



Norges miljø- og
biovitenskapelige
universitet

Master's Thesis 2016 30 ECTS
Department of Plant Sciences

Goat Farming Systems

**A diagnosis of goat sector at the scale of farms in
Centre-Val de Loire Region, France**

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Master Thesis
Mémoire de Fin d'Étude

GOAT FARMING SYSTEMS

A diagnosis of goat sector at the scale of farms in Centre-
Val de Loire Region, France

FOR THE OBTAINMENT OF THE MASTER DEGREE IN AGROECOLOGY
FOR THE OBTAINMENT OF THE ENGINEERING DEGREE IN AGRICULTURE

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October 2016

Acknowledgement

I would like to thank Delphine BRETON and Didier LEROY who have always been available and helpful throughout the production of this diagnosis.

Special thanks to Benoit FOISNON, the Livestock Department of Blois' Agriculture Chamber and the INOSYS' network that have answered my questions and gave me valuable advice.

Thank you to each field staff members who have led interviews and without whom this diagnosis wouldn't have been possible: Jennifer BAUDRON, Bertrand BLUET, Dany BURON, Joël FAUQUET, Benoît FOISNON, Camille FONTAINE, Cécile FOURNIER, Cécile GOURINEL, Lola JOUAN, Jean-Charles MICHELLIER, Mathilde MINARD, Marion PETRIER, Florence PIEDHAULT, Marine TAVENIER and Mathilde TUAUDEN.

Thank you to farmers who willingly agreed to give their time to participate in the diagnosis and to share their insights on the goat sector.

Thank you to Charles FRANCIS, Xavier ALIX, Jonathan LINDHOLT, James DOUGLAS and Mathilde CORDIER who reviewed my work.

Abstract

The goat sector in Centre-Val de Loire Region, France is highlighted by its five PDOs, its important volume of milk produced (63 million of litres in 2014) and its high rate of on-farm cheese processing (40% of the volume). Regional Agriculture Chambers and dairy counselling organisms launched the diagnosis of the goat sector at the scale of farms. Through an inquiry led on 268 regional farms having a flock larger than 50 goats at 1st January 2016, this diagnosis allows to get to know better goat farmers, their farm systems and their projects by 2020 to anticipate futures evolutions of the business. Despite side effects left over the last crisis (2009-2011) and difficult climatic conditions on the last few years, goat farms reach today satisfying results both technically and economically. Breeders affirm their willingness to maintain volumes to sustain a flagship sector, of excellence and with high-potential. Efforts made to stop the decline of the number of farmers start to show results and must be maintained, and even reinforced in some territories. In order to develop and sustain the sector numerous other elements must be addressed: systems automation, food self-sufficiency or climatic changes are few examples.

Key Words

Territorial diagnosis, goat sector, farm scale, PDOs, agroecology

Résumé

La filière caprine en région Centre-Val de Loire est mise en exergue par ses cinq AOP, son important volume de production (63 millions de litres en 2014) et son fort taux de transformation fermière (40% du volume). Les Chambres d'Agriculture de la région Centre-Val de Loire et les organismes de contrôle laitier se sont mobilisés pour réaliser le diagnostic de la filière caprine à l'échelle des exploitations agricoles. Au travers d'une enquête réalisée auprès de 268 fermes réparties sur l'ensemble de la région et ayant un cheptel d'au moins 50 caprins âgés de plus de 6 mois au 1^{er} janvier 2016, ce diagnostic permet de mieux connaître les éleveurs caprins, leurs systèmes d'exploitation et les projets qu'ils portent afin d'anticiper les évolutions de la filière et de l'accompagner de la meilleure façon dans les prochaines années. Malgré les stigmates de la dernière crise du secteur (2009-2011) et les conditions climatiques peu aisées ces dernières années, les exploitations caprines atteignent aujourd'hui des résultats satisfaisants tant sur le plan technique que sur le plan économique. Les éleveurs affirment leur volonté de maintenir les volumes pour pérenniser une filière emblématique, de qualité et d'avenir. Les efforts pour enrayer le déclin du nombre d'éleveurs commencent à porter leurs fruits et les actions pour faciliter l'installation des jeunes agriculteurs doivent être maintenues, voire renforcées dans les départements de l'Indre, du Loiret et de l'Eure-et-Loir. Afin de développer et pérenniser la filière de nombreux autres éléments doivent également être pris en compte : l'automatisation des systèmes, l'autosuffisance alimentaire ou encore le changement climatique en sont quelques exemples.

Mots clefs

Diagnostic territorial, filière caprine, élevages, AOP, agro-écologie

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Introduction

Agroecology can take on many different aspects; whether as a set of agricultural practices, a social movement or a scientific disciplinary (Wezel et al, 2009). Agroecology as a science is a powerful tool to understand agricultural and food systems with a holistic approach, and in this particular case: to develop further and sustain the goat farming systems in Centre-Val de Loire Region.

Goat cheese is one of the major and historical agricultural productions in Centre-Val de Loire Region (or CVL Region). The regional goat sector profits from a 'project assistance contract for goat sector', so called "CAP'Filière Caprin" (Cape in the text). The second generation of the Cape runs on the period 2013-2017. This work at the farm scale aims to conclude the second Cape and to lay the foundations for the third one by getting a better understanding of goat farming systems and identifying future evolutions of goat businesses. It will sustain the goat sector in CVL Region and to organize support for the development of goat farms' projects within the Cape. This diagnosis is carried out by Agriculture Chambers of the CVL Region and by dairy council organisms (CEL and Alysé).

Since the overall project aims to diagnose the whole goat sector, a second study is investigating the main food industries processing goat milk in CVL Region. This study is carried out by the CRIEL¹.

The target of this work is reached through three research questions: What is the current state of goat farming systems in Centre-Val de Loire Region? How are going to evolve goat farming systems by 2020? What are the existing elements in goat farming systems that can be used as levers to develop and sustain the goat business in CVL Region?

Firstly a literature review will clear the context of the project, secondly the methodology used will be detailed, and thirdly the more relevant results will be presented and discussed. Eventually some recommendations will be given.

¹ CRIEL = Inter-professional Regional Center for the Milk Economy

1. Literature review

1.1. Centre – Val de Loire Region

1.1.1. Location

The scale of the study is the whole Centre – Val de Loire Region in France and its six administrative departments (Figure 1): Cher (department number 18), Eure-et-Loir (#28), Indre (#36), Indre-et-Loire (#37), Loir-et-Cher (#41) and Loiret (#45). The Region has an acreage of 39,151 km² and had in 2013 2.56 million inhabitants (65 in/km²). About 50% of the population lives on the axis Orléans – Tours. Only these two cities have more than 100,000 inhabitants. The prefectures of the four others departments (Bourges, Blois, Châteauroux and Chartres) count between 39,000 and 66,000 inhabitants (Région Centre, n.d.).

The CVL Region is advantageously situated in France and some major French cities are quickly reachable overland: Orléans → Paris = 2 hours, Bourges → Lyon or Tours → Bordeaux = 3^{1/2} hours (Figure 1).

1.1.2. Economy

CVL Region is culturally rich as can testify historical sites such as Chambord, castle of King François 1^{er} or the presence through centuries of important figures such as Leonardo da Vinci or the poet Ronsard. The food heritage is just as important and the numerous terroir products like wine, goat cheese or tapped pears are recognized in France and abroad.

Tourism is one of the most important economic activities for the region, especially in the Loire Valley. About 9 million entrances have been registered to the main touristic sites in 2014 (Région Centre-Val de Loire, 2014). Also the concept Cycling – Loire allows 800 thousand cyclists every year to enjoy the Loire Valley through 800km of routes for biking from castles to

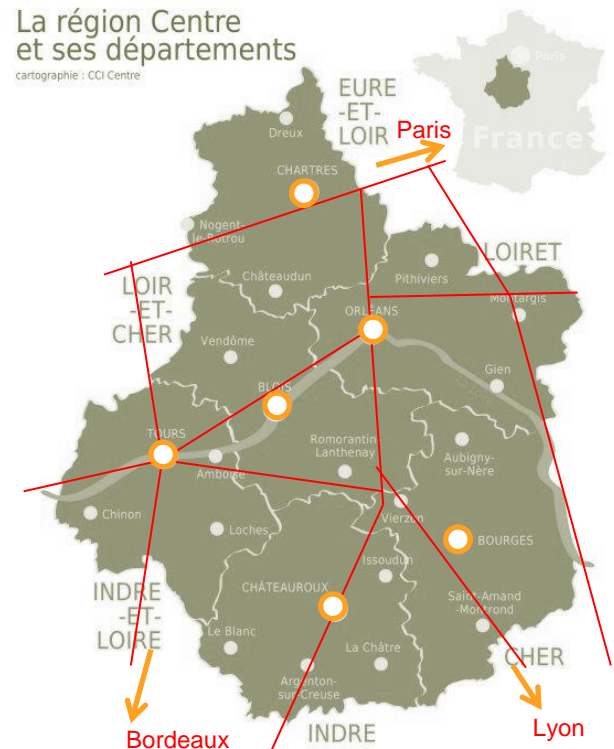


Figure 1 : Centre – Val de Loire Region and its departments, source Chambre de Commerce et de l'Industrie Centre-Val de Loire (n.d.) Legend : red dots = main cities, red lines = highways, white lines = departments limits, white dots : secondary cities, grey thread = Loire River

villages and discovering the heritage and the gastronomy of this region (Région Centre - Val de Loire, n.d.).

The region is also at the first national rank for pharmaceuticals sector as well as for the industrial rubber and plastics sector and is also at the third rank for wind energies. Other important industrial sectors are mechanic equipment, electronic and informatics, and chemistry (Région Centre, n.d.).

The regional GDP was of 68.9 billion euros in 2013 (INSEE, 2016). The industry sector provides 17% of the regional GDP. Almost 75% of the GDP comes from the service sector, by including tourism (Région Centre, n.d.).

1.1.3. Agriculture

Agriculture is the last, but not least, economic activity of the CVL Region. It covers about 57% of the CVL territory (Interbev, 2016). The agricultural landscape is much diversified according to the social, historical and soil-climate context of the different areas. 18 different regions can be counted. They are gathered into seven *Pays*². Those are introduced in Appendix 1 in a more detailed way to give an overview and a better understanding of agriculture in the Region.

CVL Region is the first crop Region in France and in Europe. It is known to be “the breadbasket of France”. In 2014, the production of cereals in the region reached about 5 million of tonnes, of which 32% of corn. The production of oilseeds was of 1.2 million of tons and the protein crops were of 97,000 tons (DRAAF, 2015).

In 2014 the wine production was of 121 million of litres, 86% under PDO³ specifications and 6% under PGI⁴ (DRAAF, 2015).

1.2. The goat sector

The CVL Region is at the first rank of French Regions for producing goat cheese under quality labels (60% of the volume), at the second rank for processing goat cheese on farm (35% of the volume) and at the third rank for goat milk production (10% of the national collect) (CRIEL Caprin du Centre, 2011).

1.2.1. Market today

In France, compared to 2014, the collect of goat milk stayed globally stable. The average price was of 727 €/1000L (DRAAF, 2015).

² Perche, Beauce, Gâtinais, Val de Loire, Sologne, Touraine and Berry

³ PDO = Protective Designation of Origin

⁴ PGI = Protected Geographical Indication

However the increased demand for processed goat milk (cheeses and ultra-fresh products) has required importations. Up to 20% of goat milk processed has been imported from Spain (FranceAgriMer, 2016). Fresh cheese is a sector with a high level of competition at every scale: between European members or between regions (Napoléone M., 2011). In such context, quality recognition through labels such as PDO is particularly valuable.

According to the Kantar WorldPanel, the consumption of goat cheeses increased in households by 5.9% in 2015. This is mainly explained by the infatuation for the industrial “bûchette”, a cylindrical goat cheese (FranceAgriMer, 2016).

Despite some complicated seasons during the last decade (crisis in 2009-2011), the goat sector is currently going rather well in CVL Region.

In 2014, 40 million litres of goat milk have been delivered to dairies of the region and 23 million litres have been processed on farm (Institut de l'Elevage (c), 2016).

1.2.2. The Cape, second generation

The cape second generation (2013-2017) aims to support goat farming through four strategies.

- Communication toward consumers to increase cheese sales and in particular PDOs products.
- Maintain and develop the cheese processing on farms.
- Improve the competitiveness of goat breeding farms. This axis includes grants to develop farms with for instance wooden barns, or automation of feeding systems.
- Ensure the renewal of generations in farmer population

1.3. Introduction to regional PDOs

1.3.1. PDO products

The goat sector in CVL Region profits from five different PDOs cheeses. PDO's cheeses count for 45% of cheeses produced in CVL (Interbev, 2016). PDOs are labels of quality and origin protecting the name of a product in the whole European Union. PDOs are products reflecting the specificities of a terroir (defined geographical production area where the physical, biological and climatic matrices interact) and of know-how (INAO, n.d.). They are also part of the territory identity. The specifications for PDOs' cheeses cover the different steps leading to the final product: goat races, type of feed, feed origin, veterinary care, processing steps and so on.

The five PDOs' goat cheeses of the region are Sainte-Maure de Touraine, Selles-sur-Cher, Valençay, Crottin de Chavignol and Pouligny-Saint-Pierre. Most of the production area is

located along and in the South of Loire River (Figure 2). PDOs are described in detail in Appendix 2.

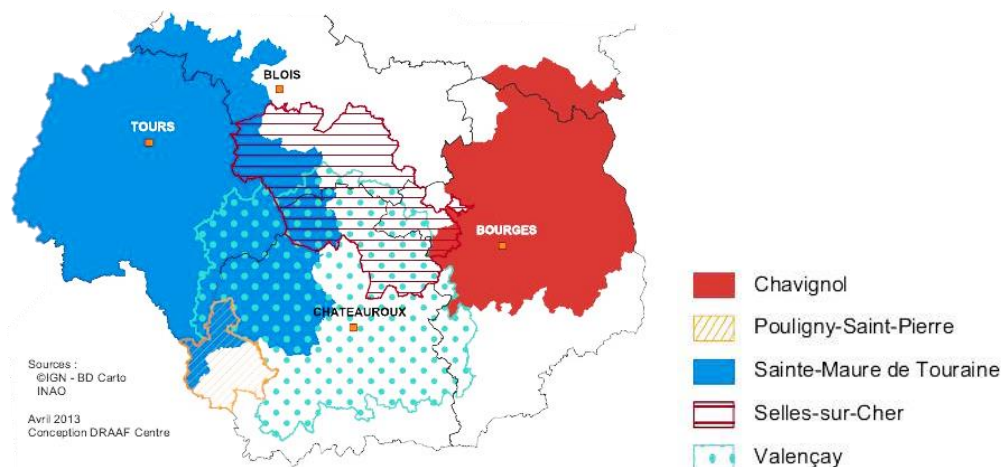


Figure 2 : PDOs' areas mapped in CVL Region, source (CRACVL, n.d.)

The PDOs succeeded to reflate their sector after the 2009's crisis. Indeed the number of animals and the volume of the production increased these last years (Interbev, 2016).

1.3.2. Trèfle du Perche

The Region has a sixth cheese currently climbing the steps to obtain a PGI certification. For now this cheese profits from a CCP (Product Conformity Certificate). This cheese has been created by a group of goat farmers circa 20 years ago. They are driven by the desire of obtaining recognition for their territory (Perche) as having a tradition in goat farming. This cheese can only be produced by cheese-maker farmers. The shape they choose – a four leaves clover – is from a tin that has been rediscovered in a museum of the region (Legendre, 2013). The Trèfle-du-Perche is described in Appendix 3.

2. Material & Methods

2.1. Data collection

The mean to collect data is an inquiry. Interviewers are field staff from Agriculture Chambers or from Dairy Council Organisms. Interviewees are farmers or sometimes farm employees knowing well the farm system.

2.1.1. Targeted population

The population concerned by the survey is the entire set of farms having fifty or more animals (goats) aged of at least six months at the date of 1st January 2016 and being situated in CVL Region, France. The list of farmers has been collected from the CNIL, the French body protecting personal data.

The limit of fifty animals has been determined by the steering committee (COPIL), the assembly gathering stakeholders of the caprine system. This limit aims to investigate only farms having a caprine production of professional size and thus having a real impact on the regional system.

Since the project wants to look at the milk production, the limit of age avoids to take into account farms specialised in fattening young goats for meat.

A sample of 55% of this population is selected randomly (draw without replacement) in the population stratified by department (Table 1).

Table 1: Repartition of the population sampled, source COPIL, updated 08/01/2016
NB = number, OBJ = objectives, INQ = inquiry

DEPARTMENT	NB FARMS	%REGION	OBJ INQ (55%)	NB INQ DONE	%OBJ
18 – CHER	123	23.4%	68	61	89.71%
28 – EURE-ET-LOIR	7	1.3%	4	3	75.00%
36 – INDRE	170	32.4%	94	69	73.40%
37 – INDRE-ET-LOIRE	140	26.7%	77	71	92.21%
41 – LOIR-ET-CHER	55	10.5%	30 (55)	47	100.00%
45 – LOIRET	30	5.7%	17	17	100.00%
TOTAL REGION	525	100%	290	268	86.55%

Loir-et-Cher department choose to investigate 100% of dairy goat farms (more than fifty animals aged of at least six months). Only 30 farms (randomly selected) are used for regional analysis (regional total = 251 farms), but the whole set of farms for departmental analysis (Loir-et-Cher total = 47 farms).

2.1.2. Sample representability

268 farms have been surveyed, including 251 for the regional sample. It represents 48% of the total defined population. The sample is representative in terms of repartition between departments (Figure 3). χ^2 test: p.value = 0,288.

2.1.3. The survey

Development

The first draft of the survey has been drawn by the steering committee in mid-February and is based on other inquiries realised previously on cattle-rearing sector. Questions have been adapted to goat farming and improved.

In order to test the robustness of the survey, 6 trials have been conducted in Loir-et-Cher and Indre departments. These tests and feed-backs given by the interviewers led to the ninth and finale version.

Structure

The final survey gathers questions split into nineteen categories: Information allowing answering to the first research question (What is the current state of goat farming systems in Centre-Val de Loire Region?) have been collected through the following parts:

- General information on the farm
- Farming activities
- Surfaces
- Goat flock and milk production*
- Feeding and self-sufficiency
- Quality labels and other specifications*
- Workforce and work organization*
- Production tools : Automation and computerization of facilities
- The farm and its natural and structural environment
- Production tools : Milking setups*

The second research question (How are going to evolve goat farming systems by 2020?) has used elements from categories introduced thereafter:

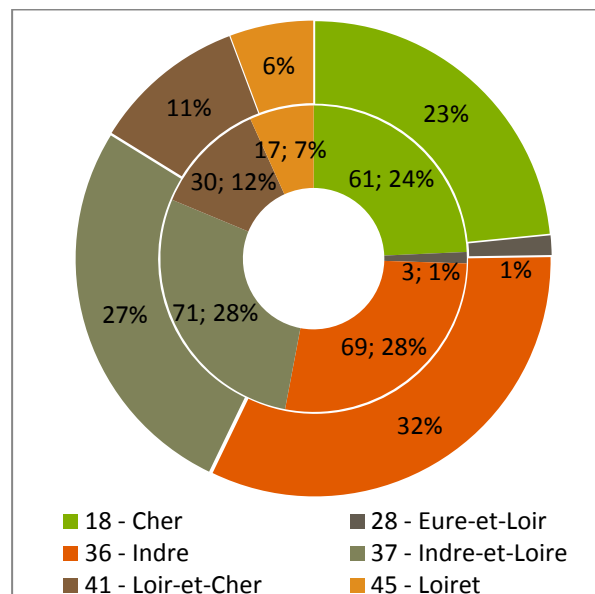


Figure 3 : Farm repartition between departments. External circle: global population, internal circle: sample inquired (size; percentage).

- Goat flock and milk production*
- Farm future*
- The farm pass down*
- Risk perception
- To go further...

The third research question (What are the existing elements in goat farming systems that can be used as levers to develop and sustain the goat business in Centre-Val de Loire Region?) has been addressed through the categories below:

- Workforce and work organization*
- Farm future
- Quality labels and other specifications*
- Support, other activities and link with partners
- Goat flock and milk production*
- Production tools : Cheese factory*

Categories that are describing facilities existing on farm are simply presented in Appendices. These results are useful for the steering committee to plan funds that will be available in the next Cape. In the appendices are also found additional details from categories already quoted above.

- Production tools : Goat barn
- Production tools : Feeding storage
- Production tools : Milking setups*
- Production tools : Cheese factory*
- Production tools : Effluent storage facilitation
- The income

*categories used in different part of the report

The survey is mainly composed of closed questions what allows a simpler statistic treatment. These questions are either quantitative (What is the volume of milk produced in 2015?) or qualitative: Yes/No questions (Do you practice artificial inseminations?) or multiple choice question (Do you work with the Agriculture Chamber often, regularly, sometimes or never?).

2.1.4. The interview

Each department is responsible to conduct interviews on its own territory by providing enough staff and by organizing the work schedule.

Each field staff member got training on the content of the interview and participated to a workshop to learn how to lead an interview.

The interview, with duration of two hours is printed on paper and is conducted on farm.

2.1.5. Data base

As interviews are processed, fulfilled survey files are centralized and data are registered into an excel table.

2.2. Analysis

The tool used to do descriptive analysis is excel and Xlstat for statistical analysis and multi-factor analysis.

2.2.1. Sorting criteria

Analyses are conducted at several territory scales: the Region, the departments, the PDOs. This enables to deal with the complexity of the territory and the different realities such as economies, policies, and environments, but also with requests from the various stakeholders. Analyses are conducted by system too (dairy, cheese-maker and mixed farms).

Region is the main scale on which the analyses are focusing on. All points addressed in the survey are detailed at this scale. If a smaller area is facing a particular challenge, zooms are done.

Because goat farming is a marginal production in Eure-et-Loir and Loiret, and because these two departments are situated in the same geographical area with similar agricultural productions (mainly cereals crops), their data are analysed together.

Analyses at PDOs scale are taking into account only farms labelled. PDOs area can overlap each other's but also departmental limits.

2.2.2. Method to analyse opened and explorative questions

Similar answers/ideas have been gathered into the same variable to quantify them. For instance when asked for how they would like to see the regional goat sector evolve by 2020, many farmers answered setup new/maintain small/medium goat systems/family-farming/human-size-farms. These answers are grouped into the same variable. Reasons expressed for this wish have been recorded in qualitative way. Looking at information given through the survey it has been possible to determine what a 'small/medium goat farming system' is for these farmers.

2.2.3. Method to analyse closed questions

In order to analyse data and to cross variables, pivot tables have been used. To check if they are significant, different statistical tests have been used either on pivot tables or on raw data.

These tests can be linear regression, ANOVA, correspondence analysis or test on contingency tables.

2.3. Handled documents

Results for the COPIL have been returned through an oral presentation where the steering committee plus interviewers were gathered. A power point document summarizing the results and a synthesis table with leading indicators has been sent to concerned people. A written document with detailed results has also been returned to the Regional Agriculture Chamber of Centre-Val de Loire.

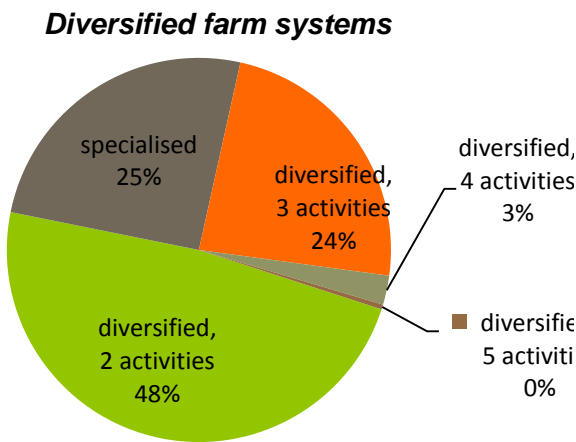
Farmers having participated in the study will get a return during the autumn 2016 through a four pages flyer.

3. Results

3.1. What is the current state of goat farming systems in Centre-Val de Loire Region?

This first part aims to give the picture of goat farms systems in Centre-Val de Loire Region. Four themes are addressed here: first the main lines of the farm system: diversification, production's systems, surfaces, feed production and the flock; second, a point on age of head-farmers and production volumes associated to them; third, a focus on human resources; and fourth, a point on automation and computerization of farm systems.

3.1.1. Goat farms picture



As shown in Figure 4, 75% of goat farms are diversified with at least two activities and 25% of farms are specialised on the goat activity (either dairy farms or cheese-maker farms). Only activities generating a part of the turnover are considered.

In 2010, about 45% (2/3 of regional flock) of goat farms were specialised (DRAAF in (Interbev, 2016)).

Figure 4 : Diversification of farming systems

Despite the fact that the number of specialised goat farms increased between 2000 and 2010 (Agreste, 2013), today their proportion is reduced to 25% (1/4 of regional flock). These farms seem to have been more sensitive to the crisis that occurred on the period 2009-2011. Maintaining diversified farming systems in the goat sector appears to be a pledge for the sector resiliency.

It exists some differences at the departmental level (Marascuilo procedure, χ^2 : $p.value < \alpha_{0,05}$). Indeed Cher Department is more diversified than others with 44% of farms having three activities. Departments Indre and Indre-et-Loire have a majority of 60% of farms with two activities.

The two more frequent activities to complement goat farming are cash crops (62% of diversified farms) and cattle rearing (22% of diversified farms). 19% of diversified farms have also a system associating goats with cash crops and cattle rearing (3 activities).

In farms producing cash crops, this activity participates for 33% of the turnover (Figure 5). 25% of these farms have for main activity cropping and for secondary activity goat farming. In farms rearing cattle, this activity generates in average 28% of the turnover (Figure 6).

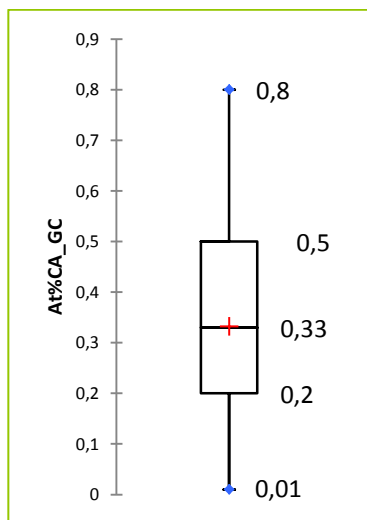


Figure 5 : Boxplot, estimated turnover associated to cash crops

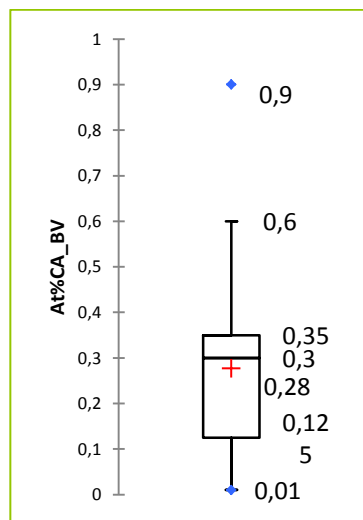


Figure 6 : Boxplot, estimated turnover associated to cattle rearing

Other activities such as sheep, dairy cows or poultry can also be found on goat farms. There are very few non-agricultural activities on farms. 4% of them do agrotourism and some have photovoltaic (5 farms) or methanation (2 farms) projects.

Three strategies concerning the milk production

53% of inquired farms are in a dairy system (delivery of milk to dairy industry), 32% in cheese-maker systems (on farm processing of milk into cheese) and 15% in mixed system. In term of volume 60% of the milk produced is delivered to dairy industries and 40% is processed on farm.

Depending of departments profiles can vary. Cher, Indre and Indre-et-Loire departments have more of 50% of farms in dairy systems and Loir-et-Cher and Loiret/Eure-et-Loir departments have more than 60% of their farms in cheese-maker systems.

Farm surfaces tend to increase

On average the farms size is of 100 hectares of UAA⁵. Cheese-maker systems are smaller (72ha) and dairy systems are larger (114ha), (Linear regression, Pvalue <0,0001). Also more diversified the system is, more the farm surfaces are larger (Linear regression, Pvalue <0,0001). Specialised systems make in average 42 hectares.

The tendency is to larger farms. Younger the farmers are, larger the surfaces are (Linear regression, Pvalue <0,0001). Indeed young farmers are more frequently settled in farms with a

⁵ UAA = Usable Agricultural Area

societal juridical status. And farms with more associates are larger and more diversified than others (See p.29).

The total forage area on farms is about 41 ha (all activities) and the total feeding area for goats only (forages and cereals) is about 29 ha.

When asked for assets and constraints linked to plots used for the goat activity (Appendix 4), 9% of farmers said they had no asset. Some also responded 'I don't know'. Does this reflect a need to work more often in partnership with crop and husbandry consultants to identify crops that are both relevant to the plots available and nutritionally interesting?

The goat flock

In 2014 the regional flock was of circa 99,000 goats (ANICAP, 2014). It represents 11% of the national flock. The CVL Region is ranked 4th in number of goats on the five main goat French regions. Among farms interviewed 50% of farms have between 95 and 240 goats in production and the regional average is of 197 goats. There is no major disparity between departments in term of flock size (Figure 7).

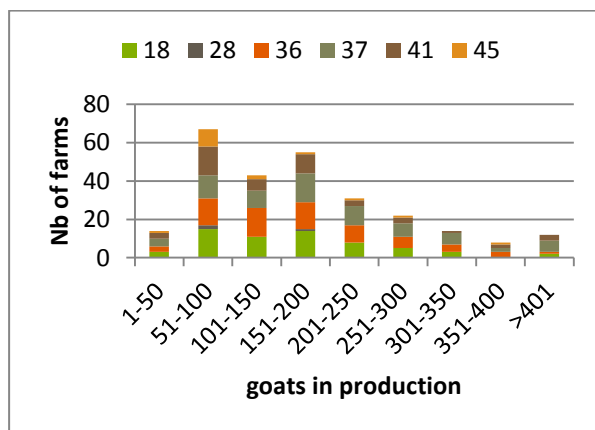


Figure 7 : Number of goats in production per department

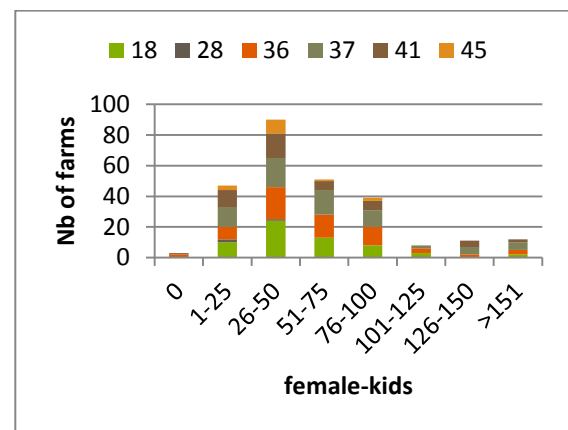


Figure 8 : Number of female-kid per farm and per department for renewal

On average there is one female-kid for 3.44 goats in production. This number varies from 1 kid per goat to 1 kid for 15 goats. The median size of female-kids' flock raised on farm is 50 animals. 50% of farms have between 30 and 80 female-kids for renewal (Figure 8). Note that some farms raise little or no female-kids to renew their flock, either for sake of efficiency, or by lack of space. This has the advantage to delegate a delicate work. However it asks to carefully manage the arrival of animals to acclimatize them to their new environment (bacterial biotope among others) and to prevent the import of sanitary problems.

The average herd size in cheese-maker systems is smaller than those in dairy systems in all departments. But mixed farms have even larger herds than dairy systems in the Cher, Indre-et-Loire and Loir-et-Cher departments.

57% of farms practice the out-of-season breeding (shift of births period in time). The livestock adopts two profiles there. Either 75% of these farms shift the period for over 40% of the herd. This strategy allows a continue lactation throughout the year. Or the entire herd is shifted: 1/4 of farms shift 100% of their flock (Figure 9).

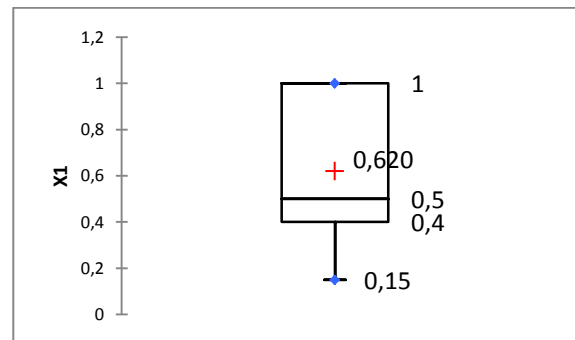


Figure 9 : Boxplot, part of shifted birth among the flock

Cheese-maker systems practice less frequently the out-of-season breeding (37% of farms) than other systems (65% of dairy systems and 76% of mixed systems). This out-of-season breeding allows dairy industry to have more steady supplies. Also the price of milk paid to farmers during the lean season is higher than in high season. However the lean season is often the period preferred by farmers to take holidays, what is not anymore possible with the out-of-season breeding.

Note that some farms perform long lactation, but this data has not been quantified. It would be interesting to collect this data in future studies.

37% of farms perform artificial inseminations. These farms produce significantly more milk on average per year: +116L (ANOVA, p.value <0.001). Cheese-maker systems practice artificial inseminations less frequently than other systems (21% of cheese-maker farms, 42% of dairy systems, 51% of mixed systems).

The use of ultrasounds is very common on farms to follow the evolution of gestation (81% of farms). Once again cheese-maker systems have less adopted this practice. 69% of these farms use ultrasounds against 84% of dairy systems and 90% of mixed systems.

These differences between systems may be explained by the fact that cheese-maker systems are more frequently out of the goat sector frame. They are followed by counselling organisms less frequently than other systems (44% of cheese-maker farms, versus 57% of dairy systems) and they sale their products directly to the consumer (B2C) and not to a professional (B2B). Their objectives might also be different, more focused on the cheese processing than on milk production.

In appendices can be found: elements on cheese processing (Appendix 9) and on goat and female-kid barns, storage building, milking room and its equipment (Appendix 10).

Feed self-sufficiency

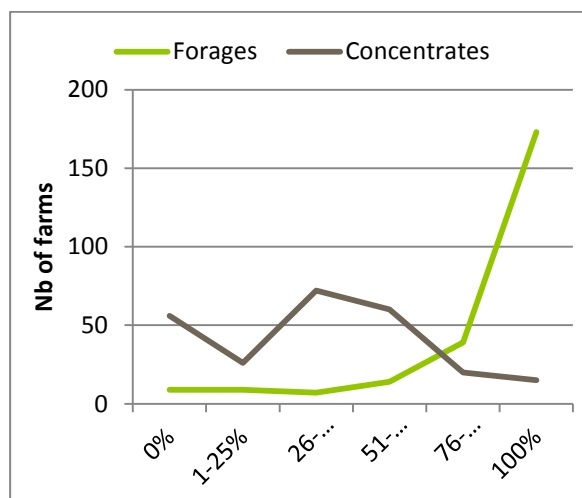


Figure 10 : % of feed self-produced in the ration

95% of farms produce themselves a part of forages and/or concentrates they need to feed goats. 2% are completely self-sufficient. 66% are self-sufficient in forages and 3% in concentrates. 5% of farms are completely relying on external supplies to feed goats.

A way to improve the quantity of feedstuff produced on farm, and so improving the self-sufficiency is to increase yields with for instance use of varietal mix (used today by less than 5% of farmers), but also by

identifying crop varieties better adapted to soils and climate.

Self-sufficiency can also be seen at a larger scale: the territory with for instance deals between neighbours. But this kind of practice has not been explored.

CEREL project (exchange between crop farmers and animal breeders) could be improved with an internet platform allowing connecting farmers between them. Thus they could offer their productions or by-products for exchange or sale. To make successful such a tool, two elements are needed: a group of enthusiastic farmers to test the tool (primary users) and communication to develop the user community.

Milk production today

Centre-Val de Loire Region is the third largest French region (after Poitou-Charentes and Pays de La Loire) for the production of goat milk (collected volume) with 10% of the national collect (CRIEL Caprin du Centre, 2011).

96% of farms milk their flock twice a day. Those who milk only once a day are mostly in cheese-maker systems.

31% of farms stop completely milking for the drying period for an average of 56.9 days (min = 15 days, max = 95 days, 50% of farms between 45 and 60 days). Note that in dry period some farms prefer to switch to mono-milking. This data has not been quantified.

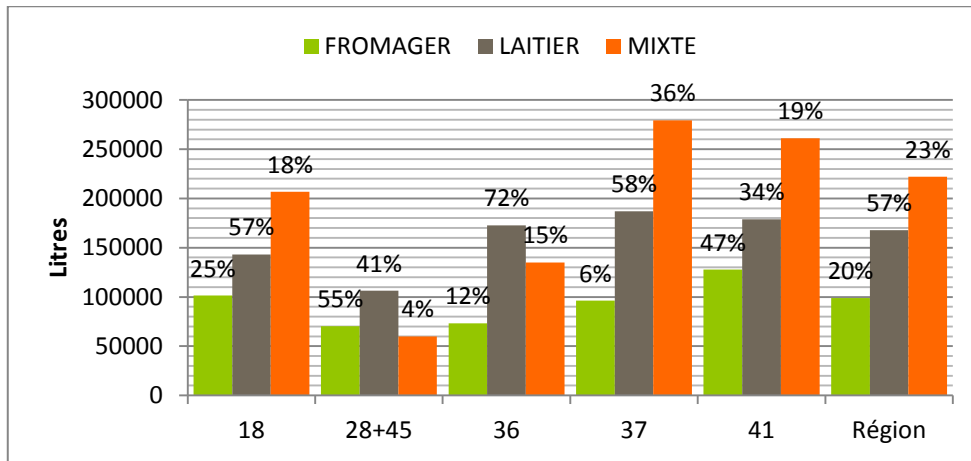


Figure 11 : Average litres produced yearly par farm and per system

% = percentage of the total volume produced per department and associated to each system (green = cheese-maker systems, grey = dairy systems, orange = mixed systems)

In cheese-maker systems, the average litres produced annually is lower than in other systems (Figure 11). This can be explained primarily by the fact that the amount of milk produced is limited by the available labour force for daily processing (time). So flocks are smaller. Moreover, the added value is being kept on farms (transformation + marketing), so farms need less milk yield to be profitable.

Although the average volume of milk produced per goat at the peak of lactation is lower than in other systems (3.3L vs 3.5L for other systems), this difference was not statistically significant.

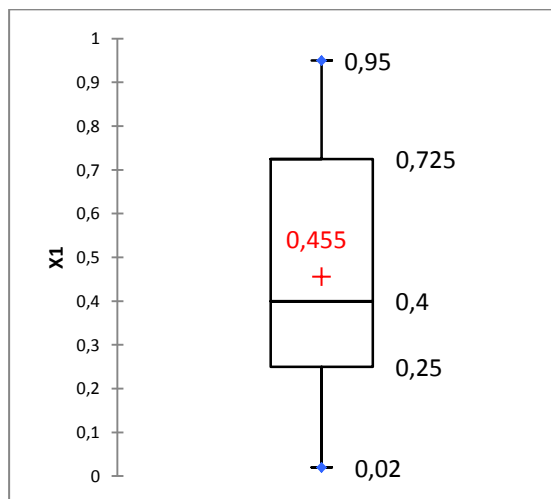


Figure 12 : Part of milk delivered to dairy industries in mixed systems

The total volume of milk produced in mixed systems is regionally more important than the volume produced in dairy systems (Figure 12). On average the milk delivered represents 45.5% of the volume produced. This means that more than half of the production is processed on farm. In matter of volume, it is roughly equivalent to the volume processed by cheese-maker systems (volumes processed uncorrelated to the system, ANOVA Pr = 0.980).

Average ration of a goat at the lactation peak comprises 1238g concentrates. Meanwhile the average volume produced by goat is 3.44 liters.

This point cloud (Figure 13) clearly shows that the amount milk produced at the peak of lactation tops out at 4.5 liters per goat, even if the amount of concentrates in the diet is increased.

Performances of farms have a leeway in the establishment of the daily ration. It could be adjusted to have the concentrates better absorbed by animals.

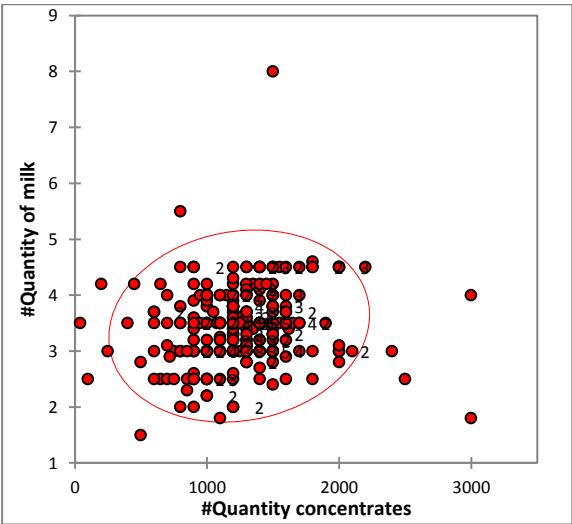


Figure 13 : Quantity of milk produced at the lactation peak as a function of the quantity of concentrates in feeding. Confidence ellipse

PDOs and Trèfle du Perche today

84% of farms regionally surveyed are in a PDO territory. The volume of milk labelled in PDOs represents 80% of the volume of milk produced in the region.

Depending of departments from 59 to 100% of farms surveyed are in PDO area. It is a real asset for them (Figure 14).

Trèfle-du-Perche although not yet recognized as a PGI, could be a major asset to boost farming in Eure-et-Loir and to increase the diversity of production in this region rather focused on cereals.

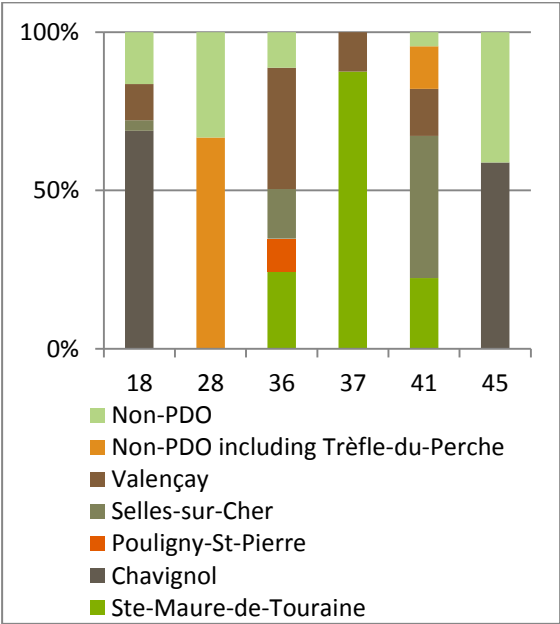


Figure 14 : Percentage of farms in PDO territory in each department

As highlighted by a farmer, the PGI would be a lever to reinforce the Perche area attractiveness, and especially to include new farmers in the development of the local sector.

Indeed, playing on the particular history of Trèfle-du-Perche and on the willingness of local farmers to create an original business by themselves, there would be an opportunity to attract a particular profile of young farmers and thus stand out from the rest of the regional sector.

Back to the PDOs, we can highlight some disparities existing between them (Table 2 & Table 3). It can be in terms of size of the territory. Thus, the Sainte-Maure-de-Touraine has the largest PDO territory (number of municipalities) and it reflects on the number of members and on the volume of milk produced (more than half the PDO milk in the region).

Table 2 : Farms in PDO area and membership
*volumes of farms member to several PDOs are counted several time

	Nb of communes	Farms surveyed in PDO area	Farms surveyed members PDO	% farms members PDO	Including member to several PDOs	% Vol* PDO/ TotPDO
Ste-Maure de-T.	415	113	73	64,6%	14%	51%
Valençay	228	71	31	43,6%	48%	13%
Chavignol	187	52	48	92,3%	/	20%
Selles/C.	137	50	39	78%	32%	16%
Poulligny-St-P..	22	12	10	83,3%	/	7%
Trèfle du P.	225	11	7	63,6%	9%	/

Table 3 : Potential of growth of the number of member

	Farms surveyed in PDO area	%Farms non members but other PDO	%Farms non PDO	Including doing cheese-processing
Ste-Maure de-T.	113	23,9%	11,5%	75%
Valençay	71	39,4	16,9%	58%
Chavignol	52	/	7,7%	75%
Selles/C.	50	6%	16%	85,7%
Poulligny-St-P..	12	/	16,6%	0%
Trèfle du P.	11	0%	36,4%	80%

Disparities can also be in terms of rate of membership to the PDO. According to this criterion, the Chavignol is the one federating the most of farms around its PDO.

In terms of number of farms members to their PDO, the Valençay, the Selles-sur-Cher and the Poulligny-Saint-Pierre are those having the most growth potential with more than 16% of goat farms in their territories being members of no PDO.

PDO territories of Sainte-Maure-de-Touraine, Valençay and Selles-sur-Cher are overlapping; subsequently some farms have seized the opportunity to join two or three PDOs, what is strength to diversify products on the market.

However, some farms are not members of the PDO, for reasons shown in Figure 15.

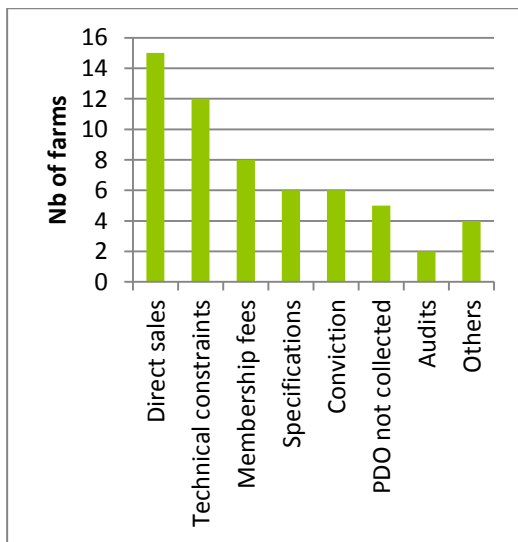


Figure 15 : Reasons why farmers have no membership to PDO

Farms members to no PDO are for 2/3 cheese-maker systems. They are not members for two main reasons: firstly they already have a good valuation of their cheeses in direct sale, and secondly customers do not ask for the PDO.

The last 1/3 is in dairy systems. Most of them are working with a dairy that does not collect the PDO.

Some farms are members to only one PDO while they have the opportunity to join several. Reasons pushed forward are the price of the subscription or a request from the dairy industry for a specific PDO. Cheese-maker systems may also take this decision for efficiency and ease of working during processing.

To increase the rate of PDO membership, a partnership could be found between PDOs sharing the same territory (Valençay, Selles-sur-Cher and Sainte-Maure de Touraine) to reduce the over-cost linked to the membership to several PDOs.

PDO's syndicates and their members would like to see all cheese-maker farmers join their PDO. Indeed a part of them processes cheeses looking a lot like PDO's cheeses but not having the certification, this creates competition with PDOs and confusion among consumers. To bring cheese-maker systems to join to the PDO it would be needed to convince their customers they want to buy PDO cheese and not only a local cheese.

Only 4 farms in PDO territory over the 29 non-members expressed an interest in labeling.

Goat milk production out of PDOs territories

45 farms (16% of surveyed farms) are situated outside PDOs area. In average their flocks are smaller than in PDOs areas (158 goats versus 197 goats). 56% of them are in cheese-maker systems, 33% in dairy systems, and 11% in mixed systems. These systems are less diversified than the average since 40% of these farms are specialized, whatever the system of production chosen.

55% of the milk produced in these areas is processed on-farms. None of these cheeses are sold to a refiner. All the farms producing cheeses sell them on weekly markets or in on-farm shops.

3.1.2. Goat farmers, age & volumes, a stable sector in perspective

Age pyramid and volumes associated

The mean age of head-farmers and associates (HFA) interviewed is 45 years old.

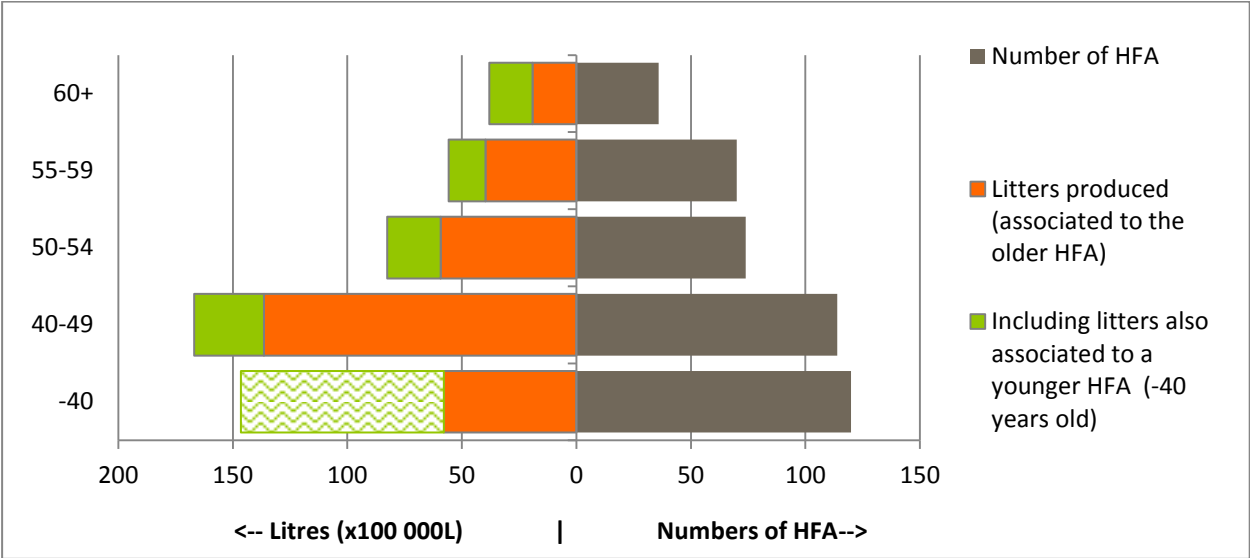


Figure 16 : Head-Farmers and Associates' (HFA) age and milk litres related

The regional age structure (Figure 16) shows that the younger generation of farmers (<40 years old) is numerous enough to renew the 40-49 years old's generation with a time step of 10 years. However the 40-49 years old generation is not numerous enough to replace the >50 years old's generation.

The volume produced by these three generations (<40, 40-50 and >50 years old) is equivalent. This means the volume produced should be maintained. Nevertheless it is important to keep in mind that in some farms with several associates, the younger farmer does not plan to maintain the goat activity after the retirement of the older one. The question of the volume evolution is addressed in a more detailed way at the point 3.2.1.

On one hand, the average age of goat HFA is today 45 years old, while it was 42 years old⁶ in 2007 (ROSACE, 2007). Goat farmers are getting older and the goat sector lacks of farmers in the middle of their career. Added to the decreasing number of farms (it has been divided by 2

⁶ There is no source available with the exact same sampling method, however several sources presented an average age lower a decade ago.

between 2000 and 2010) (DRAAF in (Interbev, 2016), it shows that the goat sector is losing farmers. This is particularly true in Loiret/Eure-et-Loir departments and for the Valençay PDO.

On the other hand the number of young farmers (<40 years old) is sufficient enough to renew the 40-49 years old's generation with a step time of ten years. This positive element means the efforts to set up new farmers show results. Which action can be undertaken to pursue in this path?

The regional analysis can be applied to most of the departments and PDOs. However Indre Department should have a heightened vigilance on young farmer's setups since the <40 years old are lesser than the 40-49. This is also true in *Trèfle du Perche* area.

These two areas need to reinforce the attractiveness for their territory to insure their future. Specific grants from the future Cape could be allowed to these territories.

Young farmers more frequently in societal farms

As shown in Figure 17, younger farmers are more often set up with other farmers (Linear regression, <0.0001). In farms with at least three associates, younger farmers are less than 45 years old.

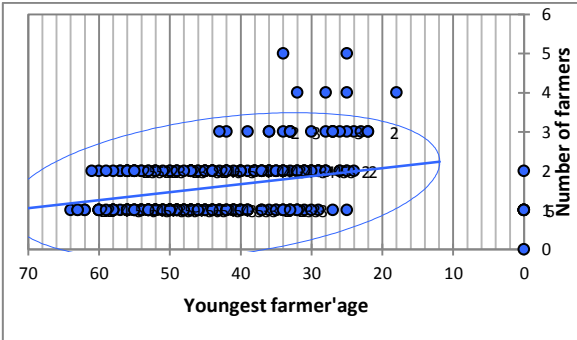


Figure 17 : Age of the youngest farmer in function of the number of farmers

The choice of creating a farm with several partners can be explained in two ways. They shaped a farm with partners (other than spouse) to have a better work organization and being able to free time for themselves. Or they are associated with their parents (transmission phase).

3.1.3. Human resources

Labour force on farm

On average there are 2.7 full-time equivalents (FTE) on farm, including 1.9 FTE dedicated to the goat activity (Figure 18). Systems with cheese processing have more labour force (2.6 FTE) than dairy systems (1.3 FTE).

The number of head farmers varies. 1/3 of farms have only one head-farmer and 1/2 have two associates. The number of associates can go up to five.

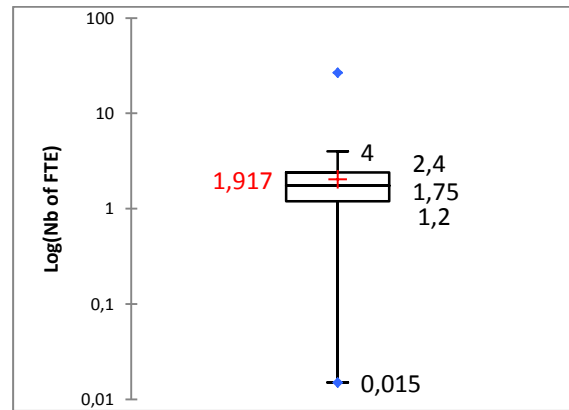


Figure 18 : Boxplot, FTE dedicated to the goat activity

Place of volunteering

50% of farms have a labour force partially relying on volunteers. The number of volunteers varies from 1 to 3 in these farms. These people are the parents in 40% of the cases and other member of the family in most of other cases. In equal proportion, cheese-maker systems are those benefitting most often of volunteers (1/3 of cheese-maker farms).

The place of volunteers in goat farming systems is important in half of farms; how to be prepared to the reduction of this category of labour force (see point 3.2.3, p.37)?

Skills sharing among labour force

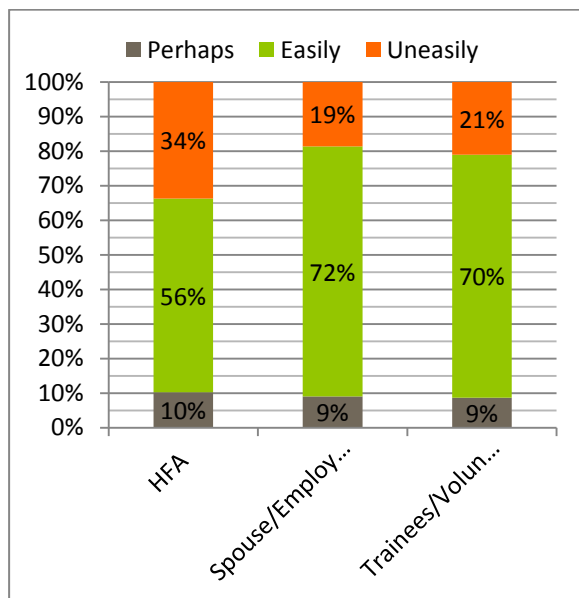


Figure 19: Do people working on farm can easily be replaced by another?

34% of head farmers and associates are hardly replaceable and 2/3 of them do not have any associate at all. These HFA are often the only people to have skills to manage the farm (administrative or accountancy for instance) and to take care of the crop activity (or forage production). They are also the people milking the flock the most often (Appendix 5). In case they can't work, they need to call out for external people to ensure the proper functioning of the farm.

1/5th of the other people working on farm are uneasily replaceable in-farm. Among the category Spouse/Employees, 37% of uneasily replaceable people are taking care of the cheese-processing (Appendix 5).

In order to have a more resilient system in term of skills sharing, some areas of expertise that need to be deepened have been identified. They are economy, administrative management, flock feeding, forage production, animal care, work organisation, and milking and milk quality.

Farmers face difficulties to hire labour force

The means to hire part time replacement labour force are detailed in Appendix 6.

61% of farms need or regularly look for employees. Among these farms 58% have difficulties in hiring. Two problems stand out especially. The first is the financial cost / or high social costs engendered by hiring a person. The second is the operational / skills of the available workforce when it arrives on the farm.

Other difficulties in hiring, less cited but no less important are the lack of interest /motivation that potential workers have for this kind of job, the timetables imposed by a milking/breeding activity (work early morning and late evening with a gap in the day) and the lack of people specialized in goats on the labor market.

Whatever the type of work proposed (replacement service, employer group, seasonal) one of the main obstacles is the financial cost (Appendix 6). Is it a brake based or an a priori? Is the value created by the labor of one more person on farms would not cover the financial costs of a hiring, especially if the job is shared?

3.1.4. Automation and computerization of facilities

Feeding of animals

The distribution of fodder in stalls is done manually for 76% of farms. The mechanized farms (23%) are using a wide range of machines. A very interesting system consists in daily harvesting of “the green” in a plot and to bring it straight to the barn for animals.

The concentrates supply in stalls (92% of farms) is done manually for 54% of farms. The mechanized farms (12%) use a variety of materials, the most common is a machine allowing mixing the different foodstuffs (29%). Automated farms (26%) use for 67% of them a feed-car.

7.5% of farms do concentrates distribution only in the milking parlor. 85% of them manually, the remaining farms are mechanized.

In total 61% of farms have a distribution in the milking parlor. This is often a complement to what is distributed in stables or a way to keep goats occupied during the milking. This

distribution is done by hand for 49% of farms. 7% of farms have a mechanized distribution (type endless screw or distributor) and 4% an automated distribution (automatic concentrates' distributor or rotational milking parlor). Some farms do not distribute concentrates neither in milking parlor, neither in barn.

Expand mechanization and automation of feeding seems to be necessary on goat farms, especially as the adult feeding is judged to be a heavy task by almost 40% of farmers and a burdensome by more than half of them (see Appendix 13).

Milking of animals

Many milking systems are available on the market and since this activity is done twice a day, the choice of adequate milking facilities is important.

Systems with two milking platforms are more efficient than systems with only one. Some systems have three platforms and their results are greater than those with two. However there are not enough farms equipped with such system to statically compare it.

The two other elements influencing the most the time spent to milk are: the number of milking posts available (higher the number of posts, faster the milking is) and the presence of a cleaning unit (automatic washing of the milking parlor). Be equipped with a cleaning unit and an adequate number of milking posts from the beginning seems so paramount.

Other devices are available to reduce time spent for milking including automatic release, high pipe lines and systems to make entry and/or exit in the parlor faster. Details about them can be found in the second part of Appendix 10.

Computerization

95.5% of farms have an internet access.

26% of farms have software to manage surfaces. 45% of these farms use the MesParcelles software (offered by Agriculture Chambers). However there is a wide variety of software, indeed those used by farmers include 18 different softwares. The main competitor is ISAGRI company software's.

27% of farmers use software to manage the goat herd. 68% of them use CapLait (also offered by Agriculture Chambers) and 17% use IsaLait (ISAGRI software's). 6 different softwares have been identified.

26% of farmers are considering using the electronic ID (earring). Today any animal must be identified with such device but few farms are using the chip it contains. *[Warning, some of these farmers are already using it, and others who use it have not answered this question].* They

would use it for the milking parlor (41% of them) or with a portable chip reader (30%). Some breeders have noticed that chips used do not hold on to the animals and are costly. This is a major obstacle to their widespread use.

3.2. How are going to evolve goat farming systems by 2020?

This part aims to highlight the evolution of goat systems on four themes: the evolution of milk volumes at the regional and departmental scale, the evolution of volumes on each PDO, the evolution of labour force on farm and the passing-on of farms.

3.2.1. An increase of milk production carried by dairy systems

The milk production evolution is a major source of questioning for the whole set of stakeholders in the goat sector in Centre-Val de Loire. It impacts strategies in dairy industries, needs from farmers for counselling or investments, the management of farms, the communication on PDOs products and most of all the equilibrium of the system at the regional level.

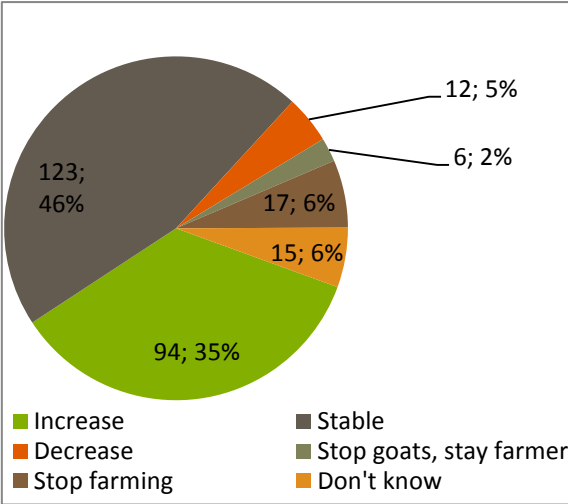


Figure 20 : Wished evolution of litres on goat farms by 2020 (size; part)

81% of farms wish to maintain or to increase the volume of milk produced on their farm (Figure 20). According to the stated objectives by farmers, it will result by a raise of 19% of the volume at the regional scale (Table 4). Whether at the departmental level or at the PDO level, milk volumes will increase too (from 10 to 26%). In term of on-farm cheese processing it will be regionally maintained. However in Cher department and in Eure-et-Loir/Loiret departments the volume of on farm-made cheese will decrease.

However these numbers have to be analyzed carefully because on one hand they reflect goals of farmers and their maturing may not be 2020 and on the other hand they does not take into account external shocks such as economy, climatic events or labor force issues.

**Table 4 : Planned evolution of milk volumes by department and system
(ratio vol 2020/ vol2015)**

Syst\Dep	18	28 + 45	36	37	41	Region
Dairy	1,25	1,05	1,27	1,12	1,29	1,22
Cheese-maker	0,80	0,97	1,11	1,10	1,19	1,05
Mix	1,18	1,23	1,25	1,21	1,20	1,22
All	1,11	1,1	1,24	1,13	1,26	1,19

Increasing the volume

35% of farms have the objective of increasing their milk production. In average the volume will rise of 70% in these farms. But there are strong disparities between these objectives: ¼ of these farms wish to increase the volume from 10 to 20%, ¼ from 20 to 40%, ¼ from 40 to 90% and ¼ for more than 90%. Among these farms, 60% percent are in dairy systems, 28% in cheese-maker systems and 12% in mixed systems.

Reasons

They are four reasons explaining why farmers want to increase their production. The main one is the improvement in profitability (52%). Here we must wear a point of vigilance on chosen levers and their impact on operating costs.

The second one is the inclusion of a new associate or employee (30%), Indeed in order to free up time to work and hire or integrate someone, these farms need to increase production for both creating a position with a full-time job and to generate of higher turnover and being able to pay the employee and cover related expenses.

The third reason is the opportunity on the market (29%), and more especially an actual offer below the demand. The focus of attention here is on the stability of this demand in time: on which products it is focused and how it will be met. Indeed sales growth in industrial goat cheese comes mainly from the market segment 'bûchette' (cylindrical goat cheese). In France in 2015, this segment grew by +10% compared to the previous year, what represents 2/3 of the growth. And it is on this segment that are positioned low price references that are particularly popular, yet it is these references that are first affected when production declines (Livestock Institute (b), 2016).

About regional PDO's cheeses and the evolution of their sales in super- and hypermarkets, results are mixed. The Chavignol experienced the largest increase (+11%) followed by the Selles-sur-Cher (+ 6%) and the Sainte-Maure de Touraine (+5%). Farmers of these three PDOs have therefore a market opportunity as long as the demand remains stable. As against the

Valençay and Pouligny-Saint-Pierre saw sales regressed (respectively -8% and -7%) (Livestock Institute (b), 2016). Increase production in these two territories would regain dynamism and boost consumption of these products. Maintain in the next Cape an objective of communication toward consumers would help develop sales. Television advertisements have a broad audience, however they are costly and many of them are already showing (industrials) cheeses with a message of tradition. A good balance between costs and a large audience goes probably to radio commercials. Moreover there is very little communication on cheeses via this media.

The fourth reason why farmers want to increase the production is the use of the facilities available to their full potential (28% of farms).

Levers to increase production

Levers that will be used are the increase of productivity (29%), the growth of the flock size (23%) and a combination of the first two (48%). The use of such levers requires some points of attention. For productivity, the potential for improvement of livestock must be well evaluated and this improvement should not drive more charges. For example the use of more concentrates is not a guarantee for profitability or efficiency (see Figure 13), the animal does not necessarily have the genetics to value this extra food intake at best. Farmers who wish to act on the productivity of goats are autonomous in forages for 75% of them, but the autonomy in concentrates is much worse since half of them buy at least 50% of what they need for the ration.

The increase of the flock size requires to technically mastering a larger number of animals and being able to handle numerous small groups of goats. This mastery is necessary to avoid the decrease of productivity of each animal and so to avoid a lower profitability per head. A gradual increase of the flock may be wise.

A balance between economy of scale and the adjustment to requirements of each animal must be found.

Limits to the production growth

55% of farmers identified limits to their objectives. These limits concern the capacity of work tools: barn (54%), labor force (17%), and cheese workshop (11%). But these limits won't dissuade projects since 40.5% of these farmers have costed their project or have a quote ongoing.

49% of these farmers have less than 40 years and 34% have between 40 and 49 years. Thus the growth of production is mainly led by young and mature age farmers.

Decreasing the volume

5% of farms plan to decrease their production. In average the volume will decrease by 37% with 50% of objectives between 20 and 30%. Reasons evoked are the will to cut off of the work load (50%) or a change in the system (33%) with the creation of a cheese workshop or a conversion toward organic agriculture.

In average these farmers are aged of 48 years old. The decrease of production is therefore not especially linked to older farmers but reveals a real long term strategy for the farm system.

Stabilizing the volume

Farms wishing to maintain their current production in term of volumes represent 46% of the sample. Reasons the most evoked are the good functionality of the current system (31%), a present situation at its optimum (28%), and the preparation of the farm passing (20%).

These farmers cannot be distinguished by a particular age group or by a particular system.

Cessation of the goat activity

The reasons given for stopping the goat activity are for half the farms constraints related to work; regulation and environment; and for one third, the partner taking care of this activity retires. These farms are not distinguished by a particular profile.

Cessation of farming profession

Almost all farms (13 farms on 17) stopping their whole activities have their head-farmers ready to retire. The status of these transmissions is uncertain for 41%. At least half of these farms will have completely disappeared by 2020. Set up in priority new farmers on these farms would help maintain them.

3.2.2. Evolution in PDO areas

PDOs are of major importance in the region. 73% of farms are member to one, or more, of the five PDOs and they produce more than 80% of the regional goat milk volume. The production objectives expressed by farmers will result by an increasing milk volume in each PDO by 2020 (Table 5). The strongest increase of production will occur in Selles-sur-Cher (+31%) and in Sainte-Maure de Touraine (+12%) areas. At the national level, they are two of the most famous regional goat cheeses.

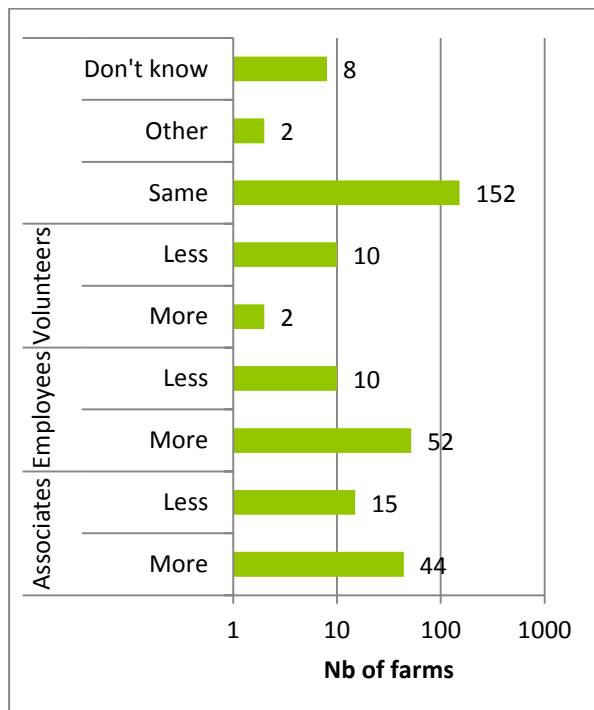
Table 5 : Milk volume evolution in PDOs by 2020

** these PDOs have overlapped territories*

	Evolution*
Ste-Maure-de-Touraine*	+12%
Crottin de Chavignol	+2%
Selles-sur-Cher*	+31%
Poulligny-St-Pierre	+5%
Valençay*	+5%
Trèfle du Perche	+5%

In 2015, and compared to the previous year, sales of PDOs in super- and hypermarkets are contrasted. Chavignol, Selles-sur-Cher and Sainte-Maure-de-Touraine increased by respectively +11%, +6% and +5% (Institut de l'élevage (b), 2016). Dairy industries, and so farmers, of these three PDOs benefit of a favourable market for their products. Valençay and Poulligny-St-Pierre decreased by respectively (-8% and -7%). Increase the production thereof would allow to increase their dynamism and to restore the consumption on these products. The role of dairy industries is important in this case since they are the link in supply chain able to decide either the milk can be processed into PDOs or downgrade it as regular milk, this to avoid prices drop.

3.2.3. Evolution of labour force



The majority of farms will have no changes among their workforce by 2020 (61%).

39% of farms are planning to increase it, mainly by increasing the number of employees. Among these farms, 1/3 has already begun his researches for labour force.

14% of farms will lose labour force (including 1/3 of volunteers). This decrease of the number of volunteers needs to be anticipated to figure out how will the systems be adjusted.

Figure 21 : Evolution of labour force by 2020

Farmers' counsellors should try to identify farms concerned and propose to build a reflection on this question because many farmers seem not to have thought about the impact of the change in labour force. To not bring major changes to the farming system, a promising approach would be the promotion of shared employments.

But how to find qualified employees and entrench the partnership? To get people to take the plunge and to maintain them on the territory an original offer could be proposed. Today many people are unemployed and are looking for a stable job and perspective of evolutions. Through a partnership between a group of farmers and an 'inter-communality' it might be possible to attract people by a package 'training + assured job + products benefits'. First a group of farmers organize themselves to create an offer for a full-time job on several farms of the same area. The offer will contain some advantages such as accessible housing (partnership with the inter-communality). Then the offer is communicated to an employment agency able to identify candidates. The selected candidate follows a short training period in a training center to acquire basic knowledge in agriculture and complete his formation of farms. This kind of project would ask an investment at the beginning (time and funds) but could be supported by Regional or Departmental Council. To make the partnership last in time, missions could be revised on a regular basis and strategic 'products benefits' identified.

Among the farms that want to integrate employees or associates, there are on average 3.3 people working on the farm, representing an average of 2,7FTE. The paid labour (employees and trainees) represents an average of 0.9 people on these farms. But there are great disparities between them since 54% of farms have no employee and contrariwise 21% have at least 2 employees.

3.2.4. Transfer of farms to younger farmers

Would farmers recommend the goat farmer profession?

78% of farmers would recommend the profession of goat farmers because it is a wonderful (24%), multitask (6%), and profitable (14%) profession. However, they nuanced their answer by saying that this profession requires motivation and must be a passion (22.5%). Many have advised to settle with associates (10.5%) and to master the added value through processing (8%) or direct sales. The goat sector has a future, market outlets and there is space on the territory for new farms (6%).

Breeders who do not recommend this business (18%) quote as main reasons the constraints (40%) and a time consuming job (17%) but nevertheless they nuance their answer by saying that this profession is a passion (15%) and that consequently the stresses become 'acceptable'.

A farmer tipped to have in the entourage one or more people able to take a fresh look at the farm. If these people do not know about farming and / or are familiar with other sectors (e.g. industry) their remarks will be even more rewarding.

Will farmers transfer their farm when they'll stop their activity?

82% of farmers want to transfer the farm so it can continue over time (34%) and not to lose the labor invested on the farm (14%). This must enable to maintain the sector and / or PDO (12.5%). 14% of these farmers want to pass their farm on to their children.

12% of farmers do not want / cannot transfer their farm. Reasons are: they want to conserve land and buildings (13%), they do not want to (13%) or their farm is let (13%) and therefore it is not something they control.

Farms passing

Are concerned farmers aged of 50 or more years old or farmers ceasing their activity soon. The detail per department and for each deadline is introduced at the Table 6.

Table 6: Scheduled transfer of farms per department

The green part of the table gathers farms that have not completed this part of the survey, but should have. The green part was developed from answers to other questions. These farms are not part of the analyses of the transmission part.

	18	28+45	36	37	41	Region
2016-2020	8	7	11	9	9	44
2021-2025	7	3	7	6	6	29
2026-2030	9		5	9	4	27
2031-2035	2		1	1		4
2014	1					1
Don't know	5	2	5	5	1	18
Age 50-55 years old	2		2		2	6
Have a younger associate	6		2	6	4	18
Done	1		1			2
Stop farming			1			1
TOTAL	41	12	35	36	26	150

By 2020, among dairy systems there are 17 farms to pass on; only three of them have an assured succession. Among cheesemakers there are 15 farms with only 5 transfers assured and among mixed systems 7 farms with 2 transfers assured. The detail for each deadline can be consulted at the Appendix 14.

Farms adopt different strategies to pass on their farm (Figure 22). Most frequently they do not change the current system. It will be up to the newly set up farmers to take decisions. Other

farms wish to modernize their activity with for instance the mechanization or automation of feeding to make their farm more attractive. Somehow they have in mind that young generations are looking for systems not too much time consuming. From their point of view, another way to make their farm much attractive is to increase the volume of milk produced. However this strategy must be taken with precautions since a larger activity has an impact on the farm selling cost. It makes it more difficult for future farmers to purchase it. Few farms also planned to reduce the goat activity. There are two reasons to these reductions. They plan to retire in circa ten years but they have health issues so they need to reduce the load of work. Also they haven't found an associate to transfer the work load and to prepare the succession. These farms are the most endangered today since from a reduction strategy they could shift to a definitive stop of the goat activity. Another reason to reduce the goat activity is the shift toward a different system with a cheese-processing activity, this to prepare the succession for a child.

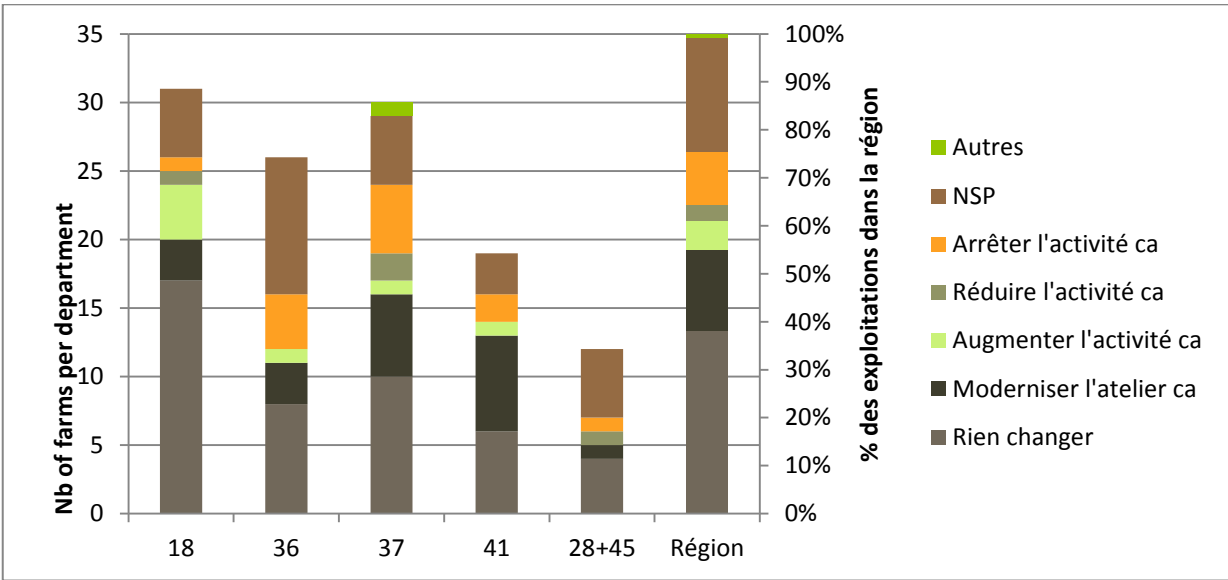


Figure 22 : The different transmission strategies adopted by farms
 from bottom to top: Don't change anything, modernize goat activity, increase goat activity, reduce goat activity, stop goat activity, don't know, and others

Among farms with a certain or uncertain transmission status, half should be transmitted to a child. Among farmers with uncertain or unplanned succession status (74 farms), 42% of them know where to look for a successor.

71% of farmers prioritize a goat succession and 4% are undecided. 32% of farmers prioritizing a transmission with maintain of goat activity have a specialized farm.

In farms with several head-farmers, the replacement of the outgoing partner is planned in 47.5% of cases. On farms where nothing is planned, consequences will be for 33% the abandonment of one of the activities (in 81% of cases it will be the goat activity and in the remaining cases the

cattle one), and for 19% the hiring of an employee or the research for a new partner. Other strategies include reducing goat activity with a decrease of the processing or on the contrary its increase, the reduction of the size of another activity, or no change at all in the operating system. In this last case we can wonder about the equilibrium of the new system.

The profile of farms to pass on can be found in Appendix 14.

14% of farms to be transmitted are in contact with a counselor transmission. 17.5% would like to meet a transmission advisor as soon as possible and 9% want to be contacted in due course.

The passing on of farms would need to be addressed well in time before the deadline. Often farmers start to think about it and look for a buyer just few years before the deadline. The lapse of time between the beginning of researches and their deadline seems to be too short to find adequate people and they are often either stuck in their activity or forced to sell the farm to the best bidder. It also seems they are not always aware of the different possibilities offered to them: they can sell the whole farm to a new person, but also look for an associate and pass on the farm on several years. This second option appears to be few frequently considered. Communicate on these questions in agricultural newspaper with articles on a regular basis could be beneficial to raise the awareness on these difficult questions.

While asked for **their wishes for the regional goat sector**, farmers spontaneously spoke about this whole question of transmissions. Transmit goat farms it is to allow the dairy industry to maintain its momentum, especially today where there is space on the territory (market and farms) for new farmers.

Breeders would like to see new farms start on small areas with human size livestock, with reasonable buying/selling costs, and societal juridical forms to free the constraints of time.

"Go get them ..."

These would include more communication on the sector in the educational curriculum (5%). Indeed it would be needed to better train young people in agricultural courses on the different options / jobs in agriculture and particularly on goats which are almost completely absent of programs; and enjoy of events as it will be done at Capr'Innov to communicate on the specifics of the goat sector in Centre-Val de Loire Region and so "generate interest" and "motivate them, give them a taste of the profession".

"...and help them [to settle]"

Access to small farms could be given in priority to goats' projects and goat lands, often of low agronomic quality, should be maintained for goats. Also it is important to facilitate access to loans by banks for all thorough projects, and erase the gap between conjuncture and loans. The

construction of socio-economically viable projects requires the full access to data on system's expenses, time needed for each task (in hours and not in FTE) and on how to set-up a system allowing to free-time.

3.3. What are the existing elements in goat farming systems that can be used as levers to develop and sustain the goat business in Centre-Val de Loire Region?

This part aims to deep four themes that are either a challenge for the goat sector in Centre-Val de Loire Region or a path to bring further the sector. The first theme is the attraction of new farmers, the second theme is the climate change and its potential impact on PDOs, the third is the valuation of aside goat products and the fourth is the place of raw milk in the sector.

3.3.1. Attract new farmers

Opinions on how agriculture should evolve and to what future farms should look like are diverse, and none of the possibilities makes consensus. What we know for sure is that diversifying the offer is a pledge to find interested people. Identify and highlight particularities that contribute to the identity of the regional goat sector allows to be differentiated from other goat regions (e.g.: farm sizes). Also push forward elements showing changes occurring in agriculture (e.g.: possibility to take days-off) and organisms acting as a network around goat businesses can help attracting new farmers (including new rural people).

Human-size farms

The size of flocks, and so farms, in the Region is a feature of the regional goat sector. Indeed, compared to its two neighbours: Poitou-Charentes and Pays de la Loire Regions who have also a strong goat sector in a plain area, the medium size of flocks is lower. All size of flocks confounded 154 goats in Centre Region in 2013 versus respectively 267 and 263 goats in Poitou-Charentes and Pays de la Loire Regions (Institut de l'Elevage (c), 2016). Moreover these two neighbours are also known for having very large flocks (more than 500 goats). When 2% of the sample studied in Centre-Val de Loire had flocks bigger than 500 goats (12% of goat regional flock), in Poitou-Charentes there were already 6% of farms (23% of goat regional flock) with very large flocks in 2010 (among farms having at least 10 goats) (DRAAF, 2012).

16% of farmers interviewed said spontaneously they would like to see small/medium-size goat farms being favoured in the region. These farmers have goat flocks smaller than 200 goats. Reasons expressed to maintain this kind of farms are numerous: viable, profitable, productive, easier to pass on (economically and technically), source of employment (of major importance in rural areas).

However smaller farms face more difficulties to benefit from economy of scale, even so the organisation of farmers into cooperatives can allow benefiting from it for some inputs (chemicals, seeds...).

To qualify these statements, few farms also mentioned that we should not hesitate to enlarge the structures (2.5%) to cope with declining production volumes and meet demand while reducing imports.

A network of numerous farms

8% of farmers also said it would be positive to have more numerous farms on the territory. It would better the sector resilience (if a small farm disappears, the impact on the volume is lesser than if it was a large one), and help maintaining proximity services (counselling agencies, veterinarian, agricultural machines cooperatives). The natural and historical landscape would also be preserved.

Facilitated access to land

Goat farming can be settled on a very small surface and doesn't need large infrastructure. Even a land without buildings can be easily adapted. A tunnel-barn can be set up for animals and the milking room, and an air-shed can be built to shelter feed and machines. Feeding can be outsourced (spare a lot of time for another activity) or plots can be rent to produce forages and concentrates.

A major threat to land accessibility is the expansion of crop farming. These farms are already large and have the necessary treasury to buy plots at a price superior to their real value. It limits the access to land for young farmers and induces price bumping. Lands used today for goat farming, small surfaces newly available and poor soils could be sale in priority to new goat farmers.

Young farmers and days-off

Young generations are more willing to take days-off. Being able to show that it is possible to free time for holidays and hobbies is a key element to attract new farmers.

Depending of farms, free time taken in 'days-equivalent' ranges from 0 to 163 (total of half-days, days, weekends and weeks not worked). Although on average (Figure 23), the younger age groups take more days-off (days-equivalent) in the year, a linear regression showed that in reality it is not correlated (P.value = 0.85).

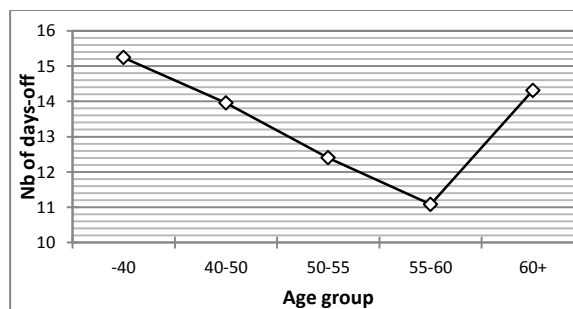


Figure 23 : Average number of days-off depending of the age group of the youngest head-farmer.

However the percentage of young farmers (less than 40 years old) taking weeks of holidays (mean = 1.6 weeks) is higher than in the other age groups (47% of young farmers versus 29 to 39% for other age groups). This is statistically significant (ANOVA, P.value <0.0001). And the part of young farmers never taking days-off is lower than in other age groups (14% versus 18 to 33% for older age groups).

Not cheesy cheeses

Goat cheeses are assets for the region and for the territories they belong to. Depending of departments from 59 to 100% of farms are in PDO's areas or in Trèfle du Perche. At the regional scale it is 84% of farms that have the opportunity to be labelled. These farms can get a better price for the milk they produce with PDOs and raw milk bonus.

PDOs are a warranty for both the quality of the product and its typicality. Specifications are complete and obligate to master the sector up- and downstream: feed production, animal husbandry and processing of the milk have to be done in the PDO area. It keeps economy, employment and know-how in the region.

Highlighted artfully **Trèfle du Perche** could be an opportunity to inject enthusiasm into animal husbandry in Eure-et-Loir and North-West Loir-et-Cher Departments. By its singular history and the will of farmers to master their product from field to fork; this original cheese is the opening to attract young farmers wishing to be actively involved in the goat sector.

A well-developed network around farms

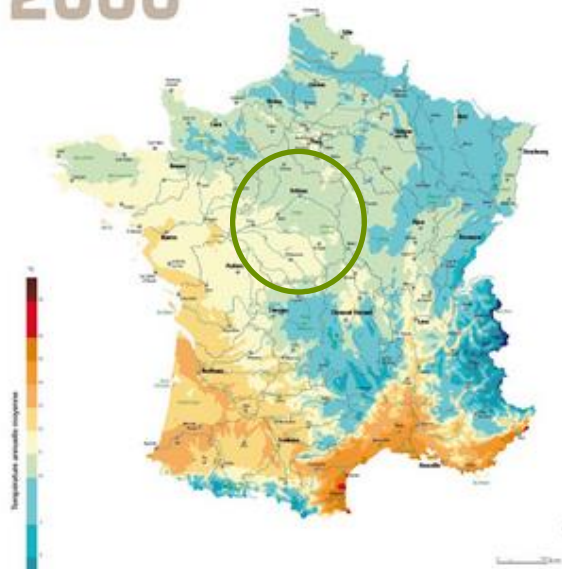
Numerous actors are present and actively involved in the regional goat sector: Agriculture Chambers, dairy control organisms, PDO's syndicates, dairy industries, CRIEL... Their role and the positive impact they have on farms must be put forth.

Other elements evoked before can also be assets. For instance the numerous tools existing today that facilitates the work and particularly mechanization/automation of milking and feeding equipment.

3.3.2. PDOs and climate change

What makes PDOs a strength for their territory can also bring constraints because of the specifications and more especially in case of climatic hazards. It is important to have stakeholders quickly responding to grant waiver to import forages or concentrates if needed. It is important to engage soon a reflection on how the territory will evolve in term of climate and on how to deal with these changes. Today the average temperature in the region is circa 10 to 11°C depending of the location. In 2050 projections show an increase of 2°C (CGET, MétéoFrance, 2011).

2000



2050



Figure 24 : Climate change in France, map (CGET, MétéoFrance, 2011)
green circles = Centre-Val de Loire region.

What systems will be the most adapted in term of goat breeds, forages produced, out-sourcing of feed and resistance to diseases? Also what will be the impact on the taste of the product, how customers will react to it?

Some elements of answer can be found in the feeding system by adapting seeds variety to both the quality of soils (rather poor in goat farms) and to a warmer climate (and its high variations drought/flooding provoked by climate change). A change of feeding system might also be considered. Another element is to work on animal performances by increasing the genetic diversity in flocks to adapt them to local specificities and climate change.

To respect actual PDOs specifications, the race *Cou-Clair du Berry* (Figure 25) could be studied further to identify its strengths and elements of adaptability to the local terroir. Identifying individuals of the two breeds allowed today in regional PDOs (Saanen and Alpine) and having a resistance to warmer climates (South France flocks) and import their genes could improve adaptability of regional flocks to climate change.



Figure 25 : Cou-Clair du Berry breed, (ARCCB, 2015)

To resist to droughts and heat waves South France's goat races could be interesting (*Rove, Pyrénéenne and Provençale* races). However they are not necessary resistant to wet climatic conditions or indoor breeding. Does cross breeding could address the problem? But then how to deal with PDO specifications?

Some races such as the *Poitevine* were traditionally present in the Region. Include them in PDOs would also increase the genetic diversity of flocks. Besides the adaptability to changes, the genetic variability in flocks also better the resistance to diseases.

3.3.3. Aside goat products

Value goat meat

The consumption of goat meat in France is very low⁷, thus there are only niche markets to add value to this production. Most farmers sell their animals to a merchant. This channel doesn't bring a good valuation of meat products.

Indeed, in February 2016 the average price paid to farmers in France for a kid aged of less than five days was 3.7€/head, and 7.2€ for one of two weeks old. At the same date the price for a cull goat was in average of 15.9€ (Institut de l'élevage, 2016).

15% of goat farms succeed to value a part of their cull goats better than if it was sell to a merchant: 1/3 of them sales goat meat (generally processed on farm) in direct selling, 1/3 sales carcass to a butcher and 1/3 sale cull goats (alive) to private customers.

In 2014 there were 7 slaughterhouses in Centre-Val de Loire Region practicing the slaughtering of goats. But in each of them volumes are marginal (less than 1.5% of tonnage is goat meat) (DRAAF, 2016).

Meat is a forgotten product of the goat sector. In order to insure a more secured income for farmers, new outlets could be created. By identifying population in France (in large cities for instance) consuming goat meat and by setting up partnership between groups of goat farmers and butcher shops frequented by these populations, goat meat could be better valued than today. Such study in B2B could be realised in partnership with students from engineering schools. To have a meat with better value, mixed breeds could be used. But once again it would ask to revisit PDO's specifications.

Another way to increase consumption of products is to make contract with out-of-home catering, for instance public kitchens and in particular those cooking for a young public. If they propose in their menus goat meat, it will democratize it. If young public is used to consume goat meat, the probability they ask for it at home or consume it once they'll be older is more important. The same approach can be used with goat cheeses products.

⁷ In 2014 the quantity of goat and sheep's meat consumed per inhabitant in France was of 3kg (Total consumption of meat equal 86.3kg) and was in constant regression the last decade (France AgriMer, 2015).

Other goat products

Niche market might be developed from other goat products. New products from goat milk could be created. A farmer submitted the idea to produce goat milk ice-creams or goat cheese-cakes. These products could be developed on farm or by a cooperative for direct sale on weekly markets during the touristic season.

Goat's leather could also be used to create crafts sold in a leatherwork shop.

3.3.4. Raw milk

One fifth of farms had sanitary problems within the two last years (either on the milk for dairy systems or on the cheese for cheese-maker systems). This problem could be partly limited by pasteurizing the milk (depending of what micro-organisms are at the source of the contamination), however PDOs cheeses are made of raw milk. The contaminated milk is then declassified to leave in conventional channels. Moreover the source of the problem is often difficult to identify, then the problem might persist for a while.

Does heat-treated milk would allow both to destroy pathogens and to maintain the milk quality? PDOs specifications could then authorize it under special circumstances. What protocols can be set up to isolate the contamination source? Depending of the main sources of contamination, specific trainings could be proposed to farmers. Systems could also be modified, for instance by suppressing silages since they are known to favours listeria under certain climatic conditions.

4. Limits in the methodology

4.1. Survey development

The survey was developed before I started the project, so that made it difficult to apprehend challenges behind the project. Indicators chosen in the creation of the survey, or the sampling retained complicated the comparison of results with literature. This is a point of attention to have for new inquiries.

4.2. Test of the survey robustness

Only six tries have been used to test the robustness of the survey. Even if it allowed numerous adjustments in the survey, this number has not been sufficient to test the different combination of answers possible. This is particularly true for the transmission part where specific cases are numerous. Whereas this part is very important, it has been complicated to fill out and to statically analyse.

4.3. Data collect

Despite the training dispensed to the interviewers, many mistakes have been done during the collect of data. For futures enquiries it will be good to use computer-assisted surveys to avoid them. This would also make faster the registration of data and free more time for analysis, deepen them or compare results to former enquiries.

Get in touch with farmers has been uneasy; some of them are hardly reachable by phone, if not impossible. Moreover several of them refused to meet our interviewers because they already answered to the survey lead by the DRAAF (antenna of Agricultural Ministry) on the same period. By the way these twofold inquiries partly discredited Agriculture Chambers and DRAAF in the eyes of farmers

The data collect didn't take place in the most favourable period since it occurred on the same time than kid birth and then harvest period. It is generally easier to reach farmers in winter period, but of course it is not a suitable period to hire trainee to do it.

4.4. Sampling

Only farms having a flock larger than 50 animals have been taken into account. This excludes small systems. What impact these small systems have on the sector in term of economy, volumes, direct selling, landscape, labour force and communication? How are structured these farms? Are they handled by former goat farmers retired today, are they much diversified systems or just marginal agricultural activity on farms specialised in another sector?

4.5. In results

Quantified data can have bias because they have been given by farmers and have not necessary been checked in records. For instance the milk volume produced can sometimes be an assessment, especially in cheese-maker systems where they frequently count the number of cheeses produced and not the quantity of milk produced.

4.6. Economics

This study would need to be completed with an economic study to identify elements of resilience in farms systems. Can we distinguish a profile for farms with the best ease to invest, a profile for farms able to clear a decent salary?

Conclusion

Stakeholders of the goat sector have one main concern: insure the production of milk in term of volume. According to volume forecast, the production of milk in the region will increase by 19% by 2020. This production will be sustained by dairy systems while the volume produced in cheese-maker systems will be maintained. A proper accompaniment of farmers will help maintain vitality in rural areas and to increase the visibility of regional goat cheese products on the national market. Sustaining the milk production is possible by maintaining the farmer population. In term of renewal of generations, efforts made by the sector start to show results and the decrease of the number of farmers start to halt. The work must go on with special attention to the more fragile zones (Indre, Loiret, and Eure-et-Loire Departments). It sounds wise to foster diversified new farm systems allowing several associates to work together since it alleviates the load of work and frees time; and to facilitate the access to land for new farmers, especially for passing-on the family business to an outside person.

Sustaining the goat farming sector requires not only maintaining the number of farmers and the quantity of milk produced, but also to promote goat products and develop farm systems. Goat sector is a flagship sector in Centre-Val de Loire Region. It is characterized by diversified farms and medium size flocks. Whereas there is a majority of dairy farms, cheese-maker systems are of importance since they process 40% of the regional milk volume. Dairy products of the sector are of high quality and diversified: five PDO's cheeses, plus the Trèfle-du-Perche, plus the wide range of fresh cheeses produced by industry or farmers. Aside goat products shouldn't be forgotten and develop the goat meat sector would help diversifying the farm income. The enhancement of farm systems is reachable through continuing the transition toward more mechanized, automated and computerized systems. New technologies have their place on farms to facilitate and better the work. Other levers exist to improve farm systems. Put in network farmers would help to organize the self-sufficiency of the territory in fee. The CEREL tool could be developed further. This tool could also facilitate the management of human resources and the exchange of knowledge between farmers.

The goat sector is facing some uncertainties. The first is about the future of raw milk. It is today both strength and weakness for the sector. It is an element in the heart of PDO cheeses but solutions need to be found in case of non –possibility of using the milk raw because of contamination. On the long term, one of the biggest incertitude for the sector is climatic changes. It is not only about an increasing mean temperature but up and down variations that make more complexed the adaptation of living species to their new environment. This question starts currently to be taken into account in partner bodies of the sector.

List of abbreviations/acronyms

CCP = Product Conformity Certificate

COFIL = Steering Committee

CRIEL = Inter-professional Regional Center for the Milk Economy

CVL = Centre – Val de Loire Region

FTE = Full-Time Equivalent

HFA = Head Farmers and Associates

PDO = Protected Designation of Origin

PGI = Protected Geographical Identification

PNR = Regional Natural Park

UAA = Utilised Agricultural Area

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Appendixes

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Appendix 1 : Introduction to the main “Pays” of the Centre-Val de Loire Region (socio-historical and soil-climate related), source (CRACVL, n.d.)



Beauce area: Situated in the North-East of the region, it is known as the “breadbasket of Europe”. Large scale cash crop cultures (bread wheat, barley, corn, rape and sunflowers mainly) are dominating here (DRAAF, 2015). A product? The pastry *Le Pithiviers*.

Perche area: Across the border between Normandy and Centre-Val de Loire, it is a land of hills covered by forests, bocages and a strong riparian network. This land is propitious to animal breeding, but there is also a strong crop tradition. Perche has its own PNR (Natural Regional Park) (PNR du Perche, n.d.). A product? Well an animal, the *Percheron’s* race horse.

Berry area: In the South of the Region, it is composed of several sub-areas such as the *Sancerrois* land of vineyards, the *Brenne* land of ponds and its PNR, the *Champagne berrichonne* land of cereals is a calcareous openfield and called sometimes the little Beauce, the *Boischaut Nord* and *Sud* land of bocage particularly adapted to crop-livestock farming (CA36, n.d.). A product? The green lentils.

Sologne area: Situated in the west-center of the Region, it gathers forests, brownfields, ponds and game. Sologne is a land for hunters, fishermen and hikers. There is very few agriculture in this area because of very poor soils (sandy and clays soils) and a climate successively extremely wet or dry (CA41, n.d.). A product? The lamb meat of *Solognote’s* race.

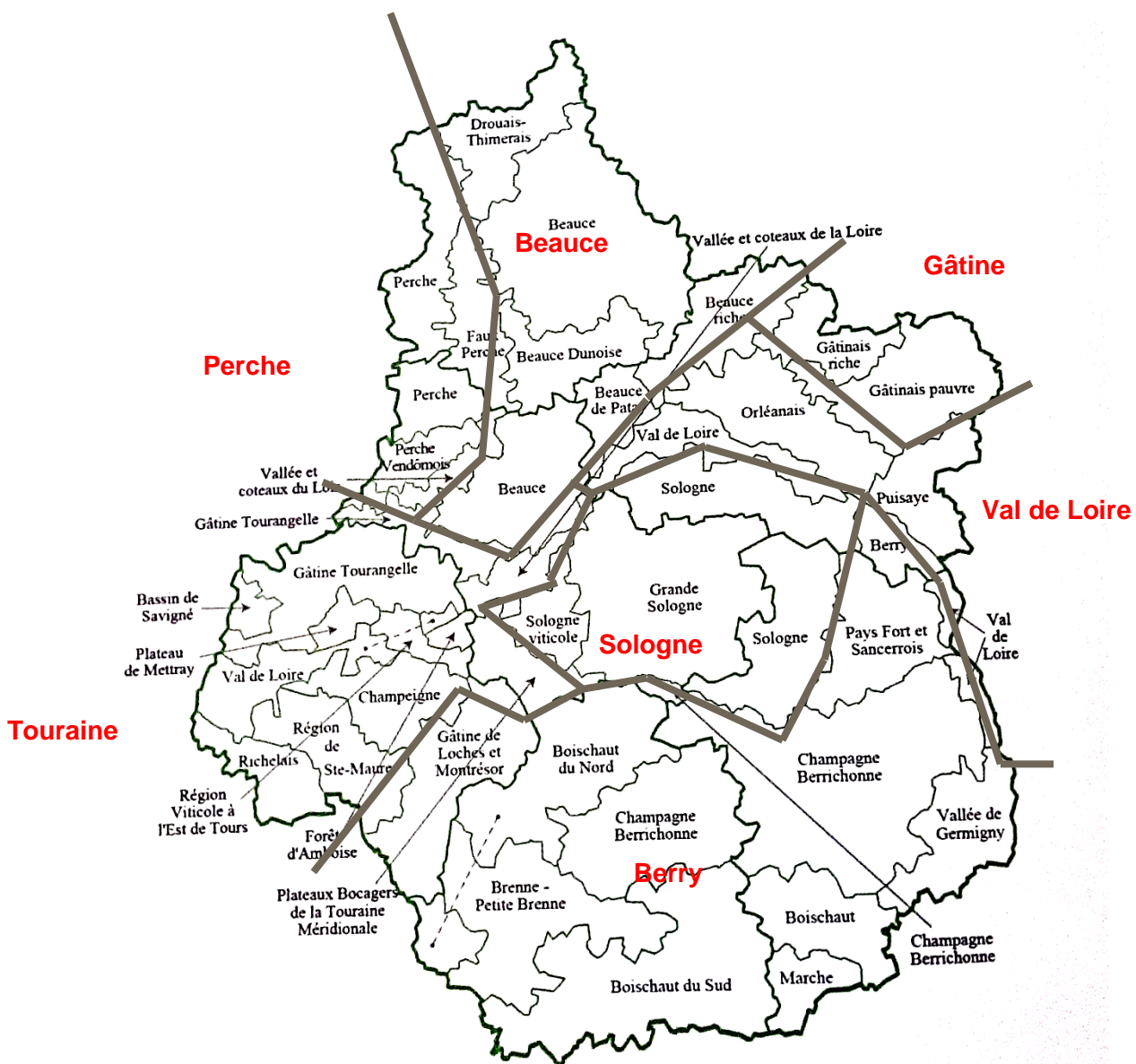
Val de Loire area: situated along the *ligerian axis*⁸, it is the host of very famous vineyards, but also of dairy, vegetable, crops and flowers productions. Its landscape is very diverse from calcareous cliffs to forests but always connected to water and with soils rather poor (CA41, n.d.). A product? The cooked meat *Andouille de Jargeau*

⁸ Ligerian axis (Axe Ligérien in French) is the axis traced by the Loire River from East to West.

Touraine area: also situated along the ligerian axis, but downstream, it is also the host of very famous vineyards. But this area also benefits of better soils favouring crop, fruit and animal productions (CA37, n.d.). A product? The *poire tapée* or flattened pear

Gâtinais area: Located in the East of the Region, it is composed of sandy soils, this agricultural region had a weak reputation compared to its neighbour the Beauce. Today agriculture mixes crops, vegetables gardening and more traditional activities such as herbs and medicinal plants, honey, cress and poultry farming (PNR du Gâtinais français, n.d.). A product? The asparagus!

Below the detail of the small agricultural regions of the Region



Les régions agricoles en Centre – Val de Loire (DRAAF Centre 2013)

Appendix 2 : Description of CVL's goat cheese PDO

Chavignol

Recognized as PDO in 1976, this cheese (Figure 26) is made of raw, whole milk. The curd, after being pre-drained is molded into tapered strainers. Then the cheese is ripened for at least 10 days. Its shape is circular with a diameter inferior to 7.5cm and is larger in the middle than the upper and the lower. Its thickness is between 3 and 5cm. It weights from 60 to 90gr.

The feed for goats is composed of hay and cereals and is produced for at least 75% in the PDO area which has soils made of

Selles-sur-Cher

Recognized as PDO in 1975, this cheese (Figure 27) is made with raw, whole milk. The moulding (hand-made) and the ripening follow a similar process to the Chavignol. The cheese is dusted with charcoal ash powder what gives it a grey colour outside. The shape of the Selles-sur-Cher is a puck with a diameter up 9.6cm and its edge is slightly beveled. It weights is about 150gr

The feed for goats is composed of hay and cereals and is produced for at least 75% in

clay or calcareous clay (Région Centre (b), 2014).

In 2015 there are 131 farmers producing milk for Chavignol, including 47 processing it themselves into cheese. In 2013, 809T have been marketed (Le Syndicat du Crottin de Chavignol, n.d.).



Figure 26 : Chavignol cheeses at different ripening stages, source: Syndicat du Chavignol's website

the PDO area and cannot contain GMO. The soils of this area are poor (Région Centre (b), 2014)

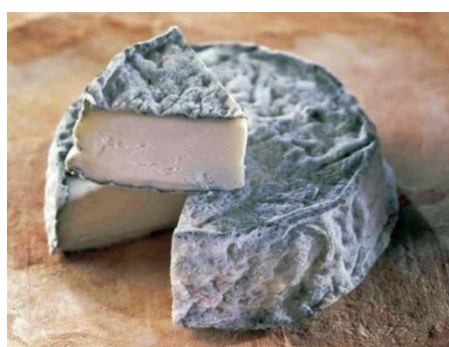


Figure 27 : Selles-sur-Cher cheese, source: Cuisine à la française's website

Sainte-Maure-de-Touraine



Figure 28: Sainte-Maure-de-Touraine cheese, source: Pays de Sainte-Maure-de-Touraine's Tourism Office website

Recognized in 1990, this goat cheese (Figure 28) one of the most famous in France. The moulding is made by hand according to ancestral process. On

Poulligny-Saint-Pierre

Recognized in 1972, it is the first goat cheese benefitting of this label. Its area production is very small (the smaller PDO area in France) and is part of the PNR de la Brenne. The moulding, according to an old process is made with a ladle. The ripening lasts at least 10 days. Its shape, inspired from the village steeple, is a square pyramid with a slightly truncated top and with a height of 12.5cm. The small Poulligny weight

The feed for goats is composed of hay and cereals and is produced for at least 80% in the PDO area. The Poulligny terroir is characterized by the poverty of soils and the patchwork of ecosystems: heathlands, oak forests, pine forests, meadows and ponds (Région Centre (b), 2014).

In 2013, the production of Poulligny was of 310T. About 30 producers made milk for this PDO and 9 of them process it into cheese on farm (CNIEL, n.d.).

demoulding, a rye straw passing through from end to end is added. The ripening is minimum of 10 days and maximum of 3 weeks. It is a slightly conical log shape cheese with a length from 16 to 17cm and a maximum diameter of 6.5cm. It weighs about 250gr.

The feed for goats is composed of hay and cereals and is produced for at least 75% in the PDO area. The soils of this area are of good quality and allow growing feed crops (Région Centre (b), 2014).

about 150gr and the big Poulligny about 250.



Figure 29: Poulligny St-Pierre cheese, source: PNR de Brenne's website

Valençay

Recognized in 1998, this cheese (Figure 30) is made of raw, whole milk. The moulding (hand-made) and the ripening follow a similar process to the Chavignol. Its shape is a square pyramid with a largely truncated top. It weighs 220gr for the classic Valençay and 110 for the small.

The feed for goats is composed of hay and cereals and is produced for at least 75% in the PDO area. The landscape is characterized by the alternation of crops and bocages (Région Centre (b), 2014).

In 2009, there were 47 producers for the Valençay cheese (64% processing on farm, whether 35% of the production). It represents 13000 milking goats for 350T of cheese. The processing system is also

composed of 5 dairies, 1 milk cooperative and 1 refiner (Région Centre (b), 2014).



Figure 30: Valençay cheese, source: syndicats des vins et fromages d'appellation Valençay's website

Appendix 3 Trèfle du Perche

The Trèfle du Perche is a goat cheese processed only on farms and made of raw milk. The cheese is moulding with a ladle, turned and ashed by hand. The ripening lasts at least 10 days. Its shape is a four lobes clover, height 3 to 3,5cm, width 7 to 8cm, weight circa 150g. Its colour is grey and its rind is bloomy. Its texture is creamy and melty. Its taste has aroma of apple and undergrowth (Hardy, 2009).



Figure 31 : Trèfle du Perche, source (Hardy, 2009)

Appendix 4 : Assets and constraints linked to used plots for goat activity

- Strengths of plots used for goat activity:

The most common assets are related to the spatial arrangement of fields: close from each other's (35%), near/ around the farm (27%) which is an asset for grazing and green feeding, large or re-parceled (12%). The flatness of landscape is another asset frequently quoted.

The second category of assets gathers technical and agronomic advantages: Good agronomic quality of soils (17%), the possibility of introducing legumes (16%). Other assets are well-drained fields or with possible irrigation, soil diversity that enables a variety of crops, and good bearing capacity of soils.

The only environmental asset quoted here is the presence of Natura2000 areas.

9% of farms report no asset-related to plots used. Some people also answered "do not know".

- Plots constraints

Constraints related to agronomic and technical aspects are humidity (40%) or floodplains, but also the presence of game (32%), which damage crops, the inability to implement legumes (alfalfa or clover) (22%) or just alfalfa. Other constraints include low agricultural potential, waterlogged soils, heterogeneous soils (on the same plot), woodland edges or the presence of stones in soils.

Constraints related to their spatial arrangement are the distance between the farm and plots (27%), land pressure (linked to urbanization) (18%) and the competition for land between cash crops farmers and other farmers (13%). Other constraints are the spread of plots, their small size, the inability to pasture (distance) and the relief.

6% of farmers do not identify particular constraint. Some breeders have also responded "do not know".

Appendix 5 : Who is participating to...

- ... the milking?

On average 1.3 people participate to the milking (min 1, max 3). As shown in Figure 32, HFA (Status - 1) and collaborating spouses (Status 3) participate in a similar frequency to the milking, namely two-times a day (Traite - 2). We can also see that trainees (Status - 6) are milking once a day (Traite - 1) Permanent and temporary employees, volunteers and other status (Resp. Status 4.5, 7 and 9) seem to generally never participate in milking (Traite - 5).

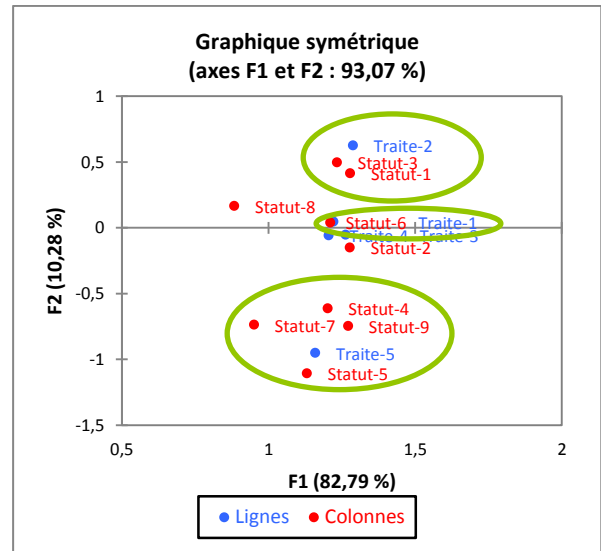


Figure 32: Factorial correspondence analysis between the status and the frequency of participation to the milking.

- ... the cheese processing?

Figure 33 shows that cheese processing (Transfo 1 = Daily, Transfo 2 = Rotation with others) is mainly carried out by permanent employees (Status - 4). When rotated, it is more likely that this rotation is done with collaborating partners (Status - 3), a temporary employee (Status - 5) or HFAs (Status - 1). Other people do not seem to participate in cheese processing.

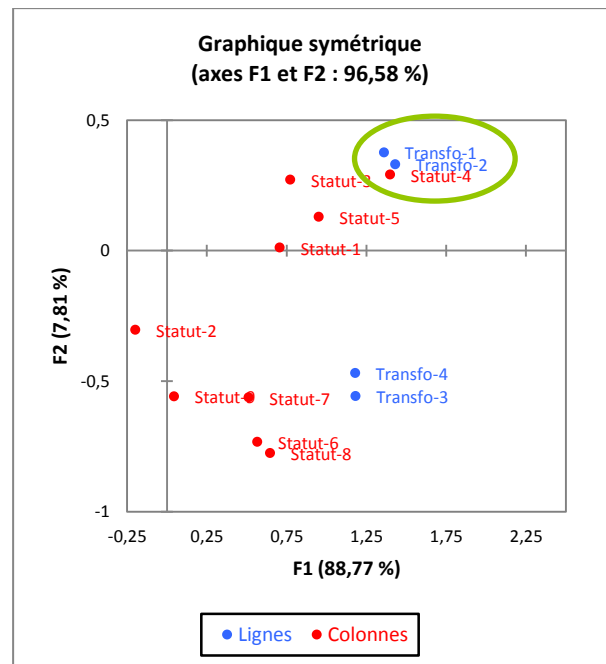


Figure 33 : Factorial correspondence analysis between the status and the frequency of participation to cheese processing.

Appendix 6 : Outside employment

To cope with extra work or to replace one of the people working on the farm (Figure 34), farmers mostly play on the organization of work between partners and employees (40%), then they call out for volunteers (38%) and then work with the replacement service (28%) and then work with the replacement service (28%)

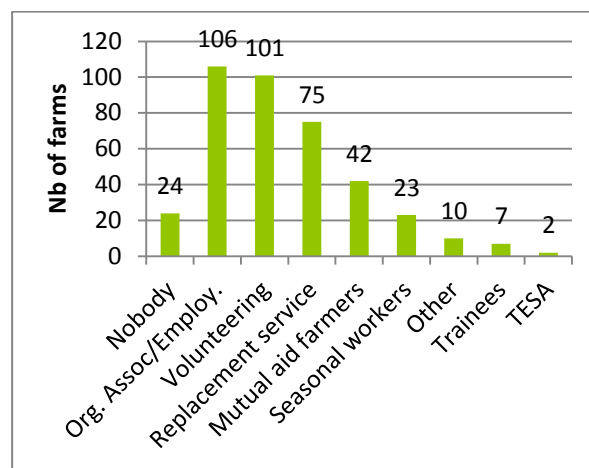


Figure 34 : Reinforcement of labour force

Replacement service

Replacement service (used by 28% of farms) is used for periods superiors to 1 month in 21% of cases. On the whole it is mostly used for short periods. This duration may be carried out in continuous or discontinuous days (few days per week). The task the most entrusted to replacement service is the production of fodder and not tasks related to breeding. Indeed one of the difficulties that farmers are facing is the lack of labor force having skills in goats on the labor market

The two major reasons why farmers do not work with the replacement service are the financial cost and the lack of trust they have in the skills of the people proposed.

Another obstacle to the use of replacement service is the necessity to plan in advance the needs, but this can be difficult (weather). Particularly given that the demand for replacements is simultaneous in all farms (peak of lactation). Farmers would need more flexible replacement services so the service could answer to popping up needs.

Cheese-maker farms have also the difficulty to find skilled people in processing. A farmer even proposed to create a new profession: the cheesemaker operator specialized in cheese-farm processing. Familiar with the specifications of the various dairy products from goats: PDOs, yogurts or other goat cheeses, we can ask for him through an organism type replacement service or an employer group. True 'Swiss knife' of processing, it has little or no need for training in each new farm.

Seasonal workers

It may be noted that seasonal workers are not widely used on farms (9% of farms). The most quoted reason is that they do not need it. There is no particular preference for one task or another. It is mostly used for a period superior to one month (64% of cases).

Employer's group

An employer group is the gathering of several farmers to hire one person working part time in each farm. Few farms are part of a group of employers (9 farms). Two creations of such groups are planned: one in the Indre and one in Cher.

Barriers to create an employer group are the financial costs, but also and especially the lack of favorable conditions (understanding with neighbors).

Many farmers do not seem to know the principle of employers' groups. It would be interesting here to develop communication among breeders for this type of job sharing.

A lot of mutual aid between farmers

55% of farms do mutual aid with other farmers. Mutual aid between farmers involves mainly field work: 58% of these farmers do it for forage, 48% for crops and 24% for silage.

Appendix 7 : Cheese-maker farmers & PDOs, the conflict

73% of farms are member to a PDO while 84% of farms interviewed are in PDO area. In average it 13% of farms that are not member to a PDO whereas they could. Depending of the PDO this number varies from 8 to 17%.

2/3 of these farms are in a cheese-maker system. The reasons recall for not being labelled is the practice of direct selling which already bring a good product valuation and the fact their clients are not demanding for PDOs but just for local cheese.

However this is source of questioning and concerns from PDOs syndicates and other labelled cheese-maker farmers since some of these unlabelled farmers are using the shape of PDOs and benefitting of their reputation.

Why local people do not ask for PDO products? Do PDO products reflect the identity of their territory? Do people know about them? What would be needed to reconnect people to local flagship products?

What part unlabelled cheeses that look like PDOs cheeses really represent among all unlabelled cheeses on the direct selling market?

Appendix 8 : Partnership between farms and stakeholders

Organisms of dairy control

55% of farmers surveyed are members of the performance dairy control (CEL Performance) and 47% to dairy counselling (CEL Conseil).

Cheese-maker systems are less frequently member to the performance dairy control than dairy systems (45% of farms versus 57% of farms, mixed systems = 67% of farms), however they are more frequently member of the dairy counselling (65% of farms versus 48% of farms, mixed systems = 60% of farms).

Reproduction

23% of farmers are members of CAPGENES (37% of farms are practicing Artificial Inseminations).

Medias

74% of farmers have a subscription to a professional or technical source of information (e.g.: magazines such as LaChèvre or Horizons).

CMBPE & GBPH

Mutual Code of Good Breeding Practices (CMBPE) is a tool for farmers to enable them to better master their animal activity and implementing regulations. It brings together good practices in the following areas: identification and traceability, health, food, quality of milk and goat products, animal welfare, environment and access to the goat farm, and rearing animals (ANICAP, 2015).

The Good Hygiene Practice Guide (GBPG) is intended for goat farmers practicing cheese processing. It allows farmers to set up a system of control of sanitary risks during processing. It is a tool to implement the means required by regulations in this area (ANICAP, 2008).

69% of farms surveyed are member to CMBPE (86% of dairy farms, 34% of cheese-maker farms, 76% mixed farms) and 42% GBPH.

GPBH = 42% of total farmers (66% of cheese-maker systems and 74% of mixed systems)

Local authorities

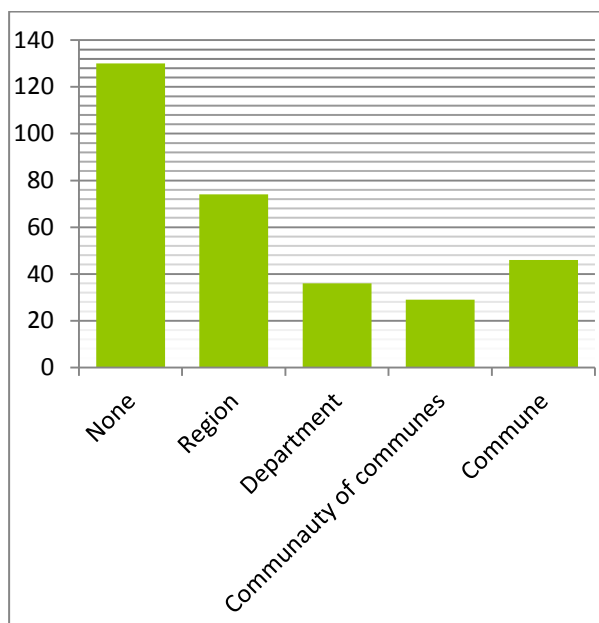


Figure 35 : Local authorities having a positive influence on goat businesses

Local authorities (Figure 35) have a positive effect on goat farming, mainly through the

Dairy industry

89% of breeders working with a dairy industry reported having a good relationship with it.

The Cape

64% of farmers know or heard about the Goat Cape (CAP'filière caprin). 16% benefited from it. 14% benefited from a LEADER / FEADER project (European's funds), 8% from a PCAE and 7% from other funding.

Farms and general public

1/3 of the farms is involved or organizes events for the general public. The two most popular events are fairs (26%) and agricultural shows (21%).

Some initiatives are very positive for the communication on agriculture and to promote goat sector. First the Open Days on farms and other visits (10%) allow farmers to explain their profession and their practices to families or schools. The network Bienvenue à la Ferme (Welcome on Farm), the action Fermes Ouvertes (Opened Farms) or the project De Ferme En Ferme (From farm to farm) bring similar benefits.

subsidies' lever. Some communes and communes' community have also committed themselves to settle farmers on their territory and maintain a dynamic local network. These approaches are very positive.

However, some farmers deplored they (communities of communes and municipalities) are not more involved by participating to events, highlighting local and regional products. They would also like that public kitchens supply more foodstuffs from local producers.

The Regional Natural Park of Brenne seems also to have a positive influence on some farms..

Appendix 9 : Cheese processing

Operator training

- 44% of farmers practicing cheese processing were trained on the job
- 35% have acquired the bases in a specialized curriculum
- 19% have done internships in cheese or other EA before settling

32% regularly do internships with the Agriculture Chamber, the Sanitarian Defence Group or dairies.

Buildings

- 70% of on farm dairies are large enough
- 83% are functional
- 75% of manufacturing facilities are large enough
- 71% of ripening rooms are big enough

82% of the most recent investments are after 2010.

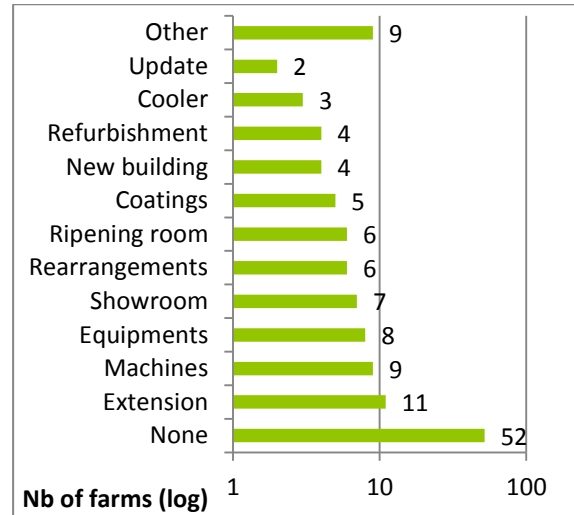


Figure 36 : Planned investments by 2020 in dairy workshop.

Sanitary status

- 61% EEC accreditation
- 17% direct sales status
- 22% accreditation exempted

Sale of products processed

Direct sales

- 94% of farms processing the milk into cheese sale it in direct sales
- In average, direct selling represents 54% of the milk processed (volume) on farm

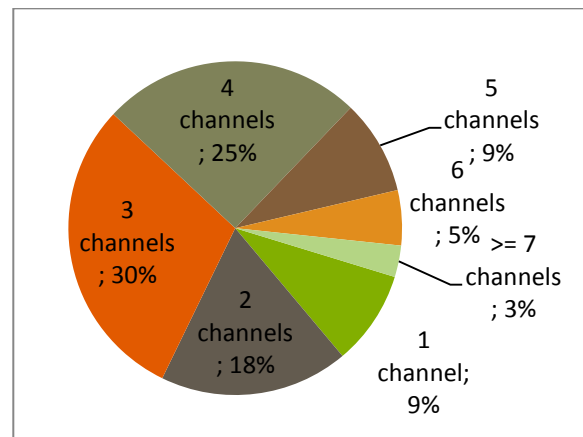


Figure 37 : Number of sale channels per farm for processed cheese

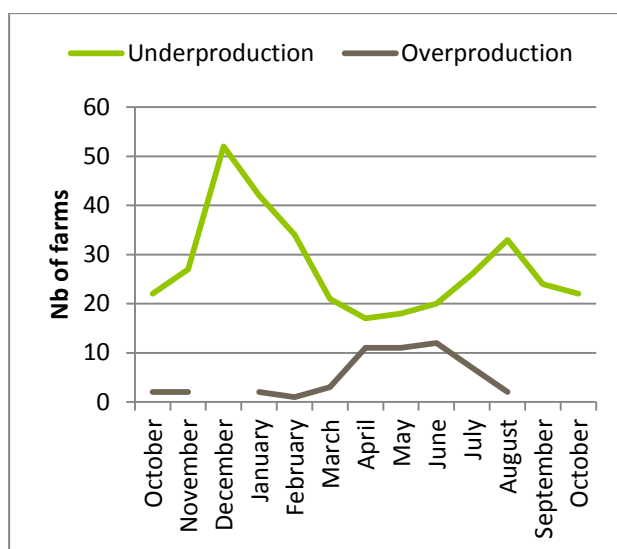
Sale to refiners

- 13% of the total processed volume
- In average, sale to refiners represents 55% of the milk processed (volume) on farm

Sale channels are diversified since 92% of farms have at least two marketing channels (Figure 37).

Over- and underproduction of processed cheeses

66% of farms lack of processed products at a certain period of the year (Figure 38). Two peaks: the first in winter during the hollow production, matching Christmas and New Year's celebrations, the second in summer while the tourist number is rising.



22% of farms know a period of overproduction. It reaches a plateau in April-May-June. The number of farms having surplus when working with a refiner or a dairy industry drops to 16%. This partnership seems to help regulate the flow of products. In most of farms surplus are managed well since instead of making fresh cheeses they refine it for a longer time and sale it as hard cheese during the summer season.

Figure 38 : Over- and underproduction of processed cheese along the year.

Appendix 10 : Farm buildings

54% of farms have two livestock buildings: one for goats and one for female-kids.

Goats' buildings

Goats' buildings in Centre-Val de Loire Region have from 45 to 1,200 places. The average is 230 places.

49.5% of goats' buildings were built or have undergone changes between the years 2010 and 2016, 37.5% in the 2000s, and 15% of the buildings predate the 2000s.

73% of farmers are satisfied with their goat building. The two constraints the most encountered in these buildings are poor ventilation (27%) and an uneasy food distribution (26%). This food distribution is mostly manual on these farms. The lack of space, the cleaning operations / scraping and movement of animals are the three other most cited constraints.

42% of farmers who have only one barn say they have concerns about space for female-kids in the goat building.

Female-kids' buildings

51% of female-kids' buildings were built or have experienced changes between 2010 and 2016, 30% between 2000 and 2009 and 15% prior to 2000.

57% of farmers are satisfied with their female-kid building, the main constraints of these buildings are ventilation, cleaning / scraping and distribution of food. The average surface available for female-kids in this building is 156 m² (it varies from 15 to 2100 m²), whether circa 2.13m² / animal.

Needs in storage buildings

69% of farmers reported having a sufficient storage capacity for hay, 60% for straw and 90.5% for concentrates (stored in building or silo). Needs for storage are mainly focused on hay and straw.

Among those who do not have a sufficient storage capacity for hay, 46% want to increase their production and 40% maintain it. For those who need more space for the straw, 35% want to increase their production and 48% maintain it. For concentrates, 52% wish to increase it and 44% maintain it.

Milking systems

On average one milking (including cleaning if human presence) lasts 1 hour 45 (min 20 minutes, max 4:30). One milking lasts between 2 and 3 hours for 25% of farms and more than 3 hours for 5% of farms.

If there is no correlation between milking systems and time spent at this task (ANOVA, p.value = 0.4), there is a correlation between the milking system and the number of goats present on farms (ANOVA, p.value <0.001).

To measure the effectiveness of milking systems, an indicator can be used: the time needed for one milking (including cleaning) divided by the number of goats on the farm. This indicator does not take into account the number of milking posts available.

On average it takes 0.7 minutes (42 seconds) to milk a goat. According to the milking system, the system efficiency is different (Figure 39). The rotating system is the most efficient (estimated average of 0.38 min / goat) and the 'direct-to-can' system is the least effective (estimated mean = 1.75 min / goat). Milking systems with the two platforms are equivalent and more efficient than systems with a single platform. The system with three platforms (only one case) is even more efficient than systems with two.

Milk systems used are introduced with the Figure 40.

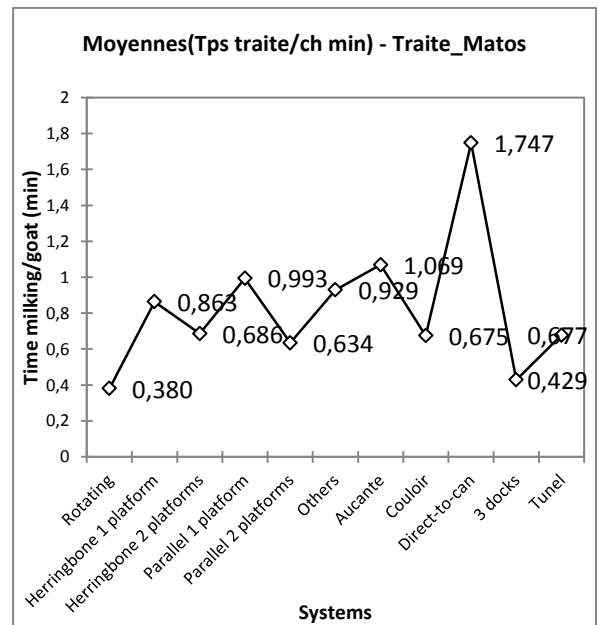


Figure 39 : Average time milking/goat in function of the milk system (minutes)

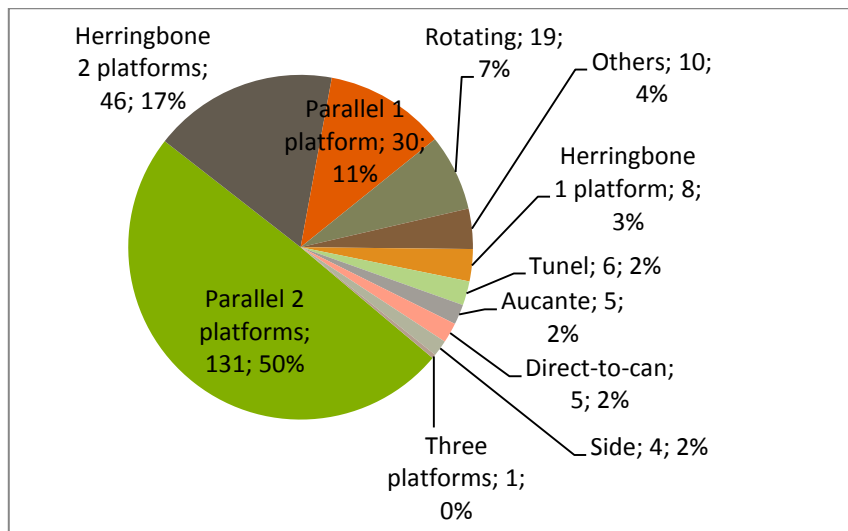


Figure 40 : Milking systems (size, percentage)

31% of farms are equipped with a high line (36% of farms having a milking parlour with 2 platforms), against 69% of farms with a low line. If milking time per goat appears to be lower with a high line, this difference is not statistically significant.

18% of farms have a rapid entry system in milking room and 25% a quick exit system.

On average milking parlours are equipped with 15 stations. The number of posts varies from 2 (direct-to-can system) to 72 (rotating parlour). On average on the platform there are 2.5 goats for one post. This number varies from 1 post per goat to one post for eight goats.

31% of farms are equipped with an automatic release. Among farms not equipped, 16% are planning to install one. Among those already equipped, 74% make it regularly checked. Two down sets were mentioned by farmers for automatic release: its price and its functioning that sometimes fails because of the highly variable compliance of the udder from a goat to another.

80% of farms are equipped with an automatic cleaning unit.

Farms are equipped with one to three tanks (except some cheese-maker farms that transform milk directly without storing it). 59% of the tanks are owned by farmers, the rest (41%) is rented (dairies). Only 5% of farms having a tank are equipped with a pre-cooler and 3% with a heat recovery unit.

Appendix 11 : Signs of quality

5% of farms are subject to a different specification (apart from PDOs or organic certification). The two most common are specifications submitted by the super- and hypermarkets and the specification of Bleu-Blanc-Coeur (Blue-White-Heart) label that values good practices (feeding, environment and biodiversity, and quality of products) (Bleu Blanc Coeur, n.d.).

Valuation of good practices

Some farms have expressed their desire to be able to get recognition from the general public for their good practices through a label type 'sustainable agriculture' or 'reasoned farming'. Such labels do not exist on the market today because of the low relevance to develop a specification that might be restrictive in practice and would block the emulation of new ideas and solutions; however there are quality management certifications such as ISO 14001 which certifies companies from all industrial sectors for continuous improvement in the environmental field. Would this recognized standard in all economic sectors be a solution to enhance farms and to highlight the excellence of French agricultural sectors?

Such approaches have already been launched by a group of farmers in Picardy in 2004 or in the Yvelines in 2013. The motives were to communicate on the farming professions, production techniques, products and territory; and to group farmers from different sectors to share experiences and skills; improve the environmental performance of farms while anticipating regulatory changes and by relying on a framework (Réseau Rural et Périurbain d'Ile-de-France, 2015). This standard can also be an opportunity to establish on farms a true human resources management, a weakness today in agriculture (Tremolet, 2008). The advantage is that every farm starts from where it is and can set its own goals to progress. The limits are the investment in time and the financial cost. At the launch of the project in Picardy, farmers followed 20 days of training, and then every year there are two meetings and cross audits (Crosnier, 2004). The financial investment to start the project in the Yvelines was of 4000 € the first year and € 1,500 per year thereafter, excluding investments on farm to fulfil the objectives. Subsidies from different partners were available, E.g. the Departmental Council.

By aspects it addresses (animal feed, human nutrition, environment, product quality approach ...), the aforementioned label Bleu-Blanc-Coeur also could meet this expectation from breeders. However despite its presence on many products and in most supermarkets, it has very little visibility with consumers.

Appendix 12 : Organic agriculture

4.5% of farms surveyed have their goat activity certified in organic agriculture or are currently under conversion. This represents 2.4% of the milk produced regionally. There is no correlation between organic farms and PDOs, although most organic farms are in PDO territory. Some of them are also member to the PDO.

The medium organic farm has 131 goats (varies from 50 to 400 goats). Farms of more than 100 goats are either dairy system or mixed system. The average flock size in organic farming in CVL is larger than the national one who was circa 58 goats per farm in 2014 (Livestock Institute (b), 2016). It is 58% organic goat's milk that is processed on farms and 42% delivered to dairies. There are no sales to refiners.

At the national level the segment of industrial organic goat cheeses rose sharply. + 12% in 2015 compared to 2014. The subcategory that made the most progress is fresh cheeses (+ 20%) (Livestock Institute (b), 2016).

Around 58% of organic farms are planning to maintain their volumes and 33% to increase it. By 2020 the volume of organic milk in cheese-maker systems is expected to increase by 14% and to remain in dairy and mixed systems.

Some farms do not certify their goat activity; but another activity. 3% of farms have only the cash crop activity certified. The strategy of these farms appears to be to produce cereals at the best price (organic) and to buy conventional food for their livestock (quite often to neighbours). And indeed the self-sufficiency of this group in feed is lower than the average 82% forage autonomy (-6 points) and above only 28% of autonomy in concentrates (-16pts). Some farms also have another certified workshop such as pig breeding or poultry.

19 farms in PDO territory declare themselves interested in organic farming certification, and three out of area. Half of these farms are in dairy systems. The brake to conversion the most often expressed by farmers is the lack of organic collect/ organic dairy industry in their area. The difficulties to source certified products (feed) and limited access to pasture are also part of the brakes.

Appendix 13 : Feeling vis-a-vis of goat activity daily tasks.

Administrative management on farms is felt as being both the heaviest task (Figure 41), the most demanding (Figure 42) and least appreciated (Figure 43).

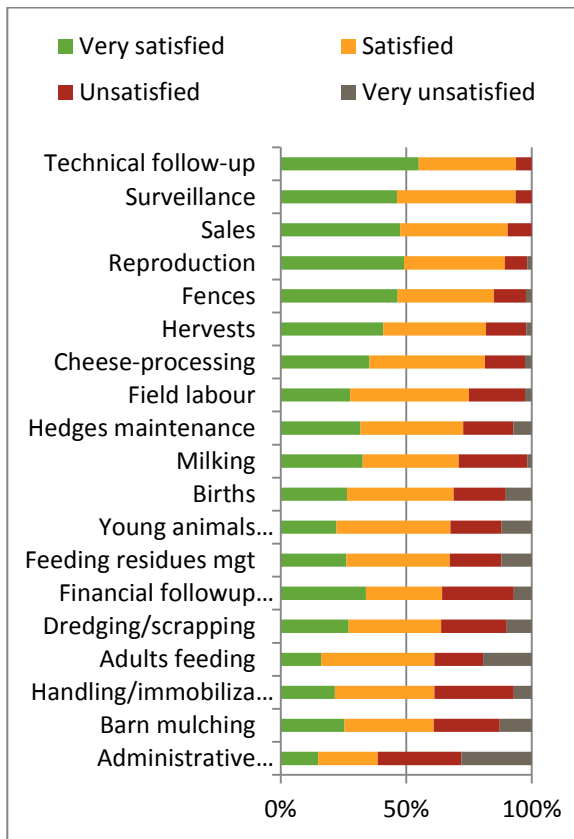


Figure 41 : Farmers feeling perception in term of arduousness of daily tasks linked to the goat activity

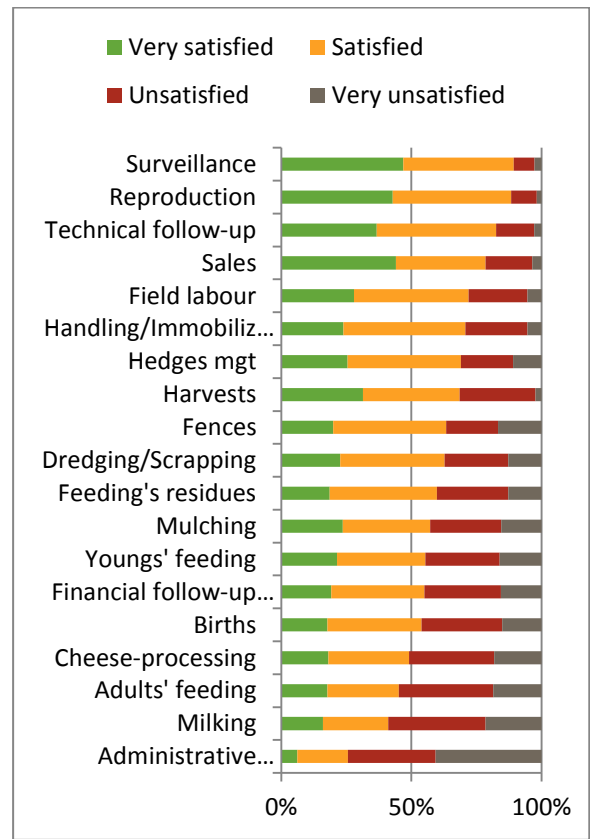


Figure 42 : Farmers feeling perception in term of constraint of daily tasks linked to the goat activity

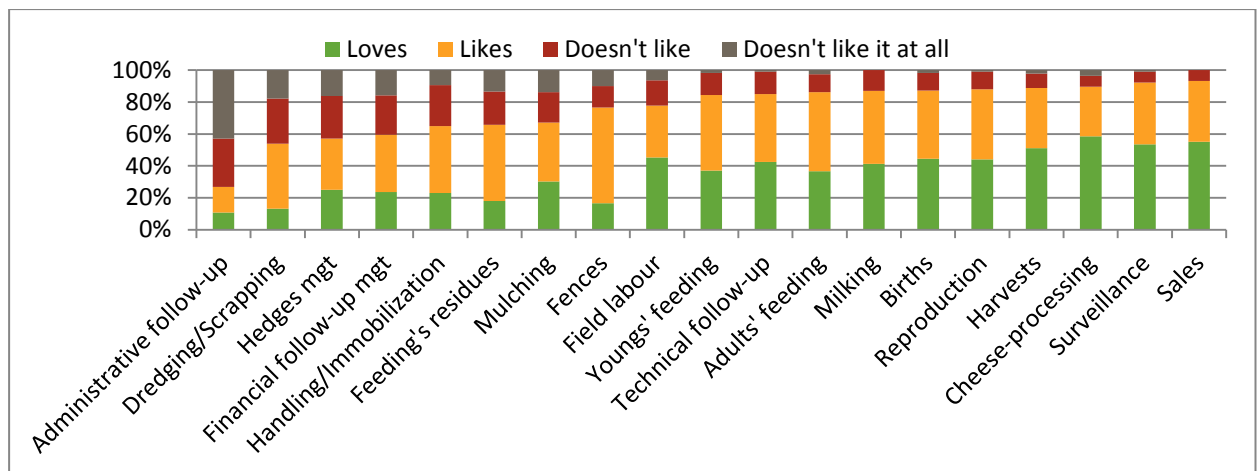


Figure 43 : Farmers feeling perception in term of affinity of daily tasks linked to the goat activity

Apart from the administrative management of farms, all the daily tasks of goat activity are mostly considered little heavy. The technical monitoring is considered as the least heavy task. Milking, livestock feeding and cheese processing are the three main tasks on farm and are identified as

very demanding but nevertheless are appreciated from breeders. The least demanding task is the monitoring of livestock, usually performed simultaneously while feeding the flock. The preferred task of farmers is the sale of productions, for dairy systems because they have very little to do in that area, and for cheese-maker systems because it gives them an opening to the outside world.

To cope with the complexity of administrative management, but also to allow farmers to do a technological watch, can be imagined a service that would pool together the "administrative division" dedicated to farmers of a sector or a territory and that defines with each of them the farm objectives and who would take care of all the administrative, financial and accounting. This service does not stop at simple numbers but have a keen understanding of what is happening on farms, allowing to keep up with farmers. It would also have a standby role on regulations and subsidies available. It would take care of filling up this type of forms. This type of service could be set up within economic interests' group (GIE juridical form) or groups of employers.

Appendix 14 : Transfer of farms

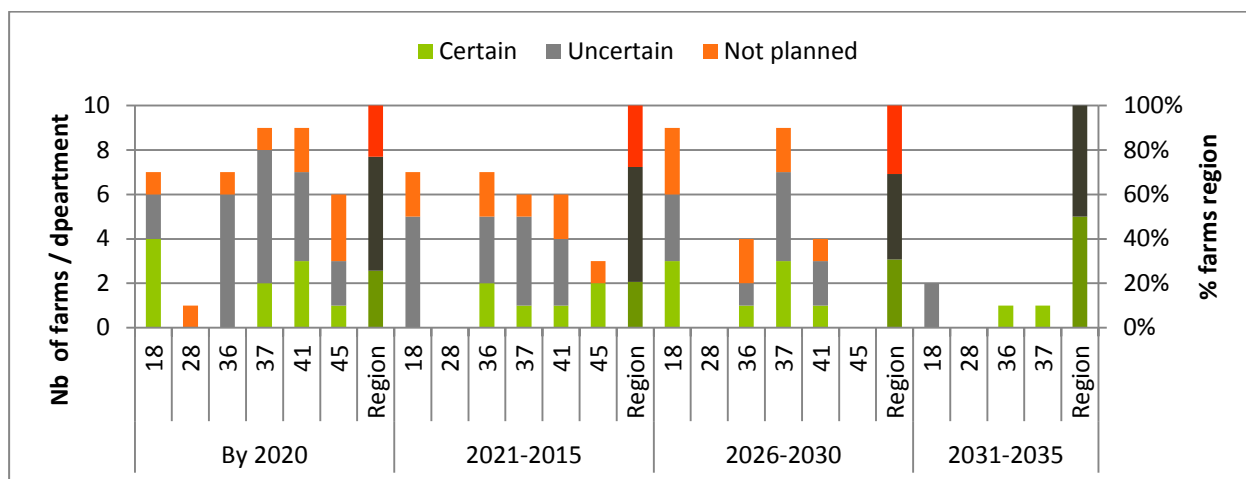


Figure 44 : Transfer status

Profile of farms to pass on

82% of farms own their buildings, 10% lease them and 7% own only part of it. In some cases buildings belong to a GFA (Agricultural Land Group).

On average 60% of the land is leased and 50% of farms have more than 75% of the land leased. On average there are 6.9 owners for land leased. This number varies from 1 to 70 but more than half of the farms have no more than 4 owners for land.

78% of farms plan to free farm buildings while the transmission, 10% are undecided and 11% will keep them. Those who will not release them, generally transmit the farm to a child or to a third party already set up on the farm (associate).

For farmers with a house attached to the farm corps, 40% think to release it, 33% think the keep it and 26.5% are undecided.

Appendix 15 : The farm and its natural and structural environment

Storage capacity of effluents

64% of farms respect applicable standards, 7% is currently upgrading their effluent facility and 11% plan to do it. 13% do not know if their facilities are up to standards. 5% of farms won't upgrade their facilities. 50% of farms that do not plan to upgrade their effluents facilities have a programmed stop of the goat activity; the other half is facing a financial impossibility.

Vulnerable zones

53% of goat farms are in vulnerable zone. This submits them to stricter legislation for the management of effluents, their application and the fertilization. 11% of farms do not know if they are in a vulnerable area.

Strengths and constraints

Being able to identify the strengths and constraints of the environment: natural surroundings, plots, infrastructure... allows to evolve in phase with it and to take advantage of the available resources

Assets linked to the farm environment

Structural strengths of the environment identified by farmers are: a quiet, pleasant and just enough isolated surrounding (27%), no immediate neighbors (17%), being close enough from cities and tourist areas (20%) and an easy access on the farm (14%). Other factors cited several times are a good location for direct sale, the little goat activity competition around or on the contrary the possibility of mutual aid with other goat neighbors, the creation of forage partnerships with neighbors and the ability to develop farm facilities (buildings, surfaces, other activities).

Some farmers also made comments on the geographical location of the region as an asset. As the name suggests, the area is located in the center of France, close enough to several major French cities (Paris, Bordeaux, Lyon) and well served. These are advantages for both sourcing raw materials or to ship, but also to attract customers and to participate in various events (exhibitions, conferences, training...).

There are also assets linked to the territory: the presence of one or several PDOs (9%) for the valuation of milk / cheese and farm diversification; but also for farms located on it PNRs (attractiveness linked to tourism).

The only environmental asset mentioned several times is the presence of hedges and trees near or in parcels and their effect as wind breakers and shade providers.

11% of farms believe that the structural or natural environment brings them no benefit and 12% answered "do not know".

Constraints linked to environment

Constraints linked to the farm environment are essentially structural. 20% of farms are constrained by the proximity of the neighborhood or a city. It is bothering mainly in flies hatching period, for reasons of management of effluents and for noise. In fact farmers are anxious about annoying their neighbors (smells) and about the image they give to the public (manure storage in plots or preparation of fertilizers in the yard). The nearby neighborhood also limits farm development (buildings) and the access to resources (no plots nearby for grazing or green-feeding). The geographical isolation (12%) is the second source of strain. This can cause problems for direct sales, the proximity with professional services (consulting, dairy, collection) or proximity services (utilities, groceries, leisure ...). Other constraints quoted were the proximity of the facilities with very busy roads, sometimes even in the heart of the farm or rather difficult access to routes for deliveries (paths, escarpment ...); the urbanization and the restructuring of traffic roads, presence of highways or railway, bypasses (direct sales), and the distance to other goat producers (pooling of resources).

Environmental constraints are vulnerable areas, water catchment and proximity to watercourses that affect practices in plots (10%), and the relief.

29.5% of farmers said that the operating environment does not impose any constraint. 14% of farmers answered "do not know" to this question.

Practices and biodiversity

84% of farmers think that their practices promote biodiversity; these practices are: the maintenance or planting of hedges* (54%) and trees* (32%), the presence of grass strips* (31%), the use of intercropping* (in time) (24%) and associations of crops* (22%), creating/maintaining habitat for auxiliaries* (21%), the presence of meadows and pastures (14%) with natural grassland, the presence of an apiary* (12%), the diversity and the length of the crop rotation (10%). Reasoning or non-use of pesticides, the introduction of nitrogen-fixing crops, the organic certification, the diversification of farm activities, no tillage and /or direct-seeding, the presence of small game and "arable weed plants", the obtainment of environmental subsidies from CAP, late mowing are other practices regularly mentioned.

*answers proposed if the farmer answered yes but without knowing what exactly

These practices promoting biodiversity are highly subjective and are most of the time imposed by some regulations. These imposed regulations do not always fit to the local reality, it is why questions on biodiversity and environment are misperceived by farmers and are highly sensitive subjects.

Appendix 16 : Economy

Income

58% of farms were satisfied of the income from the goat activity in 2015 (or on their last season). The most quoted lever (38%) to improve the income is the increase of the volume of milk produced. This lever must be operated carefully to keep a balanced system as mentioned earlier. Then comes the improvement of food self-sufficiency (26%) and cost control (23%). Other frequently mentioned levers are the reduction of expenses, the improvement of milk quality, the improvement of female-kids' breeding and the prospection for new business opportunities.

Technic-economic analysis

64% of farms are doing technical and economic analyzes. The most used is the accounting margin (69%). Production costs, technic-economic sum up and feed margin are other analyses used.

Some farms are doing "home-made" analyses, for instance the margins by type of cheese produced.

To expand performances of goat farms and to optimize systems, increase the number of farms conducting techno-economic analysis would be beneficial.

Risk perception

The biggest risks perceived by farmers are the sanitary risk for livestock (33%) and cheese processing (13%), the economic and financial risk (33%), which may be linked to conjuncture (17%) when prices of production are low and it endangers the whole farm, and finally the health risk for the operators (30%) that cannot easily be replaced.

This last risk is especially worrying them. In case they have to stop work for over a few days, the financial impact on the farm would be significant.

Appendix 17 : Needs in training

Among farmers in need for technical information, the favourite format for access to these data (Table 7) is the individual technical advice. 75% of farms have chosen - amongst others - this mean of acquisition. Depending of the theme and the complexity of information, training or simply information are also appreciated. On topics such as crop and forage production, breeders appreciate to share their practices with other breeders (collective technical advising or training).

Table 7 : Correlation table between technical information and format of information
(+++ = p.value <0.001, + = p.value <0.05)

	Individual Technical Advising (size 109)	Collective Technical Advising (size = 54)	Training (size = 66)	Information (effectif = 65)
Feeding	+++	+	+++	+++
Buildings	+			+++
Economy	+++	+	+	+++
Reproduction	+++	+	+++	+++
Flock mgt	+++	+	+++	+++
Sanitary	+++	+++	+++	+
Crops & forage	+++	+++	+++	+
Human Resources mgt	+	+	+	+
Work organization	+++		+	+++
Cheese processing	+		+++	+

A farmer also proposed to set up training in marketing for breeders, especially those doing direct selling. They would need it to position on the market and get the best value for their products. They could also learn how to create their own 'farm brand', to communicate on the image of their business.

The most significant brakes to individual technical advising are time to disengage and financial cost. Obstacles to collective technical advising are mainly the time to break free, the compatibility of schedule and to a lesser extent the search for such events. The brakes for participating in trainings are time available, the schedule and the access to information. And the principal difficulty to access information is time, in particular for search of relevant information and to sort through all the information provided.

Abstract

The goat sector in Centre-Val de Loire Region, France is highlighted by its five PDOs, its important volume of milk produced (63 million of litres in 2014) and its high rate of on-farm cheese processing (40% of the volume). Regional Agriculture Chambers and dairy counselling organisms wished to realize the diagnosis of the goat sector at the scale of farms. Through an inquiry led on 268 regional farms having a flock larger than 50 goats at 1st January 2016, this diagnosis allows to get to know better goat farmers, their farm systems and their projects by 2020 to anticipate futures evolutions of the business. Despite the stigmata left over the last crisis (2009-2011) and difficult climatic conditions on the last few years, goat farms reach today satisfying results both technically and economically. Breeders affirm their willingness to maintain volumes to sustain a flagship sector, of excellence and with high-potential. Efforts made to stop the decline of the number of farmers start to show results and must be maintained, and even reinforced in some territories. In order to develop and sustain the sector numerous other elements must be addressed: systems automation, food self-sufficiency or climatic changes are few examples.

Key Words

Territorial diagnosis, goat sector, farm scale, PDOs, agroecology