has another option if ever he cannot get beet tails.

- Here are some short videos (Youtube) I took while covering silage with Arthur: [Ctrl + click]
  - http://www.youtube.com/watch?v=Bfqy9nE8PUQ
  - http://www.youtube.com/watch?v=PiQoZBNWrc0
  - http://www.youtube.com/watch?v=uvgB4foz7ps
  - http://www.youtube.com/watch?v=vhpZwSSwde4
- During my fieldwork, I've seen two other farms that also did it (Frasnes-lez-Buissenal) using oats (4-5 cm of grains) to cover the silo. I also discussed with another neighbour, he usually puts beet leaves on top of maize silo but beetroot harvest timing must fit -he does not decide, this year it does not fit so he puts plastic sheet. Jacques (FSM) told me that he tried but he finds that silage is too moist and that there is nutrient leaching. Jean (FTS) used to do that with beet tails but he cannot get them anymore.

Adapting crop rotation Reassigning land to production of fodder (legumes, cereals), raw products that will be processed on the farm (bread cereals), or to soil recover (green manure, cover crop) -farm internal, non-commodity circuit. It contributes to the reduction of animal food purchases, increases farm economic autonomy and food quality control.	Rethinking food ration, Peas, Temporary grassland seed mixes, Bread cereals, Fodder cereal-legume association, Self-provision of animal food, Adapting the machinery, Reducing tillage, Catch crops, Cover crops, Reducing fertilizer purchase
Farmers told me pulps and other animal food *"coûtent beaucoup trop cher"* (cost too much) so they dedicate more land to fodder production. Improving crop rotation and soil health reduce the necessity of intervening with the tractor -e.g. for tillage. This novelty is connected to many others: temporary grassland seed mixes, fodder cereal-legume association, bread cereals, peas, catch crops *"cultures dérobées"*, and cover crops *"couverts"* (see detailed sections). -Design of rotations: weeds, fertility, soil, plant and animal health are the main issues. For instance, Pierre (FDB) includes legumes and fodder production in the rotation: wheat *"froment"* (bread), triticale - peas (fodder), horse bean - peas (legumes, fodder), wheat (bread), potatoes or oats (bread), wheat or spelt (bread). To *"relancer la fertilité"* (enhance fertility) while reducing fertilizer purchase, he has three options: including legumes (peas, horse beans, alfalfa), spreading *"effluents d'élevage"* (manure, slurry, compost), or sowing mélilot and white clover in the wheat *"en cours de vegetation"* (while it is growing). The problem with the last option is that mélilot grows fast and *"salit la batteuse et mouille le grain"* (disturb the combine harvester and makes the grain moist). Moreover, it is hard to sow again in that invasive cover. He told me he got inspired from a colleague (Emmanuel Demasy) who sows cereals in white clover (cover) with a kind of strip-till driller. Romuald (JDR) would like to introduce cereals and/or temporary grassland in the rotation to reduce weeds and pests -eg. sclerotium that can affect turnip-rooted celery. The problem is that he would need more land. Arthur (FQP) wants to keep crop rotation as diversified as possible (vs. *"revenir souvent"* i.e. come back often with the same crop). He grows wheat, winter barley, maize, beetroots, potatoes, and vegetables for canning factories (peas, beans). He wants to *"rallonger la rotation"* (make the rotation longer), *"il faut penser à ceux qui viendront après*" (one should think to people who will come after us i.e. children). - Special case: *"Sursemis"* over-sowing permanent grassland (CHV). These parcels are removed from crop rotation but are still regularly improved. We used to plow them to grow maize. Over-sowing is a way to enrich fodder in species [clovers (white, hybrid, red), dactylis, ryegrass, fescue, timothy-grass, alfalfa] without plowing and with a small tractor and simple machines (s-tine harrow, seed driller, roller).	

Temporary grassland seed mixes Assigning land to the production of fodder (grass-legume association) for farm animals (or to sell as animal food).	Rethinking food ration, Hay dryer, Self-provisioning of animal food, Adapting crop rotation, CRE, Diversifying farm production
- Farmers do experiments and trials themselves: *"Personne ne veut te vendre du trèfle blanc, on doit faire les essais nous-mêmes, ça devrait être de la recherché publique"* (nobody wants to sell you white clover, we have to do the experiments by ourselves, it should be public	

research). They say there is little info, knowledge and research on white clover *"ce n'est pas intéressant pour les marchands, on ne sème qu'une fois, il ne faut pas d'engrais ni de produit phyto"* (it is not interesting for vendors: sown once, no fertilizer, no pesticide) Jacques told me (FSM). Two of them combine their trials with CRE (FSM, FBF). Farmers read books, ask different vendors, attend conferences, mix seeds and make trials according to the specific needs of their farm (FSM, CHV, FBF, FDM, FDB, FDR, FTS, FQP).

-FSM for Limousine (meat) cattle: haylage of [clover-Dactylis-ryegrass-fescue], hay of [alfalfa 15kg/ha & dactylis 12kg/ha], haylage [ryegrass-clovers] to prevent from loosing leaves. Jacques tries to choose proper varieties of alfalfa as he noticed differences between varieties on three criteria: suitable for hay or for haylage, tenderness, productivity. But the seed provider does not have the knowledge about it and proper varieties are not often available. He lets alfalfa later so that he does one cut just before plowing and sowing maize. He puts maize silage on top later to get a mix alfalfa-maize.

- CHV for Saanen (milk) goats: hay of [clovers (white, hybrid, red), dactylis, ryegrass, fescue, timothy-grass, alfalfa] or haylage when the weather is pouring with rain. My father seeks information from UNAB (organic farmers' association) and some books incl. *"Méthode Lemaire-Boucher"*. We add alfalfa to Mélange Sencier (sold by vendor) in order to enrich fodder and reduce weeds.

- FBF for Ile-de-France (meat) sheep: haylage of [clovers (white, hybrid, red), dactylis, ryegrass, fescue, timothy-grass, alfalfa], he buys Mélange Sencier N°4 and he adds alfalfa to prevent from thistle and to improve fodder quality. He tries to get bales size so that one bale of haylage corresponds to daily consumption.

- FDR buy Mix Jorion Prelac Bio and sell haylage

- FDM for Salers (meat) and Jersey (milk) cattle: hay for dry cows, given by hand. Dany says dactylis is a rich fodder (both in energy and proteins) but appetence decreases after seed stage. He also grows a seed mix [red clover, English ryegrass, alfalfa] he sows under a cover [oats-peas-vetches] that goes in the first cut.

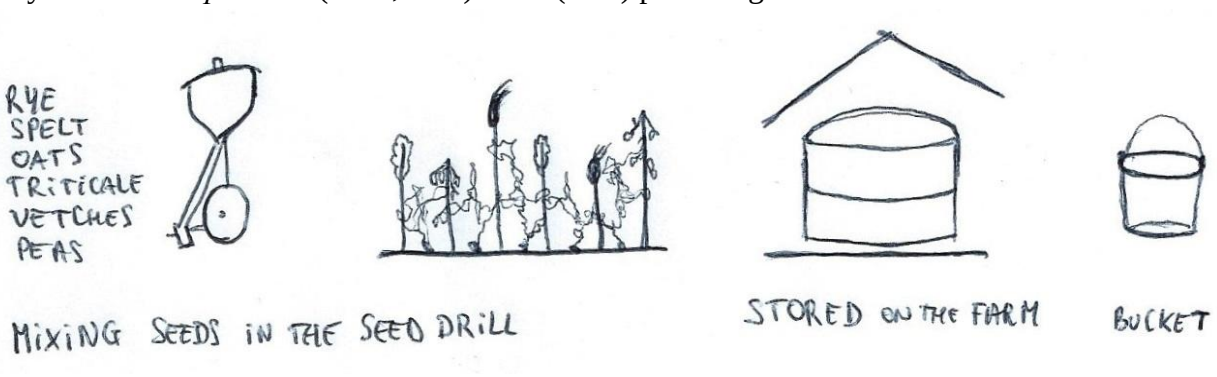
- FTS for Holstein (milk) and BBB (meat) cattle. He targets *« plus d'herbe, moins de maïs »* (more grass, less maize); maize silage makes harder butter and beet pulps give less rich milk. *"Le meilleur, c'est la prairie"* (the best is grassland); he chooses the best hay/haylage and uses a TMR mixer to get more constant food. If ever some maize silage is *« moins bon »* (less good) they remove it immediately and prevent it from going to the milk cattle. He grows alfalfa because soy is too expensive 400-500€/ton; he grows it alone and in the grassland seed mix. He also produces haylage of grassland seed mix from SCAM (incl. clovers *« ne coûte rien »*, economical). Jean likes haylage bales *"pas si cher que ça"* (not that expensive -to wrap) and he has less waste as one bale corresponds to daily consumption.

- FDB for Holstein-Montbéliarde (milk) cattle. Pierre says he is on *« un chemin, on est jamais arrivé, c'est ça qui est gai »* (a path, we

never arrive, it makes it attractive) ; he tries different kinds of seed mixes: [English ryegrass- white clover] gives a lot of milk but it is not that good for cow health, he adds one or two kilo of *"mélange pollinisateurs"* (20 species incl. poppies and cornflowers for pollinators) to [English ryegrass- white clover] as he is following beekeeping classes *"rucher-école"* with Louis -his son, they will get their first bee hive soon. He wants to have *"une prairie maigre"* (poor grassland) also with rye-grass and *"mélange pollinisteurs"* (though his father doesn't like… weeds!) in order to get more fibrous fodder that he would cut later and put it in the hay dryer.
- FQP for milk cattle (different races). He *"pousse plus vers l'herbe"* (pushes more toward grass) with 14,5 ha of grassland. He wants to *"mieux travailler l'herbe"* (work better with grass), increase and improve temporary grasslands.

Fodder cereal - legume association Assigning land to the production of fodder (fodder cereal-legume association) for farm animals (or to sell as animal food).	Rethinking food ration, Self-provisioning of animal food, Adapting crop rotation, CRE

- *"Semis en mélange"* (sowing together) cereals and legumes. Francis (FDR) buys seeds of triticale, barley and horse bean; he sells it as animal food. In CHV, we mix seeds of spelt, triticale, rye, oats, peas, and vetches to get a diversified and balanced concentrate for goats [see picture and drawings]. Pierre (FDB) tried to include oats-peas in crop rotation to feed his cattle and maybe chickens or pigs in the future. He is happy of his first harvest; he got three tons of peas and three tons of oats. Benoit (FBF) grows either spelt or triticale or barley with oats and peas. He has done it for five years; he reduces livestock size, ploughs more hectares of grassland (8ha that became temporary) and includes cereal mixes in the crop rotation. He used to buy concentrates on the market and now he's autonomous, he produces the concentrates for meat sheep. He grows cereals-legumes mix two or three years in a row then he sows temporary grassland seed mix. It happened once that this mix was damaged by lodging so he mowed it and made wrapped bales i.e. a kind of haylage of immature cereals & legumes; grains were still soft. Farmers sometimes buy some grains from each other to balance their harvest (i.e. food ration).
- However some farmers grow them separately *"cultures séparées"* (FSM, FTS). Jean (FTS) plans to grow more and more oats.



Growing bread cereals Assigning land to the production of bread cereals meant to be processed on the farm and/or to be sold for human consumption.	Diversifying farm production Adapting crop rotation

- Francis and Christine (FDR) grow organic corn, wheat, spelt, rye and got equipped with a mill to produce different types of flour. The mill is installed in the new hangar; it consists in silos to store, cleaner, hopper, brush, mill *"meule tournante & meule dormante* (two big stones), and sieve (60% flour = white, 80% = half-grey and 100% = grey, no sieve). Thus, they get the bran and the flour; they fill bags (2, 5, 10, 25kg) by hand, with a scale.
- Pierre and Véronique (FDB) grow organic wheat *"froment"*, spelt and oats for human consumption. Until now, they sell it to a merchant. They are looking for 'old' or 'resistant' varieties. They would like to grow buckwheat to make flour *"pour le magasin"* (for their farm shop) but he sowed it a bit too late, so he will see. Anyway, it's a good green manure and it has allelopathic effects against weeds.
- A new cooperative *"Epi d'ici"* (lit. wheat head from here) is in project (FBF, CHV) to process cereals into breakfast meals. Farmers already planted wheat (FBF), spelt and oats (CHV). Pierre (FDB) is also interested *"je préfère livrer à Coprosain qu'à Dedobbeleer"* (I prefer selling to the cooperative rather than to the merchant).

Growing peas Assigning land to the production of peas meant to farm animal food consumption.	Self-provisioning of animal food, Getting rid of soy, CRE, Adapting crop rotation

-Jacques (FSM) grows peas to get rid of soy. He says there are not a lot of possibilities to produce proteins here: we don't have a good climate for lupin, horse bean is the richest in proteins but it is harvested late -beginning of September when we are already busy- and all the varieties are not good for chickens. But we can grow peas, it is not the richest [in proteins] but it's good for cattle, chickens and pigs. Moreover, it is harvested *"à la bonne période"* (good moment): dry weather, soil *"porte"* supports, in the beginning of August i.e. when we have time to harvest and we still have nice/long days. Jacques combines his trials with CRE. He grows it after maize and covercrop. Until now, has always sown them in April (180kg/ha). He uses fertilizers, herbicides, and fongicides. His average yield has been 5700kg/ha of grain (harvested) 23%prot. and 4200kg of pea straw he values with cattle. In addition, peas are *"bon précédent"* (good previous crop) with N-rich residues. Difficulties are that it is hard to find a company that has a vertical blade on the grain header, driver from the company goes too fast so *"beaucoup sont restés sur le champ"* (many grains stayed on the field), and that yields vary a lot due to lodging (thunderstorms) and *"manque d'intérêt des sélectionneurs pour améliorer cette espèce"* (seed merchant are not interested in improving this crop).

Growing catch crops *"Cultures dérobées"* Turning the obligation of cover crop during winter into a catch crop and produce more fodder	Self-provisioning of animal food, CRE, Adapting crop rotation



- Jacques (FSM) grows *"seigle fourrager"* (fodder rye). After wheat harvest, he dethatched, spread manure and sugar lime. Then, he sowed fescue, timothy-grass and rye (60kg/ha, half of what he used to do) together. Last year, he grew rye alone and harvested 9000kg "*grosse production de masse en une seule coupe"* (mass production in one single cut). This year, he added timothy-grass and fescue to 'improve the rye'. These plants withstand to the tedder and can get dry in five days. He sows beans or maize afterwards.
- Jacques also grows *"Interculture pois-avoine-colza fourrager"* (peas, oats, fodder colza) between peas harvest and sowing wheat [picture on the left]. He dethatched them quickly so they are re-sown, not destroyed; their N-rich residues will decay. There were remaining peas (about 300kg/ha) i.e. more than when he sows it (200kg/ha) and he sowed oats and fodder colza. He made haylage October 15th. Then, spread manure, sugar lime, and sowed wheat.
- Jacques sows English ryegrass and red clover in September to get one cut before sowing maize
- Benoit (FBF) grows a catch crop between cereals *"Interculture entre deux céréales"*. When fodder cereal mix triticale-oats-peas is harvested, he sows Egyptian clover (26kg/ha) in addition to *"repousses"* (new growths) of oats [picture top, right]. He harvests haylage and sows his cereal-legume mix again on Oct 15th.
- Farmers (FSM, FBF) participate in group discussions and visits (CRE, see detailed section). I took the picture in the bottom during one of their open door [sorgho, moha, Egyptian clover].

Growing cover crops *"Couverts"* Turning the obligation of cover crop during winter into an opportunity to restore soil structure and fertility.	Adapting crop rotation, Reducing tillage, Reducing fertilize purchase

- Farmers sow new grassland "under cover" (FDM, CHV) i.e. they also oats-peas-vetches as fast growing cover that "protects" the new grassland mix. These plants are mowed with the grass.
- *"Semer dans un couvert"* (sowing in an existing -already developed- cover) beetroots and peas (FQP). In autumn, Arthur sows a cover that will freeze in winter. He sows beetroots and peas in spring, without plowing. He says there are a lot of insects, *« ça attire les oiseaux »* (it attracts birds) *"les corneilles n'attaquent pas les pois"* (crows don't eat peas seeds), *"on a eu des bons résultats"* (we had good yields) *"la nature est bien faite, elle s'équilibre"*(nature is well-done, it balances itself). He never uses anti-slug pesticides *« il y a quelque chose »* i.e.

there is a phenomenon but *« j'ai personne »* i.e. there is no researcher to study that and to observe the phenomenon more systematically. *"J'aimerais refaire ça pour le maïs"* (I'd like to do the same with maize) *"on innove"* (we innovate) *"on ne sait pas faire de grandes erreurs"* (we cannot do big mistakes).
- During my fieldwork, I could discuss with a colleague (E. Demasy) who experiments in that domain. He told me the importance of making a diverse seed mix of frost-sensitive plants, adapt the seed driller, associate tutors and climbing plants, and favour legumes. This is a way to reduce tillage and produce green manure.

Regional centre of reference and experimentation (CRE)

Adapting crop rotation, Catch crops, Self-provisioning of animal food, Peas, Temporary grassland seed mixes, Fodder cereal-legume association, Settling rotational grazing

Applying for and getting the status of centre of reference and experimentation from Walloon government. Jean Frison (FBF) initiated the application for four farms members of Coprosain (incl. FBF and FSM). They can get 6000€/farm/year from the government and the analysis for free (soil, food, shit, meat). There are three types of related activities: group discussions, open doors, reports.

The goals of their experiments and trials are improving farm autonomy together with making progress on nutritional, environmental, food quality issues. Thanks to this 'mattress', farmers test new things to foster farm food autonomy or assess things they already do and that improve farm food autonomy; Jacques says *« chacun fait des essais en fonction de ce qu'il avait déjà »* (everyone does trial according to what he already has). This group of farmers gets technical support from *"organismes d'encadrement"* (farming technical organizations): a vet from Université de Liège brings information on rations, digestibility, appetance, rumination, and nutrition calculations; Fourrages-Mieux ('fodder better' non-profit organization) brings new inputs on fodder mixes, rotational grazing, and grazing management; UNAB (national organic farmer union) helps with seed mixes and fertilization issues.
-CRE Group discussions in turn in the four farms. Participants: four farmers (incl. Benoit and Jacques), vet from ULg, animator from FUGEA (second farmer union), representative from Agrisain (Jean Frison) and from the Ministry, technicians from UNAB and Fourrages-Mieux. Goals: define the problems, what to work on; discuss results, findings, methodological issues, problems, sampling issues, *"l'avancée des travaux dans les fermes"* (how trials are going on in farms), prepare and share feedback on *"visites de terrain"* (open doors). Farmers and technicians thus meet regularly in a quite warm atmosphere; all seem to like these informal exchanges. They become a group "us" both in terms of 'science' (we do participatory research, *"ça doit rester la propriété des agriculteurs"* this process belongs to the farmers and it should continue like that) and

‘practice’ (we develop autonomous and sustainable systems). They also (struggle but) develop shared vocabulary and norms -e.g. the vet said *“ces prairies sont moches”* (those grasslands are ugly) and all of them understood. Gwanaëlle (FUGEA) told me that discussions start as soon as someone arrives, there is no clear start of the meeting and farmers immediately start talking about their experiences. Farmers and technician discuss results of analyses (soil, aliment, and shit); they can help to determine the limiting factor when there is doubt. They plan visits together: what did you do? What can you show to others? They say a lot of colleagues phone them and want to get rid of soy; colleagues are eager to hear about their findings. They will organize a drink at the end to discuss and make posters about what have been done. Gwanaëlle manages the invitations and the promotion in newspapers. In general, farmers say *“c’est du boulot!”* (it -CRE- is a lot of work) but they are all eager to continue for one more year. *“Pour confirmer, il faut répéter"* (to confirm, one must repeat) and they have many ideas of further trials to reduce seed and food costs, improve no-soy chicken ration, try it with pigs, collect data on rotational grazing, study *“économie de l’autonomie fourragère”* (fodder autonomy economics) to assess the option as a whole. They say they do research that research centers do not; they fill a gap.

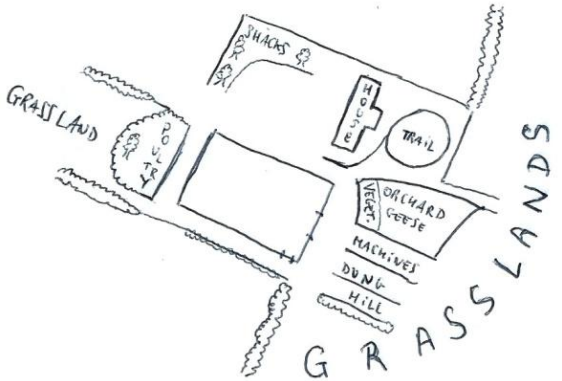
- CRE visits on farms (open doors) i.e. inviting all the colleagues to see their trials. Many farmers came as well as UNAB, Ministry representatives, TMCE vendors, and seed vendors. A women from Ministry gave a folder that describes this research project, the four farms (#work units, #ha, #livestock, different crops/land use, how they sell products) and the trials: *“précédent”* (previous crop), *“préparation du sol”* (tillage), *“semis”* (seed mix, depth, and cost/ha), *“fumure”* (compost, manure or fertilizers), *“Phyto”* (pesticides). [see pictures]. There are some posters and a pot with the grain mix (cereals-legumes). Hosting farmers explain their goal: to feed the cattle with food from the farm, *“je vise 100% d’autonomie”* (I target 100% autonomy). They also explain their trial and its ‘location’ within the whole crop rotation. We went to the field to see the different trials and to the silos to see harvests. I heard farmers saying that when they were young, everybody was growing intercrops (cabbage, turnips) and then they all stopped and grew maize “the miracle”. *“Maintenant on en revient”* (now we come back) with cover crops and fodder autonomy but with new mixes. Moreover, they also say *“la terre ne se fatigue pas à produire, elle s’enrichit car il y a des légumineuses, le sol reste vivant parce que couvert”* (soil does not get tired by producing that, it gets enriched thanks to legumes, soil stays alife because it is covered). During the drink, farmers discussed about reducing fertilizer purchase and getting better fodder.
- CRE report & extension. Farmers have to write a report although it takes a lot of time -and time is a scarce resource for them. They type their report and share numerical versions; they will be posted on the website of Ministry. Farmers insist that data & reports would be available to colleagues. These reports are also used to assess the project as a whole. Farmers also presented their results in conferences and Gwanaëlle wrote articles for farmer newspapers.

Taking active part in public debates Taking an active part in public debates and civil society events related to social justice, sustainability, and local, agro-ecological, peasant agriculture. Farmers want to share their world, and tell, teach, transmit society lessons from their experience.	Developing short food supply chain, Promoting our products, Redefining performance, Direct selling, Valuing *"l'existant"*

- Organizing events on the farm such as debates and conferences (CHV, FDB) about sustainable farming practices, short food supply chain, social justice and globalization. Farmers collaborate with NGOs, farmer unions, consumer associations. They contribute to and spread alternative discourse (their own); they consider their farm as a place where people critically think and learn about other food and farming practices For instance, Belgian development NGO (CNCD-11.11.11.) launched its campaign for right to food in CHV [see top left picture].
- Open doors for a day or a week-end (FDM, FDB, FSM, JDR, FDR, CHV). Farmers welcome visitors and show them different activities of their farms. They promote their products with degustation and lunch meals. Some of them invite other 'local producers' for a "farmer market"; there is 'animation' the whole day: music, NGOs, associations etc... Farmers do ask for help from friends and relatives.
- Educational farm and camps for children (CHV). Schools come and visit the farm during school year. During holidays, while their parents are working, children come to the farm and learn to make cheese, get in contact with goats, learn about organic farming, nature, agriculture and food, go for a tour in a carriage pulled by Brabant horses, sing, play games and do sport in the surrounding countryside (incl. "voltige" i.e. acrobatics on horses). We arranged a room for them and hire students (student jobs).
- Intervening in debates/public events (radio, tv, cine-debate). For instance, Jacques (FSM) took part in the organization of *"Marche pour la paix"* (walk for peace) in their village of Wasmes-A-B. The theme of this year was the right to food and peasant agriculture in the North and the South (CNCD-11.11.11. campaign).
- Attending conferences and debates about agricultural policies, environmental issues (GMO, pesticides), peasant agriculture (Pierre Rabhi). Farmers struggle against people who consider agriculture more as a problem than as a solution. They want to convey another message. Farmers also attend *"petits déjeuners OXFAM"* (OXFAM breakfasts) and sell some products there.

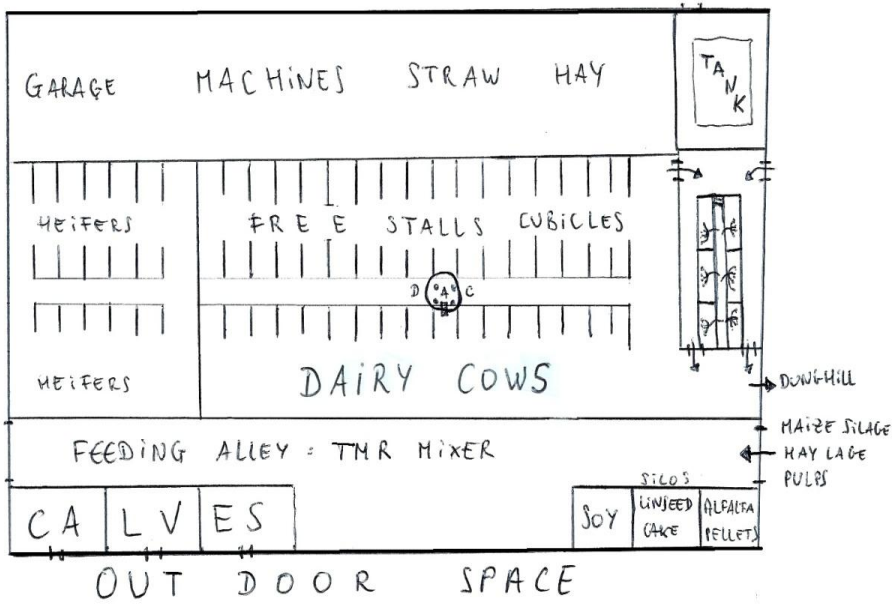
Valuing *"l'existant"*	Farm shop, Processing milk, Taking active role in public debate, Renting cottage for tourists, Self-provisioning of animal food

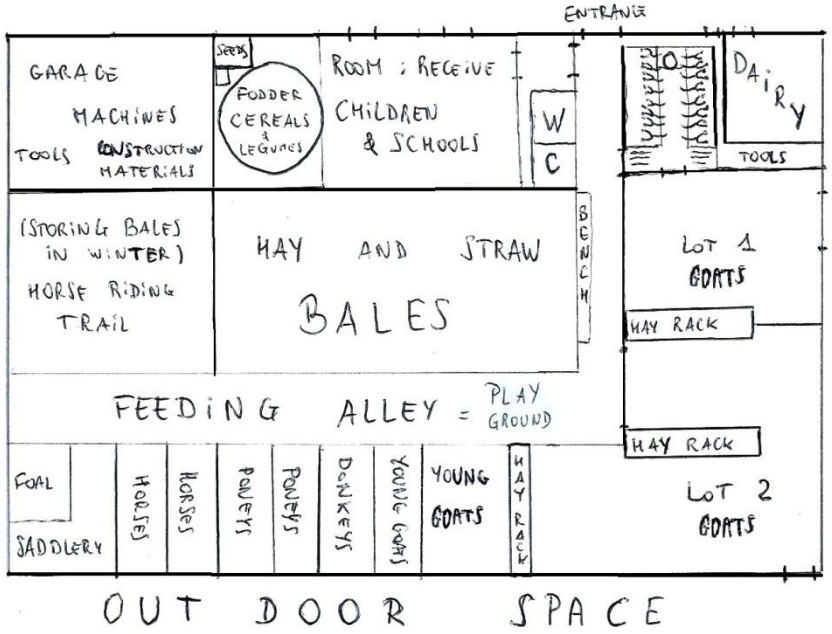
Assigning existing farm buildings, courtyard, and orchard to new (or renewed) functions. In other words *"faire avec ce qu'on a"* (do with what we have) in terms of space and remoulding it.



- Self-construction, investing farm savings, applying for subsidies. Farmers often spend a lot of time in renewing their buildings; they buy construction materials and do a lot themselves. They consider renewing farm buildings as a good way of investing their savings and preserving family patrimony. Some even apply for subsidies (heritage preservation). Thérèse (FTS) told me the story of their farm; it starts in the 13th century but the current house was built around 1700. There is still a chapel in the house, they try to *"préserver le maximum"* (preserve as much as possible) because *"c'est beau"* (it is beautiful). There is a totally different example in CHV: this hangar is a 'modern' farm building designed for intensive dairy farming in 1982. However, its functions have changed and it has been reshaped [see drawings, before -left / after -right]. There are drawbacks also *"faire avec l'existant, ce n'est pas toujours facile"* (it is not always easy to do with existing -old- buildings); farmers sometimes say they spend a lot of time in *"petits bâtiments"* (small buildings) as some tasks have to be done by hand (tele handler cannot go in). What are these new functions?
- Storing grain in the old barn (FSM, FDR, FBF, FTS), farmers have to find technique & tools (often home-made system) to be able to use this resource. Storing straw in the stable during summer when cows are in the grassland (FDB, FSM); potatoes and fruits in the old barn (FQP) -these facilities are renewed to stick to hygiene norms; wood shavings bales (FBF). Besides this, these resources are sometimes used to start a new activity (little by little):
- Farm shop (see detailed section)
- Complementary production or service: chickens in *"le jardin des poules"* (FSM chicken garden, old surrounded orchard), bull-calves (FQP), taking care of dogs during holidays (FDM).
- Milking parlour (FDM and FTS). For instance, the old stable is used as milking parlour, the pipeline system is installed there. In FDM, cows just come here to be milked, so it's cleaner. He likes this system *"il ne faut pas bouger les vaches, c'est nous qui bougeons"* (cows don't move, we do -a lot). Moreover, calves are close to the dairy and cows see the calves while being milked *"ça nous va bien"* (we like that). The main disadvantage is that it takes a lot of time to clean this stable (by hand), fortunately his father helps. Jean (FTS) says their parlour is more than thirty years old; it is located in the old stable where his father had installed the first pipeline system (he was already milking by hand there). He says about parlours *"quand le lait est cher, on dit qu'il faut un système qui coûte cher »* (when milk price is high, it is said that only expensive parlours are good), *« c'est dur de se faire conseiller objectivement »* (it is hard to get objective advice).
- Bakery. Bastien (FTS) followed courses of baker. They re-built the *"fournil"* ("bakery" part of a farm) and renewed the oven. He bakes

bread for the family. They rebuilt it themselves.
- Dairy (milk-processing room). Jean and Thérèse (FTS) build a large dairy between the kitchen (house) and the parlour (stable). She says when *"j'ai inventé de transformer"* (I had the idea of processing milk) they *"aménagé avec ce qu'on avait"* (arranged with what they had); they found second-hand tank, furniture from their former kitchen, and a vat. They built the room themselves *« avec les moyens du bord »* (with the means available) *« en gardant le même style de bâtiment »* (while respecting the style of the building). They want to invest *"un peu à la fois"* (little by little vs. *« foncer »* hurry) in order not to compromise next generation's projects.
- Cellar (FTS, CHV) is under the house, where cheese balls maturate.
- Welcoming visitors (incl. schools and open door events). Dany and Nathalie (FDM) welcome groups of (old) people that come by couch and come for the afternoon. Dany is a good storyteller, people pay for the visit then they end in the farm shop. Nathalie says *"des groupes comme ça, j'en veux encore bien!"* (I like that kind of group to come); they plan to arrange farm shop better.
- Renting cottage for tourists (see detailed section), student rooms (FQP, they rent six rooms), rural homes. See also: multi-site farm
- Atelier (workshop) to fix machinery and store tools.
- Producing fruits for sale in the orchard (FQP)



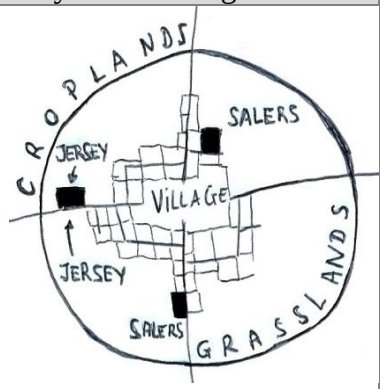


Renting cottage for tourists Renewing and re-assigning an old farm building to tourist housing facilities.	Valuing *"l'existant"*

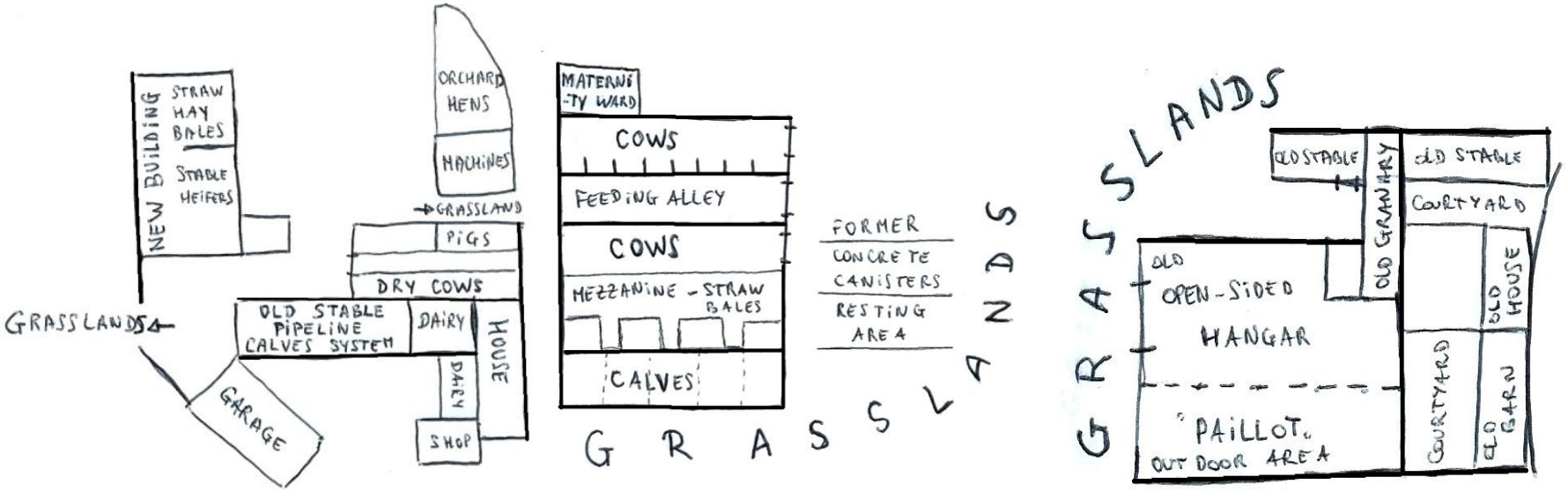
- Three farms rent or are going to rent cottages for tourists (FSM, FDR, FDB)
- In FSM, the stable built in 1795 was not used anymore -they built a new hangar- and it started to deteriorate. Jacques and Anne-Marie wanted to value this old authentic building (vaults in old bricks, carpentry in oak). They use wood from the farm and materials as ecological as possible; they pay attention to insulation (cellulose) and aeration. They work a lot in that building; they try to do themselves as much as possible to reduce costs [see picture]. They are helped by enterprises from the family and/or village and a builder. They plan to rent it to tourists and maybe to live there when they will get retired. The other half (former horse stable) is also renovated also but they don't know what to do in that yet, maybe a farm shop.
- In FDR, one wing of the square farm is renewed into a cottage; they also chose ecological materials. Pierre and Véronique (FDB) also rent a cottage next to their house.

Developing a multi-site farm Buying and renewing abandoned farm buildings in the village.	Valuing *"l'existant"*, Settling rotational grazing, New ways of breeding cattle

- Dany and Nathalie (FDM) had the opportunity to take over two little abandoned farms in the village - grasslands (meadows) and old buildings- for relatively cheap. They have a lot of ideas to make nice farms out of these. *"Je fais l'architecte"* (I act as an architect). They work there when they have some time so *"ça prend du temps"* (it takes a lot of time). They even bought a little crane. *"C'est du bazar"* (it is quite messy); they have to demolish some parts, renew old façades and re-build progressively, *"il faut une dose de courage"* (we must have courage). They plan to rent the houses and host interns, woofers or scouts. Besides this, they want to use the farm buildings: a stable for pigs, outdoor spaces (*"paillot"*) and open-sided stable for Salers cattle Thanks to these two new farms, they get more direct access to grasslands (connected to farm buildings). Thus, they align quality meat production, direct selling, Salers cattle breeding, rotational grazing and renewing old buildings. The main advantage is to get a farm more flexible, they can sell one of the farms if ever they need, without losing everything. They did not want to invest everything in milk production on one single site; they wouldn't be able to adjust over time. Dany and Nathalie invest their savings in these buildings to get an income later, when their son will take over the farm. They want to make it possible for him *"on ne va pas faire fortune"* (we won't make a fortune). They created a company with the name of the farm ("*La Ferme du Moulin*" SPRL) since 2006, it requires more administrative work and to pay an accountant but it also covers their 'real estate' activities. The status of company allows them to sell other products in the shop.



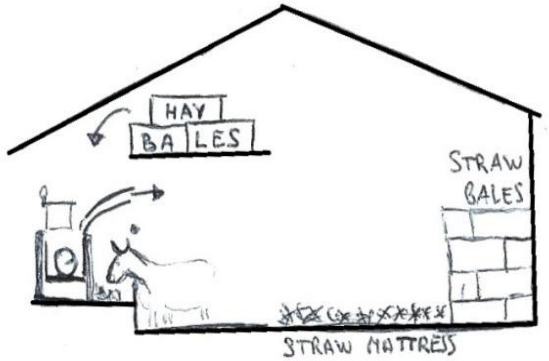
- *"Il faut penser à tout"* (i.e. they have to think about many things). A friend of him helps them a lot; he likes working alone but they discuss a lot together to choose among different options (*"trucs et astuces"* tricks, *"faire solide"* make it robust). At the moment, they are busy with settling the 'new' stables. They seek to make low-cost stables: they buy raw material from the wholesaler for cheap, rework the material, and adapt it to these old stables. Dany also looks for second-hand material *"il y a de bonnes occasions à faire"* (there are good deals to take). He says it is hard to find exactly what you're looking for *"avoir ce qu'on veut"* (get what we want). When he goes to the shop, he also looks carefully to "systems" he finds interesting and he gets inspired. They settle a mezzanine to store straw and a gate system that only lets the calves go but that is too narrow for mothers. The old hangar is open-sided so cattle can shelter there -go to and come back from the grassland whenever they want. They make modular fences and gates convenient for little Jersey heifers and big Salers cows.



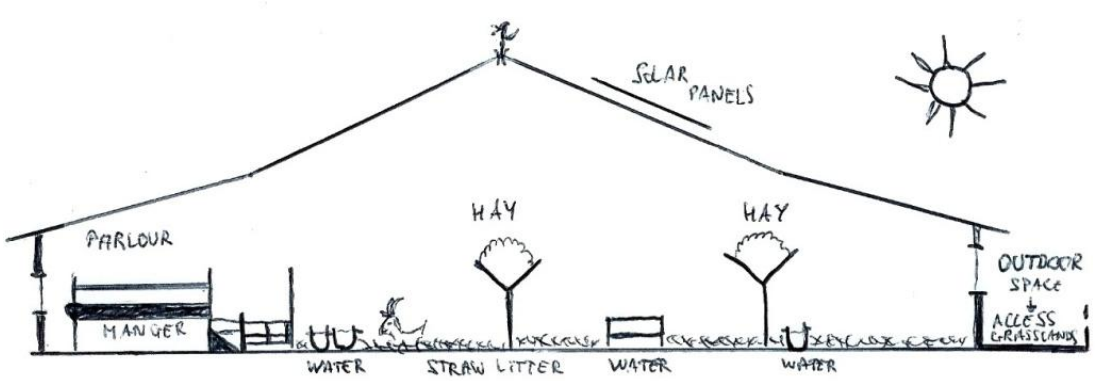
Home-thought arrangement of the stable Designing animal housing facilities while valuing existing resources and targeting farm specific objectives. Farmers often not only design but also build these facilities themselves.	Valuing *"l'existant"*, Grates and slurry, Farming meat poultry, Hay dryer, Developing a multi-site farm

- In FSM, they built a mezzanine for hay above cattle box and they blow straw from feeding alley [see first drawing]. They set up small lights with a time switch to prevent the calves from being run over.
- In FQP, cattle are tied *"vaches liées"* with two different systems: *"courroies"* (belts) and *"colliers"* (collars). He had *"colliers"* for a long

time that fit better with horned cattle. Then he could install some *"courroies"*, he had been told that they work better with de-horned cows so he started de-horning young cows. But now he lets the horns again, he observed it is not really a problem. They milk cattle in the stable (no separate parlour).



- Dany (FDM) observes the behaviour of cows and adapts the number of cows per lot; he favours outdoor housing (paillot) and grazing as much as possible (free to run). He prefers *"stabulation libre"* (free stalls) on straw; moreover, you can do a lot of things with this area when it is empty (e.g. storing straw during summer). To foster ventilation, he chose *"tôles à ventelles"* (metal sheets with small holes) so that area of air input is twice bigger than output (ridge vent). This system produces continuous ventilation and prevents from dust. When they built the new hangar, they just ordered the main structure and the roof, they did the rest themselves. See also: multi-site farm (detailed section).
- In FTS, Jean arranged free stalls, feed fences and feeding alley. He needs a lot of straw with this system. He noticed there are different *"caractères"* among cows: *"il y a des propres, il y a des sales"* (some cows are always clean, others are always dirty). He thinks that grates *"c'est plus propre, mais il y a des problèmes"* (it is cleaner but there are problems). He notices that cows were 'cleaner' when they were grazing. When they're milked, cattle go outside (outdoor space on concrete slab); there is a manger where they get haylage and silage. He doesn't want to install an automatic concentrates distributor (*DAC*) i.e. eight mangers in the parlour because *"ça coute cher"* (it is expensive), it brings dust in the parlour, and the mangers get moist when you clean the parlour. Thus, he gives everything (fodder & concentrates) with TMR mixer in the big manger outside.
- In FDB, there are grates in the waiting room and in the three first meters of the stable (from feed fence, where they eat). There is a ten meter large straw mattress behind. Cattle are on grates when they eat (to save straw) so they are *"propres quand elles viennent à la salle de traite"* (clean when they come to the parlour). Pierre says the main problem with grates is that *"effluents pas faciles à valoriser"* (slurry is not easy to value). See also: hay dryer (detailed section).



- In CHV, we re-organized boxes to improve goats' well-being and visibility for children (favour the contact). Hay racks have been settled so that it is possibile to fill them by hand or with the skid steer loader. We also replaced metal sheets by transparent plastic sheet to get a sunny atmosphere [see second drawing].

Learning about biodynamic agriculture Learning from observation, readings and discussions about holistic and biodynamic forms of agriculture.	New ways of breeding cattle, Reducing tillage
- None of the nine farmers is certified as biodynamic farmer but some of them want to learn about it so they visit biodynamic colleagues (Jacques Paris), read books and attend conferences (FDR, CHV, and FDB). - There are particular preparations to foster life in general and soil life in particular. Farmers prepare them according to specific recipes in their cellar, with faterflows and dynamizers. It also includes using homeopathy means to cure cattle diseases. - Around that, there is a wider philosophy about farming: farms is an organism, farmer must feel good while doing things, acting as praying, it's all about observing, feeling, experiencing, living. It says plants are between two poles: the ground that gives volume, matter, growth - associated preparation is shit in horns - and the cosmos that gives structure, light -spread silica-based preparation. We need both poles to get good hay: both improve soil life and connect plants to cosmos and light (dries and conserves better).	

MULTIPLE PROJECTS

From previous sections, we can understand that novelties make sense in the context of a farm, a farm project. This kind of project is a narrative that *"met en musique tout ce petit monde"* (expr. puts into music this entire little world, harmonize, bring coherence) -incl. family memebers' roles, available and constructed resources- and contains a vision of the farm in the past, today and tomorrow. This section is aimed at reflecting on these multiple projects, rich in new expectations, partnerships, and bridges.

In the list of novelties, we can see that many dimensions of farming are involved. In the literature, there are ***typologies*** that can help so sort such novelties according to these dimensions. For instance, one could distinguish strategies aimed at broadening, deepening, or regrounding agriculture (van der Ploeg & Roep, 2003, pp. 42-44). The authors define broadening as developing activities that "enlarge the income flows of the farm enterprise, while they simultaneously imply the delivery of goods and services society is willing to pay for" -e.g. diversifying farm production, renting cottage to tourists, developing an educational farm. Deepening means increasing value added of farm products while responding to new societal demands -e.g. developing short food supply chains, developing distinctive quality products. Regrounding means changing resource use patterns notably while valuing locally available resources. Pluri-activity and farming economically (low-external inputs agriculture) are manifestations of regrounding -e.g. reducing fertilizer purchases, self-provisioning of animal food. In "The New Peasantries", van der Ploeg (2008: 153) lists six strategies of repeasantisation i.e. that contribute to make agriculture peasant-like again. These are (1) diversification, on-farm processing and short circuits, (2) farming more economically (reduce expenditures), (3) regrounding farming upon nature. The list also includes (4) pluriactivity i.e. building the farm (partly) on off-farm income. Finally, the two last strategies are (5) developing new forms of local cooperation and (6) improving efficiency of inputs/outputs conversion. Obviously, these categories are not mutually exclusive and novelties are spontaneous, multi-faceted, and complex.

What would then be the origin of such ***diversity***? I think we can find pieces of answer in what Jean-Pierre Darré calls *"la liberté de produire des idées"* (Darré, 1986, p. 24) (freedom to produce new ideas). In the theoretical insights given above, we consider each farm as a small space in itself. In each farm, economic squeeze and other macro phenomena are perceived in a particular way according to farm's internal balances, task organization, resource flow, financial situation, geographical location, historical and cultural background. Thus, different farm families start to "walk" from different 'locations' i.e. to look for alternatives in different domains and to consider different indicators as relevant. Farm families combine different ways of producing knowledge: observation, trials, experimentation, read books, attend conferences, discuss with technicians, surf the internet, etc. They also have different hobbies and interests as well as friends or relatives working in different domains -e.g.forestry, carpentry, construction or automotive sector. These many factors lead to the possibility for

various novelties to be produced. Moreover, farms are spaces where different novelties are combined, re-moulded and aligned. Finally, farmers complain when they say *"on est seul"* (we are alone); although farms are different little worlds, farmers are looking for partnership and support from outside the farm. Thus they engage in new relationships with other spaces -see next section.

Multiple projects. In the same vein, there are as many projects as farms. Farmers wish to act as they want, develop their own farming style, take part in the construction of a society which is desirable in their eyes. They want to bring about rural development, social justice, agro-biodiversity, good food, *"lieu qui fait du lien"* (a place that bonds) in the village, as Véronique (FDB) says. By constructing these projects, they avoid being leftovers of Modernization project (*Les Misérables* cf. Victor Hugo's novel), enrolled in the reproduction of systems that lead to phenomena they don't like -e.g. deforestation, climate change, income inequalities, soil erosion, pesticide poisoning. At their own level, these *"Indomptables"* (indomitable) make use of their freedom to start to build the society they want through multiple family projects. Another farmer told me : *« Je me suis rendu à Agribex ce mardi et j'ai pu redécouvrir l'autre monde, celui de la technologie énergivore, de l'endettement et des banques. Un autre monde, car je ne me sens plus à ma place dans ce monde là. »* (I went to Agribex -international agricultural exhibition in Brussels- on Tuesday and I could re-discover the other world, the one of energy-intensive technology, debts and banks. It is another world, because I don't fit in that world anymore).These 'alternative' projects seek to create diverse new realities and new relationships. Farm families decide and commit themselves in their own projects. These projects (means and ends) are re-thought and re-adjusted through family discussions. They really differ from Modernization project that is designed and decided by policy-makers but commits many other actors. Modernization was hardly adjusted; only through centralized and heavily institutionalized procedures. Thus, issues of self-governance, democracy, and even modernity emerge with these alternative projects.

Multiple logics. Therefore, there are different ways to run a farm while being *"raisonnable"* (wise) but not *"rationnel"* (rational, stuck with entrepreneur, financial rationale). Different farmers I met have their own calculus, legitimate way of mentally organizing the production. Thus, I could collect various quotes related to their 'logic': *"il faut maintenir une taille raisonnable"* (one should keep a reasonable farm size), *"il faut pouvoir élever sa famille, vivre avec quarante vaches"* (one should be able to raise his children, live with forty cows). While milking, Arthur (FQP) also told me *"c'est gai, on nage un peu entre les vaches, on ne fait rien de mal"* ([working] is funny, we 'swim' among cows, we don't do harm), *"tu n'as pas ce système au dessus de la tête qui nous coince"* (you don't have this system upon our head that wedges us), *"c'est plus valorisant"* (it is more attractive), *"je vais à contre courant"* (I go against the tide), *"ce n'est pas hyper performant mais c'est viable"* (it

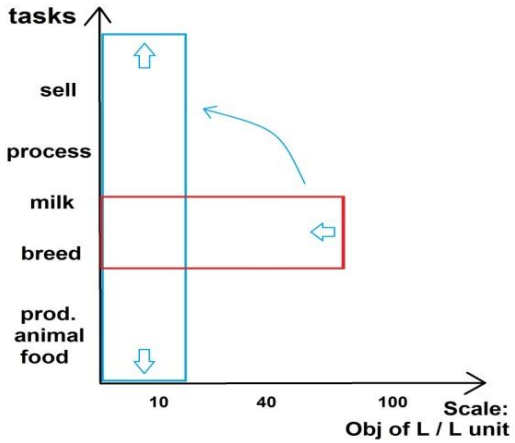


Figure 36 Farm activity, tasks and scale (2.0)

is not hyper-efficient but it is viable), *"quand les autres arrêtent, il faut continuer"* (when others stop, we should continue [to process milk]). Pierre (FDB) told me he wants to *"grapiller de l'autonomie sur tous les fronts"* (gain autonomy on all fronts) i.e. animal food, seeds, water, energy; both toward global markets, agro industries and subsidies schemes [Fig. 37]. He does not want to put an end to any relationships nor to target autarky; he wants to relate with other people and in new ways. Different goals, time frames, and parameters can be taken into account in farmers' own 'calculus'. Pierre considers this project as *« un chemin, on est jamais arrivé, c'est ça qui est gai »* (a path, we never arrive, it makes it attractive) although -he says- it may be *« un peu frustrant de ne pas tout savoir, tout connaitre »* (a bit frustrating not to know everything). While modernization project sought to bring about rupture, these farmers construct continuous, never ending projects.

Be creative to move forward. Arthur (FQP) told me: *"notre ligne de conduite n'est pas fixe"* (our development trajectory is not fixed), *"il faut de la souplesse"* (one must be flexible), *"on a notre place grâce à notre souplesse"* (we do exist thanks to our flexibility). These farmers are proud of a certain degree of creativity, of being able to (re)connect "modern" technologies and innovations -e.g. tractors- with alternative world views, projects, and practices i.e. different from those they were designed for. In the same vein, farmers engage in new relationships with experts. Few scientists and experts start to come to farms in order to get inspired and see novelties. This is what Louis Hautier (CRA-W Walloon agricultural research centre) and Marjolein Visser (Université Libre de Bruxelles) are eager to do despite -let's say- 'institutional resistance' -see next section. They may take over some ideas and develop them further in other spaces. In addition, the adoption of a technological device (innovation) by a farmer may induce novelty production; farmers actively enroll it in their own projects, re-mould and adapt it so that it fits their farm -e.g. FDB hay dryer. Thus, they escape from unilateral prescriptive (TATE) relationships but without fully losing contact. Farmers still listen to vendors because *"il y a du bon à prendre partout"* (there are interesting things everywhere) -as Jean (FTS) says- but they also consider their intuition and their own observation. The reproduction of these farms still depend on selling products but farmers engage in new kinds of relationships so that they can do something about prices and product properties (standards) i.e. in other -constructed, nested- markets. Thus, farmers target to be part of the place again, to connect agriculture with local ecosystem, resources, culture, norms, neighbours, friends, and eaters. Farmers develop novelties as new ways of embedding agricultural production in living nature, societal needs, and their own emancipation desires [Fig. 38] (van der Ploeg, 2006).

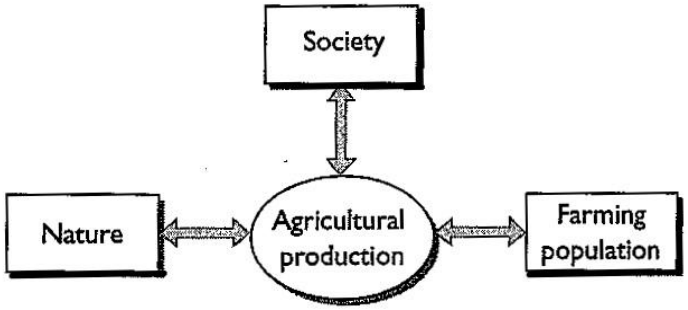


Figure 37 The embedness of farming -from (van der Ploeg, 2006)

In this last section, I would like to characterize peasant space and its relationships with other spaces. Farmers I met consider agriculture is in crisis because of income decrease, multiplication of rules, standards and norms, various threats on continuity, degradation of agricultural resources, and other many reasons -see section "Modern problems". In order to escape from the crisis, they take the lead to change farm organization and relationships much beyond and in other direction(s) than what they are asked or supposed to do. Thus, farmers struggle against existing state of affaires and institutions on three main battlefields [Fig. 39]: regrounding, repositioning and self-regulation (van der Ploeg, 2006). The fifty novelties listed above can be understood in this context of struggle [Table 3].

First, "regrounding" means developing farm resource base and internal cycles. Farmers seek to integrate resources and their uses in order to increase farm autonomy and reduce expenditures. For instance, they mix cattle races to get "better cattle" -i.e. more appropriate to their context and objectives-, foster self-provision of animal food, value by-products on the farm, rely on soil biology to improve soil structure and fertility, value existing buildings and 'ecological infrastructure' (incl. woody vegetation), and settle rotational grazing (paths, water troughs, fences, shelters). Regrounding can lead to enter in conflict with "regime" institutions and rules. Some farmers keep, sort, and clean their own seeds while seed industries are lobbying to forbid that, others struggle to get manure accepted as fertilizer by environmental regulations and make cereal-legume associations acknowledged in CAP categories.

Secondly, "repositioning" the farm toward output markets leads to process and increase added-value of farm products, diversify farm production, and to value alternative ways of working and producing food. Farmers seek to re-define performance and to make people accept to pay (more) for "better food" and more sustainable modes of producing it. They invest labour and energy in the elaboration of markets where they can do and say something about food price and qualities. Thus, they struggle to construct new markets rather than taking over market shares -invading supermarket shelves. For instance, farmers create their own brand, label and/or farm shop. Others struggle against large traders for access to weekly markets.

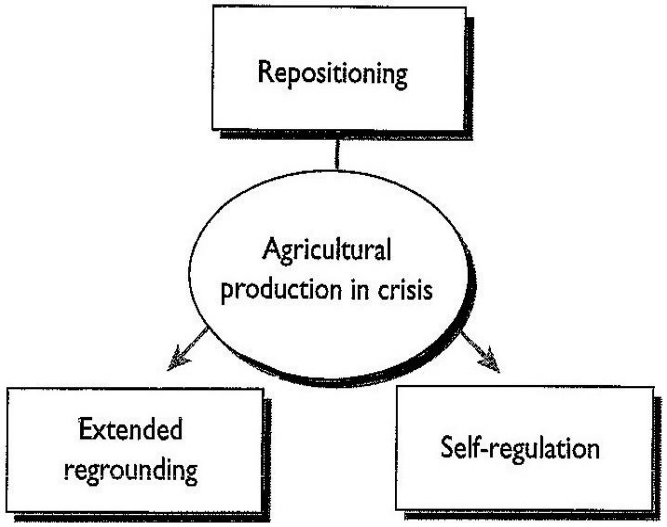


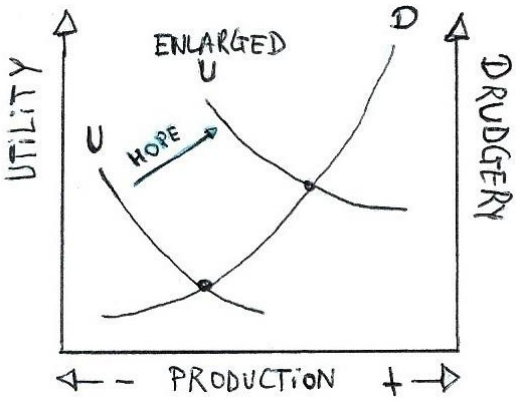
Figure 38 Ways out of the current agricultural crisis - from (van der Ploeg, 2006)

Thirdly, farmers struggle for "self-regulation" *"décider nous-mêmes"* (lit. decide on our own) and to incorporate their own values in their decisions. For instance, raw milk requires specific know-how and skills to make good and safe dairy products out of it. Farmers really want to process raw milk because it has an identity; it is the living fruit of the whole farm (animal food, living conditions, farmers care, etc.). They often struggle against hygiene rules and standards aligned to industrial practices. Both ontological properties of milk -milk identity *"mon lait"* (my milk) vs. global commodity- and farmers specific know-how -comparative advantage toward industries and source of income- are reasons for disagreements with control agencies that sometimes operate beyond the state itself. Farmers want to defend their own way of making distinctive dairy products; they question some of prescriptions about 'good practices' and 'proper equipment'. Thus, they take an active part in public debates and make people 'taste the difference' -e.g. via degustations and open-doors.

Table 3 Novelties (50) listed during fieldwork

Investing in renewable energies	Arrangement with resellers	Self-provisioning of animal food
Agroforestry	Promoting our products	Hay dryer
Collecting rainwater	Increasing the workforce	Settling (rotational) grazing
Reducing fertilizer purchase	Diversifying farm production	Covering silage without plastic
Grates and Slurry	Processing Milk	Adapting crop rotation
Ramial Chipped Wood	Valuing by-products on the farm	Temporary grassland seedmixes
Composting	Selling by-products	Fodder cereal-legume association
Reducing tillage	Farming meat poultry	Growing bread Cereals
Adapting machinery	Growing vegetables	Growing peas
Settling Permanent Beds System	Growing potatoes	Growing catch crops "Cultures dérobées"
Keeping and selecting seeds	Developing distinctive quality products	Growing cover Crops "Couverts"
Developing short(er) food supply chain	Re-defining performance	CRE "Centres of Reference and Experimentation"
Direct selling	New ways of Breeding cattle	Taking active role in public debates
Arrangements among producers for selling	Mixing Cattle Races	Valuing "l'existant"
Cooperative	Re-thinking food ration	Renting cottages for tourists
Farm Shop	Getting rid of soy	Developing a multi-site farm
Home-thought arrangement of the stable	Learning about Biodynamic agriculture	

Why do they struggle? The legacy of modernization project is still deeply rooted in many "surrounding" institutions; these farmers are pioneers and experience these institutions as additional constraints that foster prescription, commodification, and externalization of tasks. While these institutions do not guarantee good food, rural employment, nor sustainable development -cf. institutionalised incapacity (Roep, 2000)-, farmers consider these institutions are constraining them in novelty production and in their definition of progress. Thus, farmers not only cannot align -it would lead to their disappearance- but they also do not want to align -it would not bring desirable future. Farmers do not focus on sending signals, imploring institutions and policy-makers; these farmers focus on changing their practices -sometimes despite legality. Their ability to do such moves is deeply rooted in peasant culture. This can be explained by Chayanov's balance between utility and drudgery [see first drawing]. *"C'est dur mais il y a de l'espoir"* (it is hard but there is hope) -as a farmer says in the movie *"Il a plu sur le grand paysage"* (Andrien, 2012). In other words, it's hard now but the future will be better (increased utility) so pesants accept higher level of drudgery i.e. to make extra effort today. Thus, current institutional constraint is not an absolute barrier for peasant practices; they find it 'reasonable' to move forward despite that.

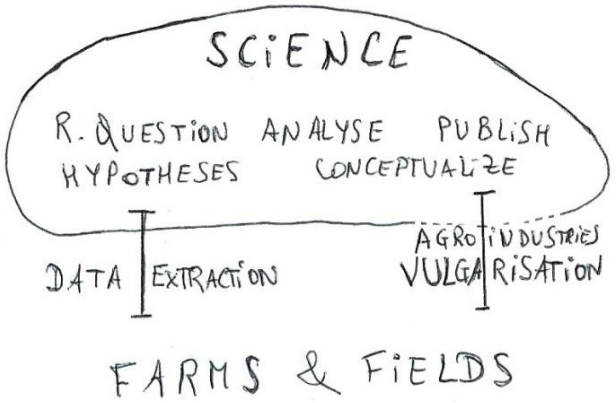


Therefore, novelties cannot be reduced to the re-organization of farms as closed and isolated spaces. Renewed peasant space is ***open but negotiated space***; it is characterized by many relationships with other spaces but its existence is not institutionalized. It has to move to be seen, peasant space *"n'a pas sa place"* (its existence is not given), it has to *"faire sa place"* (insert itself and claim its own existence).

What gives hope? Farmers seek support from elsewhere than agro industries -their vendors, advisors- and subsidy schemes -tightly related spaces some people would call 'dominant' regime. Farmers say their work would be easier if they plow grasslands and stick to vendors' prescriptions but it is not compulsory to do so -they decided not to choose this option. Farmers look for other relationships with actors from a ***non-limited*** list of other spaces, for instance: eco-construction sector, second-hand websites, groups of consumers, entertainment and tourism agencies, biodiversity and nature conservation associations, schools, restaurants, artisans, care institutions, *"revendeurs"*, and 'different' scientists. Thus, the ensemble of options for repeasantization is not size-limited but rather popping-up from many sources; there are as many sources of novelties as farms spaces. Farmers I met told me they enjoy having diverse tasks to do (vs. monotony), better labour income - it is a lot of work but it pays back-, and these farm projects open doors for continuity and attractive future, notably in the eyes of their children. Peasant space is open so that farmers can engage in new relationships with a multitude of actors from other spaces.

To settle new bridges is not that easy; theory of space may help to understand processes going on. In order to go further in the analysis, I suggest focusing on ***one case: relationships with "participatory" research*** and scientists 'looking for something else'. Actually, 'Science' is often seen as major source of innovation. In the list above, we could see it is far from being the only one. Moreover, I would like to show how and why science itself has to evolve to actually contribute to novelties in the following paragraphs. In the words of Jean-Pierre Darré, 'Science' should not be such monolithic space [see second drawing] and should get rid of believes such as that there would be only one kind of actual knowledge, that knowledge can be transferred in packages, and that having 'higher status' provides with better access to truth (Darré, 1996: 183-184).

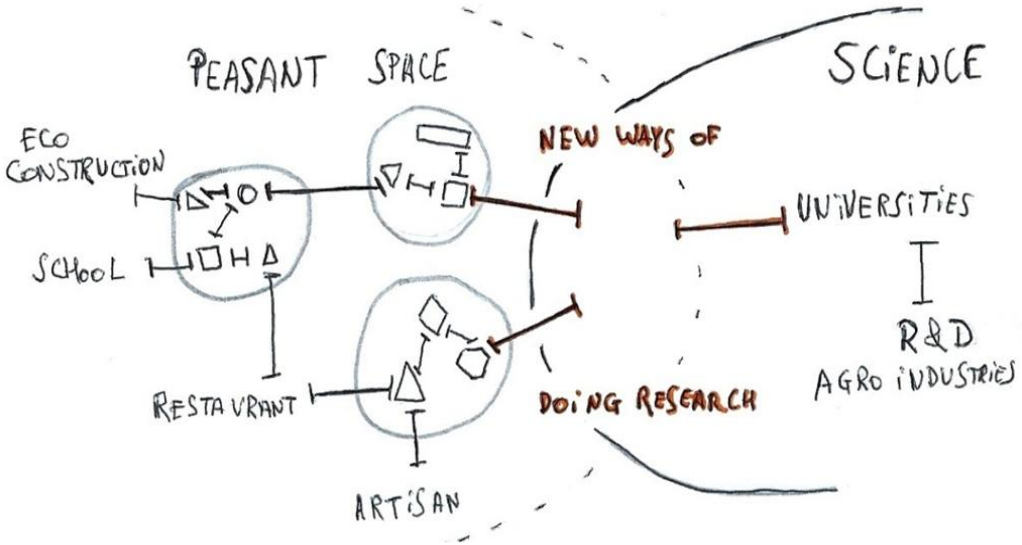
During fieldwork, I met scientists who are not satisfied with 'Science' as it has been built and framed in modernization project. These scientists criticize *"recherches qui planent dans les universités"* (research projects that 'fly' in universities), *"un beau modèle, quelque chose de bien théorique et qu'on est en déphasage total par rapport au terrain"* (a beautiful model, something strongly theoretical, and in total discrepancy with the field), *« j'ai une connaissance livresque »* (I have 'bookish' knowledge) as Louis Hautier (CRA-W) told me. They think 'science' and 'practice' became two disconnected worlds, with different interests and problems. The only 'intermediaries' are agro-industries that finance and provide research topics [see Annexe 6]. They think *"déphasage"* (discrepancy) is source of irrelevance and misunderstanding while they -personally- would like to contribute to sustainable agriculture.



Thus, some scientists are eager to find time to 'fix discrepancy', *« aller à la rencontre des réalités de terrain »* (go out and meet 'reality of the field'), and *"quitter un peu le siege du chercheur-fonctionnaire"* (quit the position of researcher-public servant -pejorative: guy having cushy, desk job) -as Louis puts it- but they also struggle with the context of modern scientific institutions -key elements of the "regime". This stuggle takes different forms. First, divergent grammar and vocabulary are big challenges for inter-disciplinarity (collaboration between academic disciplines) and trans-disciplinarity (between 'Science' and 'field'). Misunderstandings emerge because actors use both different words and different meanings; *"le signe doit être reconnu, le discours doit être compris"* (the sign must be recognized, the meaning -or content, discourse- must be understood) (Darré, 1996, p. 140). The author insists on the fact that surrounding *"univers de pensée"* (lit. thoughts-world) provides a word with a meaning; location of the word in the whole life-world really matters while the idea of knowledge transfer is made redundant. During last decades, 'Science' imposed its language while the one(s) of 'practitioners' became imprecise,

relative, subjective. Second, funding schemes are characterized by covering a time-limited period and candidate researchers have to convince funders of project's relevance in a context of political and personal issues in research centres. Third, common frameworks of scientific activity -study, publish, vulgarize- are orientated toward *"comment diffuser"* (how to diffuse) packages that contain particular knowledge, rationale, a single solution, and a single way to adopt it. Darré characterizes this orientation toward provision of ready-made solutions with the following words: it displays *"urgence sans alternative"* (emergency without alternative option), it further *"enferme dans cette soumission à la pression économique"* (wedges in submission to economic pressure) (Darré, 1996: 155-157). In the same vein, design of research project are often restricted to system optimization, i.e. the development of adoptable, marketable, controlled, and closed systems.

These characteristics of 'Science' space are sources of challenges for "participatory research", they make it more complex than expected but they are not fatalities. Building new relationships between two spaces [see third drawing] requires time, dialogue, actual knowledge encounter, shared observations, reciprocal adjustment and evolution of vocabulary, concepts, and language. There will be misunderstandings for sure as actors start with different frameworks in mind. One must be aware that an academic research protocol will not bridge the spaces; *« le labo débarque en champ et ce n'est pas une approche de co-construction, d'observation »* (the lab 'lands' in the field; it is not a process of co-construction nor shared observation) as Louis says. Such change demands learning from both sides; both farmers and scientists have to develop their ability to communicate feelings, go deeper in their own thoughts, and reflect on their experience.



During fieldwork, I had the opportunity to observe and/or take part in two 'participatory' research projects. Firstly, the Centres of Reference and Experimentation on fodder autonomy (described above) consist in on-farm experiments and trials aimed at improving farm autonomy together with making progress on nutritional, environmental, food quality issues. Farmers get a financial support and access to lab analysis in order to test new things or assess new practices they developed. This group of farmers gets support from different farming technical organizations. Farmers and technicians meet regularly (group discussions), organize open doors, and write reports. Technicians say the goal of CRE is not to do actual research but

rather on-farm observation. Moreover, they say it is good for vulgarization *"ça permet de communiquer"* (it allows to communicate) toward other farmers. However, farmers think they do more than observation and vulgarization; they consider they also do research and produce knowledge as they try, test and assess new combinations in real farm conditions. As you can see, debate is open about goals, frameworks and relevant types of knowledge. Secondly, the Agroforestry participatory research project started recently and consists in group discussions between few scientists from Université Libre de Bruxelles (prof. Marjolein Visser and her assistants) and an heterogenous group of farmers already developing novelties on their farm and planting trees and/or hedgerows in particular. This meeting took place on our farm. The 'proximate' or short-term goal of this project is to gather diverse experience, knowledge, and observations about 'trees on farms'. The 'ultimate' or long-term goal is to create space for discussion, exchange of experience, ideas, and knowledge between farmers and scientists about novelties that farmers are developing on their own farm. We wish to make the group last and the discussions evolve according to new problems, questions, and techniques farmers 'encounter' on their own 'path'. After the first meeting, farmers told me they were eager to discuss about new combinations re-adaptable in every farm systems, ideas and practices they can re-think and re-mould in their own farm (cf. 'system innovation', vs. system optimization). During discussions, actual dialogues could take place and lead to knowledge encounter - see Darré about making new knowledge through dialogue (Darré, 1985, p. 150). This kind of new relationship requires tolerance toward diverse ("crazy") ideas -we are all "fools"- and coexistance of different ways of thinking, everyone has to accept that one's truth is not universal; farmers may be more used to that and their attitude really helps (Darré, 1996, p. 147).

From these experiences, I learnt that it is of great importance to ***jointly construct new relationships and new space***. On the one hand, novelty and knowledge production that take place within the intimacy of farm spaces must be acknowledged - particularly by scientists- as a relevant way to produce knowledge (new relationship). On the other hand, we should consider creating "support" space outside the farm and fed by inputs from 'scientists' and 'farmers' as a new ***common*** for both 'scientists' and 'farmers' -where roles may be confused, negotiated and/or redefined- and as a new way to do research. As Darré says, we should orientate 'doing research' toward *"comment vivre"* (how to live) i.e. helping farmers to create room for reflection and elaboration of their own answers. (Darré, 1996: 155-157). Thus, we would develop space outside the farm for dialogue and exchange of ideas where different types of knowledge -incl. experiential- could contribute and be of help to novelty production -incl. within and between farms [see third drawing].

In the literature, debate is open about new ways of doing research -see (Carr & Wilkinson, 2005) about boundary organization and (Sherwood & Paredes, 2013) about 'being' practitioner and social actor. Indeed, such participatory research projects are opportunities to start building new spaces but 'participatory research' is above all a first step that calls for next ones in further evolution toward other types of relationships. For instance, farmers are eager to take scientists in their "never-ending walk" instead of being enrolled in time-limited research

projects. In the new space, " floor is ours" there is no fixed state of affaires and things are evolving; there is room open for multiple types of novel practices and relationship -incl. even researchers running a farm themselves. Through this particular case, I wanted to show how new bridges between peasant space and other spaces can bring (desired) change.

However, we could see that change does not occur without ***distancing*** from, struggle against 'modernization', 'regime' institutional background and its manifestations within attitudes and frames of thoughts of actors involved. Farmers often told me they were struggling for *"autonomie"* (autonomy) and *"liberté"* (freedom). Actually, distancing from the regime induces changes at the level of the farm on three entangled dimensions. First, it involves creating other materialities, another reality i.e. other biological processes, nutrient cycles, farm building arrangement, food ration, crop rotation etc. [see Fig. 40 & 41, next page]. Secondly, it involves engaging in other networks. Pierre (FDB) told me that he's talking *"un language que les collègues ne comprennent plus"* (a language colleagues do not understand anymore), he feels a kind of exclusion and he doesn't consider them as colleagues anymore, *"on n'a plus les mêmes problèmes, on a l'air mystérieux, ils ne viennent pas voir"* (we don't have the same problems anymore, we look mysterious, they even don't come and see). He feels he is not understood anymore, since they shifted to organic farming and seek for animal food self-provision. These new materialities bring about other relationships with other actors (artisans, cook chefs, NGO activists) but also other socio-technical problems. To fix them, farmers seek support from elsewhere than vendors and elaborate answers through other knowledge practices -e.g. attending conferences, experimenting, reading books. Thirdly, distancing from the regime involves other truths and knowledges. Arthur (FQP) says *« chaque ferme est spécifique, je ne prétends pas avoir le système universel qui marche partout »* (each farm is specific, I do not claim to have universal system that works everywhere) *« j'ai adapté à ce qu'on avait »* (I adapted to what we had) *« il faut connaitre ses vaches »* (one must know his own cows, -i.e. they are not generic cows). While distancing, other things -incl. internal details, balances, and specificities- become relevant; other things become true. Then he gives an example : *« la traite, ça ne peut pas être une contrainte. Sinon, on ne peut plus le faire, faut pas le faire pour les sous. Heureusement, on a le commerce pour valoriser ; c'est un tout »* (milking cattle cannot be a constraint. Otherwise, we cannot do that; we could not do that just for money. Fortunately, we have a farm shop to value our milk; it is a whole). Direct selling makes it possible and realistic to continue milking cattle on their particular farm. It allows not only to maintain -even improve- labour income but also to keep the production running so that specific knowledges are still reproduced and quality food is still offered. Through these three types of moves, farms thus become specific and unique spaces, niches for novelty production.

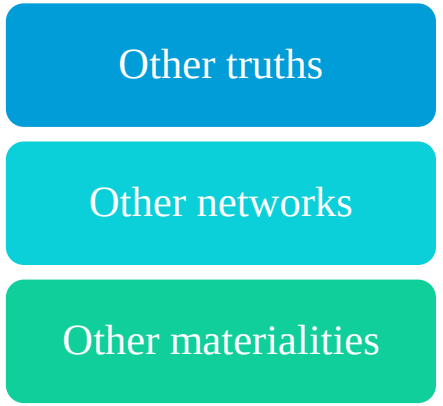


Figure 40: Former fodder maize field turned into permanent grassland for goats (CHV)

Figure 39 Former maize silage silos have been demolished to settle in-barn hay dryer (FDB)

To conclude this section, while agriculture modernization, its 'Science', agro industries, cattle competitions, and CAP subsidies do not bring desirable future anymore -even no future at all-, *"Les Indomptables"* creatively respond to interstices - regime failures- with multitude of novelties, new projects, relationship and bridges with other spaces -incl. by creating new commons such as nested markets and spaces where they share experience and knowledge. To institutional lock-in, deadly constraints, and powerless rule-makers, they answer with heterogenous and multiple logics; van der Ploeg says peasantries are "multitude" i.e. they "master the art of not being governed" (van der Ploeg, 2013, p. 14). They build new relationships between spaces -while they also keep distance from other spaces-, move the boundaries of farming, and construct new materialities according to their *"bon sens"* (lit. good/wise sense, i.e. 'common' sense) i.e. their own particular rationale where signals from living nature, societal wishes, and their own cultural repertoire and aspirations can all be taken into account.

In their struggle for freedom, *"les Indomptables"* keep moving and actually bring change by civil disobedience -e.g. by not tolerating waste, *"non sens"*- and acting for more coherence between their own problems' definitions and practices within farm spaces. By developing sustainable farming practices and creating rural jobs, they struggle to insert themselves in the future as legitimate and desirable part of tomorrow's society.

CONCLUSION

To conclude this thesis, I would like to come back briefly on few lessons I take home after this research experience. First, there are theoretical lessons; the broad category "innovation" is often misused in agriculture or -at least- it often hides the most important part of change process. (1) Sources of change in agriculture are multiple; farms are unique spaces located both socially and agro-ecologically. Moreover, farms are not closed space; each farm has some boundaries that allow distancing whenever needed but it is also in interaction with particular elements of surrounding social and agro-ecological context. In terms of dynamism and 'innovation', this diversity is of great importance; peasant space cannot be reduced to an ensemble of copy-pasted production units. (2) Transitions may start with very small changes and shifts; a novelty brings about new issues and calls for (a) next one(s). This process cannot be reduced to the sudden adoption of innovative -alternative- system. Expert projects are time-limited and contain an end, an achievement. The 'final phase' may be adoption, vulgarization, or marketing of their output. On the contrary, in the cases I met, the solution never put an end to the process. Solutions brought about a new learning process. In other words, agriculture evolution is a never ending story carried day-to-day by farmers; farmers know that being inventive again means starting walking again -it doesn't mean running up to an ultimate goal. Farmers know it is a *"chemin"* (path) and I just wanted to report some *"bouts de chemin"* (lit. pieces of path, sections). (3) In the same vein, rural development is meaningful through long-term projects; innovation without active re-appropriation, fine-tuning, and insertion in people's projects does not bring development. In the cases I met, cascade of novelties and fruits of labour investments contribute to continuous agriculture evolution; there is progress even without revolution, external 'miracle' intervention and breakthrough change. There is room for change -new rationales, new projects, new relationships, new practices- within farm spaces but this room is often not acknowledged as source of rural development and is even often threatened.

Secondly, there are methodological lessons; to go and see the reality of farmers -as social actors- is of great importance to understand dynamics of on-farm novelty production. I was looking for novelties, new techniques developed by farmers that could increase agriculture sustainability, that are relevant according to society's expectations and wishes. I met people who develop their own way of farming, who heterogenise farming despite standards of supermarkets, AFSCA rules, ready-made solutions of vendors, CAP premiums and criteria. I met people who simply and humbly dedicate their life to feed others. I met people who think every day to what they do, and try to do it "better". Thus, one should seek to understand (novel) practices in the real life of peasant families; farm projects include a vision of the past, today and tomorrow, as well as family, friends and other networks. Motion forces are multiple and include the interests, fears, and desires of emancipation of farming population, societal wishes, and messages, signals sent by living nature. All these details of thick context are

relevant, one should dare to open the black box and take them into account. Farmers are hard 'working for their own dreams' -in the words of (Vernooy, 2001)- and (re)construct their own project -they don't resign themselves to being used in projects of others. Thus, researcher should be able to deal with messiness and heterogeneity; the space of peasant farming is a battle field. Repeasantization takes place in spontaneous choices and practices of farmers so it is self-organized and "messy". As farming is displayed in the messy reality of social actors, deep understanding of the context and involvement in fieldwork relationships are of great importance to be able to put in words local action.

Studying one's "*terroir*" and living in the field are great opportunities to get access to better understanding of the context. Being farmer son also helped me to understand how and why farmers are taking into account the rest of the farm while producing novelties. The idea of sudden rupture and "innovations" were definitely not the only conceptions of progress I had in mind. I found it particularly relevant to opt for a multi-aspect approach [first theoretical framework] that takes into account cultural, biological, social, economical, chemical, political, technical aspects of novelties. In the same vein, the second framework helped me to consider all the different types of knowledges I found during fieldwork. As these farmers are taking new roles and acting in new spaces, to consider social actor as singular pluralities was of great relevance. During fieldwork, I further understood that it would be a mistake to study 'novel' practices out of their context. Thus, I chose to allocate particular attention to this context by elaborating the historical overview (incl. history of the 'regime') and farm profiles. In addition, novelties are related to each other and the issues they bring about are entangled with various others. I tried to report that via grey cases, farmers' stories and illustrations although other formats and layouts could have fit better.

Because of these particular sample and methods, I could get a lot of information on farmers' worldviews and elements of the context. Then, during the elaboration of the argument, I sought to make use as much as possible of the multiple kinds of data I had. I chose not to strictly stick to pre-defined research design; I tried to complete these data with archives, interviews, literature, statistical, and historical data whenever needed. These complementary sources of information really helped me to be more precise although I could notice there was a risk of digression. In the analysis, I largely relied on field categories and decided to choose, mix, and adapt concepts and theoretical insights from different authors according to what I saw in the field. I learnt a lot about novelties, niches, actors, knowledges, and spaces while observing farms; it is really important to read literature both before and during fieldwork as it also helps to critically reflect on our understanding of existing theories and concepts.

Thirdly, there are lessons for future (research) projects and that can be interesting for new partners. It is time to offer something else than prescription, commoditization and regulation i.e. what modernization brought about, what is killing agriculture today, and what farmers are

fed up with. One should first look at what farmers already do, incl. at "deviance" (*via*: the path in Latin) i.e. farmers choosing another path, farmers who started walking in another direction. Instead of 'landing' with breakthrough 'solutions' -whatever it could be: technology or regulation system -, one should first study the heterogeneity of practice with open-mindedness, respect, and care; one should take as starting point their farm at the moment, the direction in which farmers want to go, and their quest for coherence between what they believe in, say, and do. While engaging in new relationships with farmers, it is important to take time to create space for adjustment, discussion and knowledge exchange. Novelty production requires such room. Moreover, new spaces allow actors involved to redefine their roles; one should be aware that actors start with a particular background but one should not forget that actors are free to engage in totally new, different relationships.

Who, then, are *"Les Indomptables"*? What characterizes both 'in born' and 'new' peasants? First of all, the context of regime failure really matters. Manifestations of institutional incapacity are everywhere around us: erosion of consumers' trust about food quality, obesity and hunger, environmental degradation, increasing income inequalities. Global markets and technological developments erase agricultural labour -and peasants- from the landscape day after day. In this context, what do they do? They produce novelties; they 'occupy' their 'freedom to walk' in two different ways. On the one hand, they make use of their room for manoeuvre, self-governance, locally available resources, coproduction, quality labour and associated knowledge within farm spaces to produce novelties. On the other hand, they invest labour and energy in new connections with actors from other spaces, outside the farm. As peasant space is an open space, farmers may get involved in relationships with unexpected spaces so that they are unpredictable and ungovernable. They do so with a lot of ***"inventivité"*** (inventiveness, creativity, flexibility) -they make specific, particular use of elements they are interested in, even 'modern' technologies and high-tech devices- and ***perseverance*** "it's hard but there is hope" -they are not afraid of breaking boundaries; they are not fatalist toward difficulties, rules and constraints. Finally, farmers produce novelties because they actually seek for coherence with better society; novelties are parts of alternative projects toward desired futures beyond agriculture modernization, markets, regulations and subsidies. *"Les Indomptables"* bring societal change by changing their farm in the direction(s) they want.

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Annexe 1. List of helpful things to carry while doing participant observation on farms: warm jacket, farm boots, a road map, few blue pens, home-made rain-proof notebooks, camera, voice tracer/recorder, work gloves, hat.

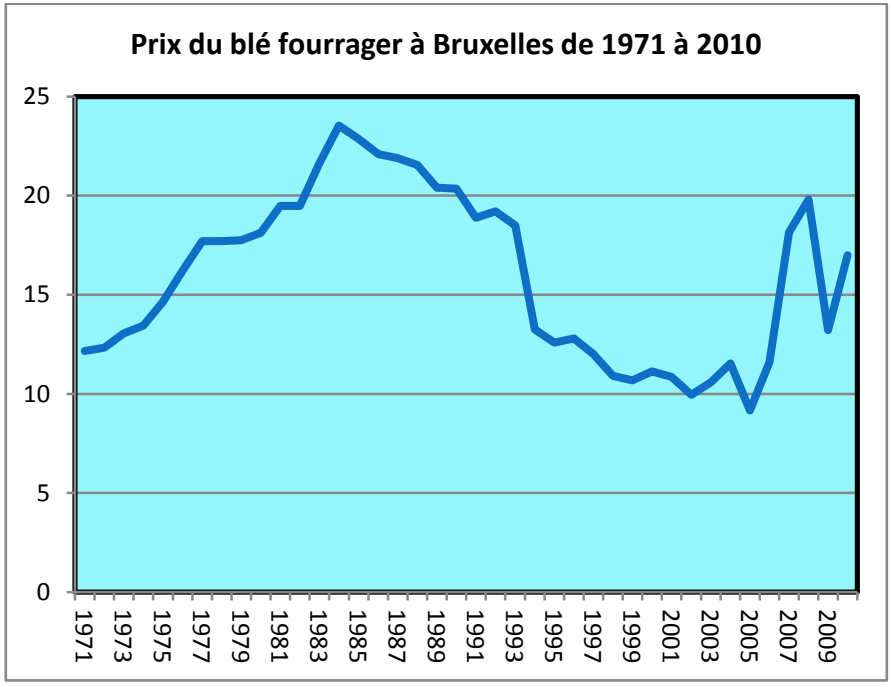
Annexe 2. Price of fodder wheat in Brussels 1971 - 2010, €/100kg. Personal data from Etienne Trifin (farm accountant, FWA).

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
prix	12,17	12,32	13,06	13,44	14,63	16,21	17,7	17,7	17,75	18,12

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
prix	19,48	19,48	21,62	23,53	22,86	22,09	21,89	21,54	20,4	20,35

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
prix	18,89	19,21	18,49	13,24	12,59	12,79	12	10,91	10,68	11,13

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
prix	10,86	9,96	10,59	11,54	9,16	11,6	18,14	19,81	13,22	16,99



Annexe 3. Price of milk dairy farmers got 2005-2008, €/100 litres (Service Public Fédéral - Economie, 2009)

	2005	2006	2007	2008
Janvier	30,3	29,2	28,9	40,7
Février	29,2	28,4	28,6	38,7
Mars	28,6	27,5	28,3	37,4
Avril	26,9	26,4	28,2	35,7
Mai	26,6	26,1	29,5	33,4
Juin	26,2	25,6	31,4	31,3
Juillet	26,2	25,6	34,1	31,0
Août	27,7	27,1	37,9	31,0
Septembre	28,7	28,4	41,1	
Octobre	30,1	29,4	44,4	
Novembre	30,5	30,1	44,6	
Decembre	30,6	29,9	43,2	
Moyenne annuelle pondérée	28,3	27,7	34,6	
Moyenne pondérée huit premiers mois			30,88	34,65

Annexe 4. Price of potatoes 1990-2011, €/100 kg (DGARNE - SPW/DGO 3, 2013)

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
Janvier	12,03	21,03	4,23	2,35	11,20	26,44	7,50	9,38	6,85	26,13
Février	11,66	21,24	3,52	2,50	13,29	29,65	7,04	8,51	6,79	23,60
Mars	15,84	21,92	2,70	3,14	14,30	28,46	6,44	7,50	7,08	20,50
Avril	21,07	20,22	2,56	3,50	13,92	28,30	7,45	7,93	8,68	16,13
Mai	12,67	19,26	2,24	3,10	13,48	22,71	9,13	9,00	9,13	19,30
Juin	23,90	36,86	23,67	5,00	11,41	9,81	9,43	8,67	9,40	14,13
Juillet	11,28	14,03	13,04	10,24	12,35	5,95	16,83	6,58	19,42	8,83
Août	7,37	10,63	7,30	11,59	19,38	6,30	9,65	3,00	17,76	3,21
Septembre	5,63	10,57	4,35	9,60	11,57	7,04	9,17	6,52	12,17	4,43
Octobre	7,54	10,18	3,47	9,25	12,64	8,18	9,85	6,11	13,47	2,54
Novembre	9,86	9,46	4,64	8,90	15,15	8,69	8,02	6,95	15,28	2,11
décembre	10,02	9,40	4,86	8,83	21,95	8,00	6,78	5,95	16,94	2,59
Moy/année	9,75	13,36	6,38	6,50	14,22	15,79	8,94	7,17	11,91	11,96

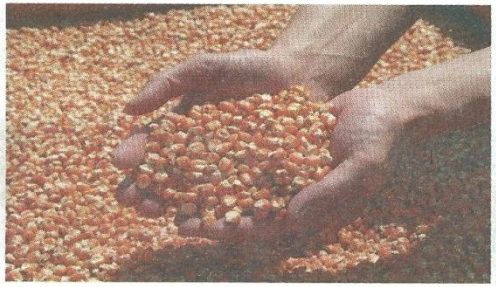
Annexe 5. Farm scale. A: number of hectares. B: number of full-time working labour units. Comparision with Walloon average: average farm size is 53 hectares, there are 16.740 (equivalent) full-time working labour units (UT) in 13.521 farms using 722.652 hectares of usable arable area (SAU) (DGARNE - SPW/DGO 3, 2011).

	A	B	A/B (SAU/UT)
JDR	1,2	1,2	1
CHV	23,7	2,2	10
FDB	65	3,2	20
FBF	10	2	5
FSM	47,9	2	23
FDR	72	4,5	16
FTS	63	2	31
FDM	80	2,2	36
FQP	62	2	31
Average (n=9)	47,2	2,37	**19**
Wallonia	53	1,2	**44,1**

Annexe 6. Extra promotional/informative folder of KWS Benelux BV (maize seeds company), included in Le Sillon Belge n°3604, January 24, 2014.

Une publication de KWS Benelux BV – édition 2013-2014

Le Journal du maïs



2013: le maïs peut faire énormément en peu de temps!

L'année dernière, le maïs a connu une nouvelle fois des conditions extrêmes. Les semis ont pu se faire dans les temps. Pourtant, en quarante ans de vie professionnelle, je ne me souviens pas d'avoir vu du maïs, au Benelux, qui dans la plupart des parcelles dépassait à peine 10-30 centimètres la première semaine de juillet. Si nous avions eu un mois de juillet et d'août comme en 2012, nous n'aurions tout simplement pas eu de maïs. Fort heureusement, les températures élevées et le temps très ensoleillé de l'été 2013 ont permis.une croissance de la végétation en un temps record. Localement, des orages ont provoqué de la verse. En fin de saison, la tempête automnale a entraîné beaucoup de verse, avec des effets variables selon les régions.

Si le maïs avait apparemment atteint la hauteur souhaitée, les tiges n'avaient pas nécessairement la vigueur et l'épaisseur voulues. La sensibilité à la verse a été aggravée dans les terres avec un précédent en herbage et une carence en potasse. La maturation du maïs a été tardive,

Sud-Ouest de la France et la Hongrie, les rendements ont été décevants, bien en-dessous des prévisions. En France, la pluviosité abondante et le manque de soleil au printemps ont empêché l'ensemencement d'une partie non-négligeable des parcelles. Là où les semis ont pu se faire, la récolte a été tardive et peu abondante. Cette situation entraînera une tension dans l'approvisionnement de semences de maïs au printemps prochain. Nous ne connaîtrons les véritables disponibilités qu'à la fin du mois de janvier, après tous les tests et calibrations.

En prévision de la campagne 2014, il est donc recommandé aux maïsiculteurs de commander bien à temps pour avoir toutes les chances d'obtenir la variété souhaitée.

Les chiffres des champs d'essai de maïs en 2013, même ceux de nombreux essais de maïs grain, s'avèrent très variables. Les

Dans cette édition: