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# SUPPORT IN DEFINING SPECIFICATIONS FOR THE PRODUCTION OF LAMB ON ALPINE PASTURE IN ISERE

Master thesis

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## **Abstract**

French mountain farming is mainly based on breeding systems and the use of semi-natural resources such as alpine pastures. Pastoralism provides many services that are not paid. It is therefore necessary to invent and implement new approaches to strengthen mountain economies. In the department of Isère, different institutions and farmers work together to allow the creation and completion of a collective dynamic around the production of lamb which are growing on alpine pastures. A first study, conducted in 2012, resulted in the writing up of specifications in order to apply for a European sign of quality named Traditional Speciality Guaranteed. The study described in this paper aims to validate some criteria regarding to the classification of pastures, the age and weight of lambs when they go down from the mountains. It is also done to improve the understanding of factors which influence lambs' weight. A map showing the potential production areas has been established combining experts' knowledge and data about predation cases. Growth monitoring has been conducted on 500 lambs from four breeders. They have been weighed at least twice: once on their way up to alpine pastures and one after summer on their way back. Lambs weighing between 15 and 30 kg at the way up are best suited to produce carcasses from 15 to 22 kg at the way back. Age criterion is not important regarding to the lambs' weight at the way back. However, it is suggested that 210 days should be the maximum age at slaughter before. According to the results of this study, changes in specifications are formulated.

Keywords: Pastoralism, lamb production, specifications, collective approach

## Résumé

L'agriculture de montagne française est essentiellement basée sur l'élevage et l'utilisation extensive des ressources fourragères, nommée pastoralisme. En plus de l'activité d'élevage, le pastoralisme procure de nombreux services dont peu sont rémunérés. Afin de le renforcer, en Isère, le Conseil Général, la Chambre d'agriculture, la Fédération des Alpages et des éleveurs se sont regroupés pour mettre en place une démarche autour de la production d'agneau d'alpage. Un premier travail, mené en 2012, a permis la rédaction d'un cahier des charges en vue d'une demande d'obtention du signe de qualité Spécialité Traditionnelle Garantie. Cette étude vise à valider certains critères établis concernant la caractérisation des alpages, l'âge et le poids des agneaux à la descente d'alpage. Il s'agit également de fournir des éléments permettant de comprendre quels facteurs influencent le poids à la descente. Une cartographie présentant les zones potentielles de production a pu être établie grâce à des experts et au recensement des cas de prédation sur le département isérois. Un suivi de croissance des agneaux a quant à lui permis de répondre aux autres objectifs. 500 agneaux appartenant à quatre éleveurs ont été pesés à la montée et à la descente d'alpage. Les agneaux pesants entre 15 et 30 kg à la montée sont les plus aptes à produire des carcasses entre 15 et 22 kg. Le critère d'âge à la montée n'est pas important au regard du poids à la descente. Toutefois, il est proposé de fixer à 210 jours l'âge maximum à l'abattage. Suite aux résultats de cette étude, des modifications du cahier des charges sont formulées.

Mots-clés : Pastoralisme, production d'agneaux, cahier des charges, démarche collective

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## **Table of abbreviations**

ADG: Average Daily Gain

ANOVA: Analysis of Variance

CAP: Common Agricultural Policy

DDT: Direction Départementale du Territoire -> Departmental Direction of Territory

DREAL: Direction Régionale de l'Environnement, de l'Aménagement et du Logement

FAI: Fédération des Alpagnes de l'Isère -> Federation of the Alpine Pasture of Isère

GIS: Geographic Information System

Ha: hectare 1 ha = 2,471 acres

INAO: Institut National de l'Origine et de la Qualité -> National Institute of the Origin and of the Quality

INRA: Institut National de la Recherche Agronomique -> National Institute of the Agronomic Research

LU: Livestock unit

PACA: Provence-Alpes-Côte d'Azur

PDO: Protected Designation of Origin

PGI: Protected Geographical Indication

PHAE: Prime Herbagère Agro-Environnementale -> Agro-environmental grassland premium

PTP: Pastoral Territorial Plans

Tce: Tones Carcass Equivalent

UAL: Utilized Agricultural Land

## Introduction

The French ovine production is characterized by the diversity of breeding systems. One of them, the mountain pastoral system is based on the use of fodder resources available in high altitude zones where only animals can valorise them. The pastoralism has beneficial indirect consequences on the other economic activities on the territory. Nevertheless, these services are not paid and the main part of breeders' income comes from subsidies. In some places, specific dynamics managed to develop and so to maintain an important use of alpine pastures, in particular thanks to the obtaining of quality sign. It is not the case in Isère (a French department in the Alps) where any products valorised the use of alpine pastures.

The pastoral territories existing in this department face different stakes such as the use of alpine pastures, the strengthening of mountainous economies and also the need to establish a better dialogue between stakeholders. In 2010, the General Council of Isère which subsidise pastoral activities initiates a reflexion among various stakeholders in order to have a better economical valorisation of the alpine pastures. Afterward a study has been done and led to the creation of the initiative "Lamb of alpine pastures" (Agneau d'alpage in French). This project aims at developing this traditional production and at creating a local network under quality sign. To implement this project, the Agricultural Chamber of Isère and the Alpine pastures federation of Isère (Fédération des Alpages de l'Isère) decided to work on it. The last one was in charge, in 2012, of drafting specifications. In 2013, the objective was to validate or modify some criteria. Thus, this paper aims at achieving this goal.

Firstly, the global context in which the study took place is presented. The French sheep production and mountain agriculture are described. Afterward, characteristics of the studied territory, namely the pastoral territories of Isère are explained in order to place more exactly the expectations of the Alpine pastures association of Isère.

Materials and methods used to produce the results allowing modification in the specifications are detailed in a second part.

In the third part, results obtained are explained: it is question of i) the mapping of the potential zones of alpine pastures allowing lambs' production, ii) the identification of criteria explaining lambs weight and iii) the part of lamb respecting the weigh specifications of the buyers when lambs come down form alpine pastures.

To finish, results obtained and methods used are discussed. Modifications needed to the specifications are presented.



## **PART 1: Context**

## **1 French sheep production**

In this first part, the French zones of production are presented as well as the corresponding breeding systems. The sheep sector and market are described with regard to the origin of the consummate ovine meat. Trends in consumption are also clarified before ending with the presentation of the various quality signs.

### **1.1 The production diversity**

While the number of French farm having sheep flopped about 70% in 30 years, from 197 200 in 1979 to 55 945 in 2010, the national herd decreased less to stabilize around 7,5 millions heads (Groupe économie de l'élevage de l'Institut de l'élevage, 2013).

In 2010, the average number of ewe by herd eligible to the ewe bonus was 238 ewes. However, the geographical distribution of the livestock is very uneven. The herds of Lorraine, Midi-Pyrénées and Provence-Alpes-Côte d'Azur contain on average more heads. The biggest herds are in Provence-Alpes-Côte d'Azur region.

The herd size is greater among younger farmers. The breeders under 40 years old represent 16% of farmers and own 25% of the livestock. This also shows that most sheep owners are rather old. This results in difficulties in the sector dynamic and farmers' renewal. Efforts have been undertaken by the profession to make it more attractive for young generation, the action "sheep recovery" ("Reconquête ovine" <http://www.reconquete-ovine.fr/>) is a good example. This was also visible at the Salon Tech Ovin 2013 in Bellac where a major theme was the installation of new farmers. Different sheep systems were also presented at this manifestation.

In contrast to other countries such as Australia and New Zealand, specialized in meat production in a single model, the French ovine production is characterized by a huge diversity of breeding systems. Dairy sheep production is not negligible (around 28% of French sheep) (Groupe économie de l'élevage de l'Institut de l'élevage, 2013).

The sixty breeds registered in France by the Office of Genetic Resources is a perfect illustration of the history of sheep production in France. Sheep have long been present on the entire territory, with the appearance of specific breeds to each region. In the early twentieth century, the farms became more specialized and intensified. Now, sheep production is mainly concentrated in the "disadvantaged" areas where other productions are only slightly possible (AgroParisTech, 2008).

This repartition is still visible today. The majority of sheep farms are located in the mountains. Figure 1 illustrates this. It shows the distribution of farms with sheep and geographical boundaries of mountain ranges. However, even within range, different production sites can be identified. They are often associated with very particular systems. By comparing the data on the number of farms with sheep and the number of sheep by small geographical unit, it is possible to identify the different production areas (see Appendix 1). A first distinction has been done regarding the targeted production: milk or meat. In the meat category, three mains systems are identified: grazer system, mountain pastoral system and dry pastoral system. All farms do not belong to one of these groups but they allow to present the outline of French sheep production. A description of these systems is made in the following paragraphs.

Figure 1 : Map showing the proportion of farms with sheep by canton in 2010 and the French range boundaries (red lines) (Agreste, 2010)



© Maaf 2012 - IGN GéoFla 2010 - France by canton (by commune for the overseas department)

### **1.1.1 The dairy systems**

In France, two dairy production basins are clearly identified: the Roquefort area and the Ossau-Iraty area. A third basin can be mentioned, it is Corsica where different cheeses are produced (the most famous is the Brocciu). These three cheeses are the subject of different Controlled Designation of Origin (CDO) (INAO, 2013). While only 40% of the milk is used to produce a cheese with a CDO, 80% of farmers are engaged in a process of identifying quality and origin signs (DOCKES *et al.*, 2012).

In each basin, specific breeds are present. Intensification degrees of systems, lactation duration and genetic explain the different production capacities on these three basins (from 290 litres per ewe per year in the Roquefort to 137 litres in Corsica).

However, whatever the differences between the basins, they share the same purpose : strengthening the French cheese industry (DOCKES *et al.*, 2012).

### **1.1.2 The grazer systems**

The grazer systems owe their name to the place that holds the grass in the diet of sheep. These systems are mainly found in the northern part of France because these regions have a climate suited to grass growth. The main grassland areas are:

- Bays of Somme and Mont-Saint-Michel otherwise known as areas of salt marshes;
- The eastern part of France;
- As well as the midwest.

In these regions, systems are quite intensive. Housed lambs are also produced (Institut de l'élevage, 2006). Different breeds are also used in pure and/or crossed in order to produce heavy lambs. For example, breeders use the Texel, the Bleu du Maine, the Charmoise and many other breeds (PRACHE *et al.*, 2013a).

In these systems also, quality signs exist in order to valorize lambs in a better way (see part 1.2.3). These lambs produce thanks to the grass born in February-March to take full advantage of the spring grass growth and are generally sold in summer or year-end.

### **1.1.3 The pastoral systems**

#### **1.1.3.1 Mountainous**

The mountainous systems are named after their geographical location primarily in the Alps and the Pyrenees. Systems from the west part of Pyrenees are not described since it is mainly dairy systems mentioned above. In mountain systems, local landraces are still strongly present such as the Merinos in the Alps and the Tarasconnaise in the Pyrenees. Many breeds with small number of ewes are still existing and participate to the French genetic diversity (PRACHE *et al.*, 2013a, Bureau des ressources génétiques, 2013).

All the breeds are used because they are well adapted to the specific climatic conditions and are generally “good walkers”, criterion therefore essential since they are use of alpine pastures. Farmers can easily seasonally adjust the reproduction of these hardy landraces which is more difficult with other breeds. So two lambing periods are generally used, it is the early spring and the autumn. Lambing is generally done at the descent of the alpine pastures in the autumn. Thus lambs can be sold before the next alpine pastures grazing season. These lambs are available on the market for Easter, French peak consumption. The other time is in the late winter-early spring before the next rise in alpine pastures. These are lambs that take full advantage of natural grassland resources; either they will go with their mothers on the alpine pastures or they will be fattened inside pen or in lowlands pastures. The mountainous farmers choose one or the other of the two period or both of them in order to distribute the workload and spread sales over the year.

In these so-called mountain pastoral systems, it is possible to distinguish herds who are all the year round in mountain unlike those who are “ascend” the mountain from plain only in summer time to valorize the alpine pasture resources. These differences are described in more detail for the context of Isère (see part 2.3.3). Some quality signs also exist in such systems for which the best known is certainly the Protected Designation of Origin (PDO) Barèges-Gavarnie.

### **1.1.3.2 Dry**

Two other significant systems exist in France: the pastoral system in the Causses (which are dry calcareous regions) and the other from the Basse Provence (also called La Crau). Unlike previous pastoral systems, animals do not necessarily change location during summer. However some farmers still practice transhumance.

For the first system the breed “Causses du Lot” is dominant. In the 90s genetic program appeared with the use of another breed called Ile de France. This selection is very well working and the lambs are valued by a Red Label as well as a Protected Geographical Indication (PGI) (Chambre d'agriculture du Lot, 2013).

The system of Basse Provence is mainly based on the use of two breeds: the Merinos and the Prealpes du Sud. These breeds are particularly well adapted to the dry climatic conditions occurring on this part of France. Different farming systems coexist: transhumant or sedentary, sheep specialist or not. Transhumant herds are averaging 600 ewes Arles Merinos that spend the summer in mountains. The food autonomy is high but not complete. The production is oriented towards housed lamb. Some breeders also have hay meadows where they produce the famous Crau hay (Institut de l'élevage, 2013b).

## 1.2 French sheep sector and market

### 1.2.1 The weight of imports

In 2012, the European Union has killed 837 000 tones carcass equivalent (tce). The France ranks in the 3<sup>rd</sup> place with 83 000 tce slaughtered, far behind the United Kingdom (276 000 tce) and closer to Spain (123 000 tce). In contrast, the European consumption reached 982 000 tce, making EU in deficit in sheep meat. Most imports are provided by New Zealand and Australia which provided 160 000 tce in 2012. Followed to a less extent the countries of South America which provided 7 000 tce. The production of Oceania countries supplies the world market. It is both for historical market such as North America and Europe, and new growing markets such as China. Exports of these countries are highly linked to the climatic conditions and the quantity exported may vary significantly from one year to another. For example, in 2012, Australia exported 22 % more sheep meat than in 2011. These changes have a direct impact on market prices. Another new phenomenon need to be mentioned : Oceania countries are turning increasingly to emerging countries with growing demand and which are more geographically accessible (Groupe économie de l'élevage de l'Institut de l'élevage, 2013, CARLIER, 2013)

Such as the European Union, France is in deficit regarding sheep meat. It is even the country

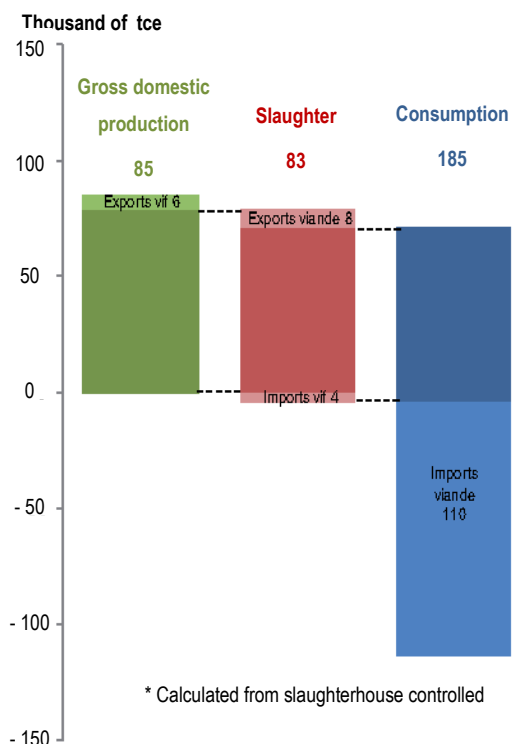


Figure 2: Presentation of French sheep market in 2012 (estimation in thousand of tones carcass equivalent) (Groupe économie de l'élevage de l'Institut de l'élevage, 2013)

with the largest in Europe. The French production is far from meeting the demand ( see Figure 2). In 2012, only about 40% of the ovine meat consumed in France was of French origin and the self-sufficiency rate did not exceed 46%. The majority of imports to bridge the shortfall comes from the European Union: 49% of the 110 000 tce imported comes from United Kingdom, 19% from Ireland, 10% from Spain and 17% from New Zealand. The price of meat from these countries is much lower than the French prices. For example, in 2012, in the United Kingdom the market price of a carcass kilogram was 4,88€ against 6,57€ in France. These differences partly explain the economic difficulties faced by suckling sheep farmers. However, these imports are indispensable, they are positioned in a niche of low prices. If they should be reduced, local

production will have enormous difficulties to occupy this niche. The decrease of meat arrival at low cost can therefore partially explain the decline in consumption in France. (Groupe économie de l'élevage de l'Institut de l'élevage, 2013, PRACHE et al., 2013a, BABA-KHELIL and TREMBLAY, 2012, FranceAgrimer, 2013, CARLIER, 2013)

## 1.2.2 The reduction of consumption

Although meat consumption was almost multiplied by 1,5 since the 70s, sheep meat has not followed the same trend. The consumption of white meat is largely responsible for this increase. In a first time, sheep meat has boomed from 150 000 tones consumed in 1970 to 320 000 tones in the early 1990s. Then, consumption has fallen to stabilize at around 200 000 tones in recent years and reached a market share of meat equivalent at the situation of the 70s (around 4%). French are the fifth largest European consumers of sheep meat with

an average of 3,4kg/capita/year (in 2010) far behind the Greeks who consume more than 10 kg/capita/year. In France, during the last decade, the annual consumption per capita decreased by approximately 1,5kg and this trend does not seem to change in recent years.

In 2008, 20% of sheep meat was consumed outside the home. The supply of these circuits is mainly done by imported meat. For the remaining 80%, the supply circuit remains more traditional than for other meat (a quarter of purchases is made in butcheries or on markets while this share is only 14% for beef), although hypermarkets have greatly increased their sales (see Figure3) (FranceAgrimer, 2012). The consumption of sheep meat is still strongly linked to the Easter period (see Figure 4). Thus, in the three dominant monotheistic religions, lambs are associated with various sacrifices that allowed men to be saved or to show their obedience to God. It is interesting to note that purchases made for the Aïd Al-Kabîr are not shown in Figure 4; this may be due to the particular method of data acquisition (Kantar Worldpanel) although sales on this occasion are not negligible for some farms. (FranceAgrimer, 2012, PRACHE et al., 2013a).

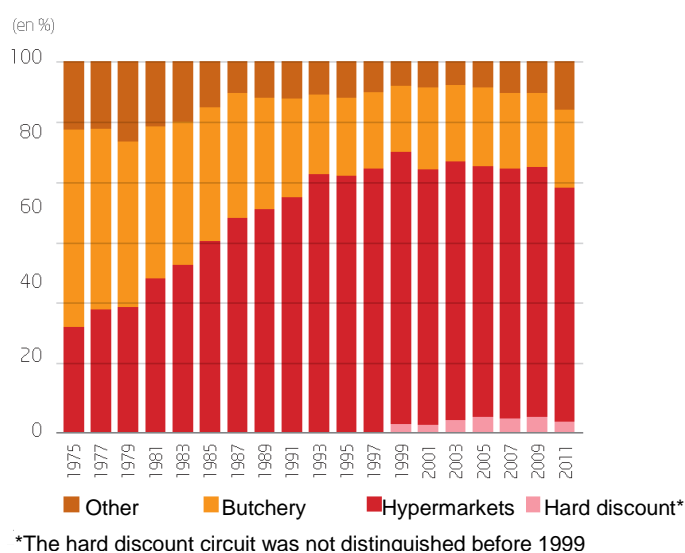


Figure 3 : Evolution of the share of distribution channels in sheep meat from 1975 to 2011 (FranceAgrimer, 2012)

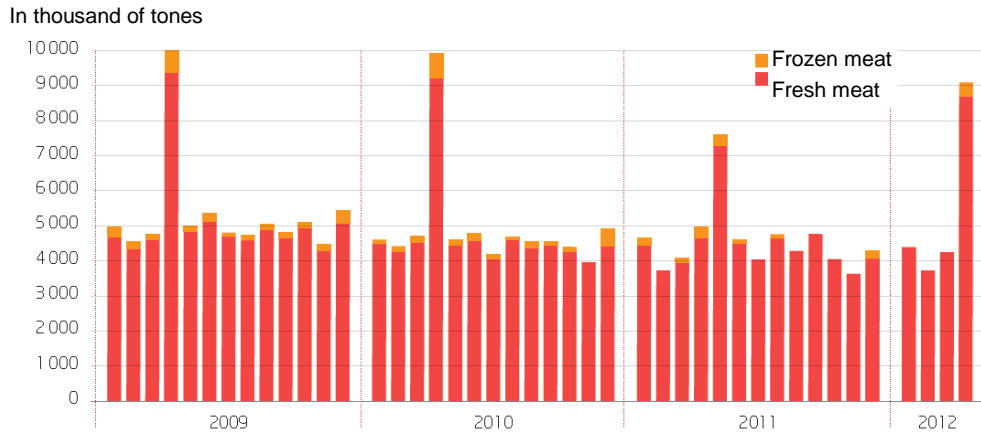


Figure 4: Lambs purchase according to months and years in thousand of tones (FranceAgrimer, 2012)

Table 1: Average purchase price of fresh meat by French households in 2010 (PRACHE et al., 2013b)

Sort of meat	Price in €/kg carcass equivalent *
Veal	7,4
Beef	6,4
Lamb	11,3
Pork	3,3
Chicken	3,5

\* Value of kg carcass equivalent reconstructed from pieces retail prices and the proportion of each piece on the

Consumption pattern also vary greatly from a region to another. Consumption of sheep meat is higher in the regions of South-East France. This is partly due to the fact that the proportion of households with an old person responsible for purchases is higher in this part of France. Indeed, 74% of purchases (in terms of volume) are done by people over 50 years. Purchases are mainly performed by the wealthier socio-economic classes. As it can be seen in the Table 1, the lamb

meat remains at a high price, which hinders its consumption (FranceAgrimer, 2012). Moreover, French clearly prefer pieces which can be grilled than the one which to be boiled. These last ones represent only 10% of purchases. It is also the preferred pieces that are the most expensive (ibid.).

To face all these obstacles to consumption and to encourage young people to buy sheep meat, initiatives are emerging. The quality signs can be cited, they represent 15% of the sales. Another project is called « Agneau Presto » (<http://www.agneaupresto.com>). This approach set up in 2008 thanks to stakeholders from France, United Kingdom and Ireland. It aims to promote lamb meat through the improvement of convenience and the reduction of needed cooking time of the different products. However, although this initiative is interesting and encouraging for the sheep industry, it seems little known by both farmers and consumers.



### 1.2.3 Various quality sign for sheep production

In 2013, there are 3 Controlled Designation of Origin (CDO) which are also under the European quality sign Protected Designation of Origin (PDO), 10 Protected Geographical Indication (PGI) and 13 Red Labels. All these signs are spread all over the French territory. In addition, other quality signs such as organic farming certification, certification of product conformity, collective and private brands are used by farmers and meat professional. CDO allows to differentiate a product which derives its authenticity and character of its geographical origin. PDO is the transposition at the European level of the French CDO. The PGI “distinguishes a product that all phases of production and process are not necessarily done in the eponymous geographic area but which has a strong link to the territory and benefit from a strong notoriety”. Red Label is a French quality sign which is done to value products which have a higher quality than the standard products (INAO, 2013).

These quality signs associated to the lamb production, except the PDO Barèges-Gavarnie which also sells ewe meat, allow the French production to stand out. The 3 PDO allow the marketing of products in high-end niche market, while the Red Label and PGI are marketed at a wider scale and are sold in numerous supermarkets.

#### **SUMMARY** : What you need to keep in mind about French sheep production...

- Number of farms with sheep decreases. This production does not interest a lot young people which are starting farming. The main part of sheep breeders has more than 40 years.
    - There is a need to give a new dynamic to the French sheep industry. Stakeholders of sheep sector try to create collective initiatives.
  - Sheep farms are mainly located in disadvantaged areas.
    - Sheep farming must adapt to various environmental constraints.
  - The sheep production is diversified, many systems coexist and are complementary.
  - Self-sufficiency rate in sheep meat is slow, only 40% of ovine meat consumed in France is produced on the national territory.
  - Imports are driving down the price of sheep meat. French farmers can not compete with these low prices.
    - Implementation of different demarcation strategies based on product quality, in order to increase selling price among other things.
  - Consumption of sheep meat continues to decline and young people consume very little of it.
    - Need to make this product more attractive.
  - Quality sign are numerous.
    - The saturation degree does not seem to be reached but for any new signs, it is necessary to create differentiation with other existing products.
- The French territory and market are not saturated, there is space for everybody in sheep production.

## **2 Mountains and French agriculture**

When we speak about mountains in France, we first need to agree on the definition of this word. Two definitions exist: one given by the Common Agricultural Policy (CAP) and one given by the “mountain law” from 1985 which create the notion of mountain massif. These two definitions have not been done in the same purpose (see comparison of this two zoning in Appendix 2). The CAP use this term to underline the structural and natural disparities which exist between farming systems. Areas called « disadvantaged » are classified in five groups which for France at least: specific handicapped area, simple handicapped area, foothill area, mountainous area and high mountain area. The three last areas are specific to the mountainous context. The two other one are spread on the entire territory. The mountainous massifs defined by the « mountain law » have been created in order to establish a coherent land use planning policy. Their scopes are wider than CAP zoning. Indeed, they also include lowland areas if they are in the continuity of the massif. Six massif are currently defined in France (from South to North: Corsica, Pyrenees, Massif Central, Alps, Jura and Vosges) and three in the overseas departments. Thereafter, we will not speak about these departments because of their big differences with the mainland (Observatoire des Territoires de Montagne, 2013). In a first part, the six massifs are described. Then, a presentation of mountainous agriculture is done and finally we will speak about pastoralism in Isère as far as the study territory is on all the pastoral territories of this department.

### **2.1 Socio-economic presentation of French massifs**

Socio-economic dynamics of massifs can be understood by using data from the Observatory of Mountain Territories.

Socio-economic dynamics can be understood by massive data from the Observatory of Mountain Territories. In this section are used those submitted by the Interministerial Delegation to the development and competitiveness of the territories included in a publication of Agriculture Chambers(NOURY, 2010).

Demographic trends of massifs are really different from the national ones. Between 1999 and 2006, Alps and Jura population increase more than the French average, while trend is reversed in the Massif Central and Vosges. Population densities in the French mountains are lower than the national average (27,8 inhabitants/km<sup>2</sup> in the Pyrenees to 83,8 inhabitants/km<sup>2</sup> in the Vosges against 112,9 inhabitants/km<sup>2</sup> in France). Mountain populations are instead quite rural even if urbanization trends appear in the Jura, the Northern Alps and the Vosges. This diversity in population density seems to be linked with the proportion of agricultural job. Indeed, one can observe that more the population is dense, less agricultural jobs are

present. Thus, in the Pyrenees and the Massif Central, agricultural jobs concern 8,4 and 6,9% of jobs against 3,5% nationwide. Other non-agriculture-related specificities exist in the massifs. Industrial sector is really important in the Jura and the Vosges (see Figure 5)

On the contrary the Alps and the Pyrenees are characterized by significant tourist activity. Indeed, the proportions of second homes are three times higher than France and have increased since 1999 (share of second homes in France: 9.9% / +5.7 % since 1999; in the Alps: 26.6% / 8.7 % and in the Pyrenees: 35.6% / 15.5 %). In other massifs, tourism seems closer to the entire French territory. If the Alps are experiencing job growth higher than the French average (13.7% against 11%), this is not true for other massifs, they have lower growth ( NOURY , 2010).

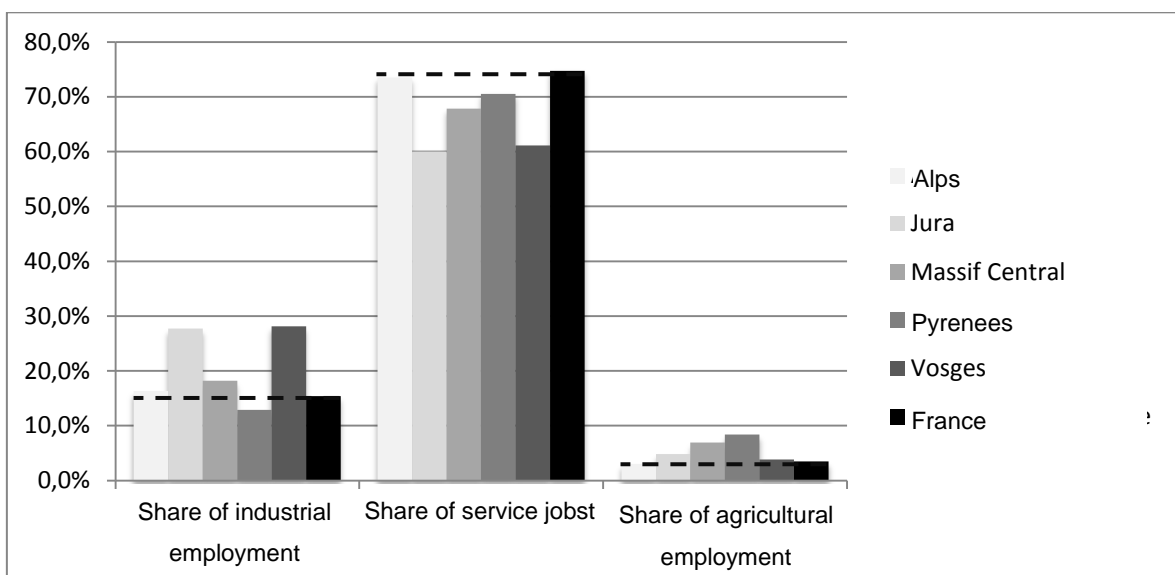


Figure 5 : Job repartition according to sector and massifs in comparison with the national average (NOURY, 2010)

Differences between massifs and the rest of France are also visible in terms of land use. 14% of the French Utilized Agricultural Land (UAL) is in mountainous area. The share of land dedicated to agriculture is less important than on the entire country. The UAL of massifs concerns on average 34,2% of land against 51,8% at the national level. However this number need to be put into perspective because the collective pastoral areas which are the support of agricultural activities are not counted there. Moreover the mountain territory is much more under forest. Forests occupy from 27,2% of the Massif Central up to 58,5% in the Vosges. In France, this occupancy level is only about 24% (CLOYE, 2010).

## 2.2 Mountainous agriculture

### 2.2.1 General characteristics

If socio-economic differences exist, it is also true in terms of agriculture. The Jura, the Vosges and the Northern Alps (Savoie and Haute-Savoie more precisely) produce essentially milk, as it is confirmed by the various dairy cattle breeds from these places (Vosgienne, Abondance, Montbéliarde, Tarentaise). On the contrary, Southern Alps, the Pyrenees (except the department called Pyrenees-Atlantique) and Corsica are more oriented towards meat production. Breeds can again illustrate this fact. The only massif not clearly classified is the Massif Central, we say it's a mixed breeding system as far as farms there produce either milk or meat or both. The typical breed for this region is the Salers which either use to produce cheese or meat. (Groupe Salers evolution, 2012).

However, whatever the differences, the strong presence of livestock is a common feature to all the massifs. Indeed, in mountainous areas, three out of four farms are specialized in livestock breeding. The mountain cattle accounts for 17% of the national herd. This figure rises to 39% for sheep farming. 16% of French farms are located in mountainous area. However, these percentages vary greatly from one production to another (see Table 2). Once again, the sheep production appears to be strongly settled in the mountainous areas.

Table 2 : Professional farms distribution in mountain according to their main production (CLOYE, 2010)

	Mountain	France	Mountain share
<b>Dairy cattle</b>	15358	55091	29%
<b>Meat cattle</b>	13950	39687	35%
<b>Mixed cattle</b>	1806	8520	21%
<b>Sheep</b>	6185	9540	65%
<b>Goat</b>	872	2277	38%
<b>Other herbivores</b>	3287	7430	44%
<b>Fruits</b>	1586	9122	17%
<b>Pig, poultry</b>	1114	13305	8%
<b>Vegetables and horticulture</b>	648	9682	7%
<b>Viticulture</b>	2489	43975	6%
<b>Crop/Herbivores</b>	1581	36494	4%
<b>Crop</b>	1325	74596	2%
<b>Other</b>	1871	18506	10%
<b>TOTAL</b>	52070	326225	16%

Given the importance of livestock and environmental constraints, permanent grassland occupy more than 80% of the UAL in mountain areas except in the Vosges where the percentage is slightly higher than 60%. The low productive permanent grasslands also occupy a significant share of the UAL, which means that the individual and collective alpine pastures are important in the functioning of mountain agriculture. These surfaces support pastoral practices. That is why pastoralism is inevitable in these areas. This is especially true in the Pyrenees and the Alps, where these surfaces occupy more than 60% of the UAL (CLOYE, 2010).

Mountain agriculture, in addition to be characterized by a strong presence of livestock differs from the rest of French agriculture by the farms structures. Indeed, farms are mostly smaller in size than the national average. The intensification process of the twentieth century has been felt less in the mountains. This is partly due to environmental constraints that govern the farm shapes. Herd size is generally decided according to the resources available unlike other types of agriculture where available resources and production are more and more disconnected. If farm size stays modest and do not follow the national trends, it is not the same regarding the number of people which are starting an agricultural activity.

In mountains, the renewal rate of farms is higher than in plains which cause a phenomenon of rejuvenation that is reassuring and needed. This trend is particularly visible in the Jura, western part of the Pyrenees and in some parts of the Massif Central. On the contrary Vosges are facing an agricultural decline. Another characteristic of mountain agriculture is the multi-activity of farmers, slightly higher in plains than in mountains, it is not the case for the high mountainous areas. In this part of the territory the share of multi-activity is twice higher than in plains and concern 17% of farmers. This is partly due to the fact that farms have smaller size and so farmers do not manage to get enough money from their agricultural activities. The Massif Central and the Jura which are not high altitude mountain ranges differ from other with a low share of multi-activity farmers. The part of full time farmers is even higher than on the plains (MOREL-A-L'HUISSIER, 2008).

As it shown by multi-activities farmers, this agriculture which is so particular is located at a crossroad with other economic activities of the territory.

### **2.2.2 A multiservice agriculture**

Without the volunteer of reducing mountainous agriculture to pastoralism, this part describes more the pastoral activity and its role in mountainous economies. Besides its unavoidable aspect of agricultural production, pastoral activity has many positives externalities. The term

externalities is highly controversial. Thus, since the introduction of the term by Sidgwick in his work on political economy, numerous authors tried to find a “good” definition. Here we will keep in mind the general idea that this concept “allow to report interdependences or interactions out of market, between functions of utility and/or production” (GROLLEAU and SALHI, 2009). The term is used in this paper to underline that pastoral activity has, in addition of the production purpose, many non-wanted consequences on economies services which encompass it. It is necessary to say that this ecosystemic services do not have a commercial value (HENRIET, 2012). All the externalities are developed in the Appendix 3.

### **2.2.2.1 Links with tourism**

Concerning the use of pastoral areas (mainly alpine pastures) by tourism, two activity periods are distinguished: winter and summer. Stakes appearing between these seasons are a mix of the one faced during the other part of the year.

In the winter, pastoral areas are covered by snow because of their altitude. Thus they are in some places the support of skiing stations. In this situation, pastoral activities maintain the skiing tracks at low cost. Most of the time this service is not paid to the breeders even if it decreases the stations functioning costs. Livestock grazing out of the skiing tracks contributes to avalanches limitation. Indeed grazing reduces the grass size which is increasing the forces of friction and so the snow retention. Moreover, the image linked to pastoralism can become a commercial strength, giving a higher quality value to stations. Links between skiing stations and pastoralism are quite strong even if unidentified. Sometimes skiing stations take their name after the pastoral activity as it illustrates by the famous station l’Alpe d’Huez. Here Alpe means the alpine pastures where the animal graze during summer and Huez is the name of a village. So the name of the station is directly linked to the pastoral activities. And the station is using this history in the presentation of itself (<http://www.alpedhuez.com/fr/ete/la-station/presentation.html>). Finally the winter activities give the opportunity to farmers to find another job needed to enough money to live.

The surroundings of farms and more widely the mountainous landscape are intimately linked to other economic activities of the territory and in a large part to livestock breeding. In summer, alpine pastures are the location of different sport activities: hiking, cross country biking, mountain board, paragliding for example. Herd presence in the same zones of these activities can also be an attractive factor. However pastoralists are barely paid for this touristic dimension of their activity which is important for the territory. Even if some farmers or shepherds get benefit from it, those organizing paid tour on their alpine pastures to see animals in “wild conditions” for example (an example in the Pyrenees with the organization Estive life: <http://www.viedestive.com/estivet.html>), those selling their products processed in

alpine pastures or not or those which have accommodation facilities (example of the alpine pasture lodge called Gîte d'alpage du Pré du Mollard in Isère <http://www.alpages38.org/decouvrir/pre.php>). Alpine pastures can also be included in touristic initiative as it is done by the "Saison des Alpagnes in Belledonne", translated Alpine pastures season in Belledonne (<http://www.alpages38.org/decouvrir/saison.php>). Moreover these positives effects of pastoralism on tourism and vice versa, some problematic interactions exist. For example, in areas where the wolves are present, shepherds use protection dog and some bites cases have occurred. On the contrary, hikers who do not respect the rules (letting their dog for example) can strongly disturb livestock. However, these are not troubles without solutions; it is why dialogue and communication programs are implemented by the different French pastoral services existing.

Partly links to touristic activities, location or purchases of houses and flat are also encouraged by pastoral activity which is mainly seen as an attractiveness factor. However, this economic activity can cause a high land pressure and so increase the difficulties for farmers to take over a farm and to start their job. It can even make their job harder if they lose land for example.

### **2.2.2.2 Links with social life**

Pastoralism is a key element on mountain cultural heritage. It keeps some traditions alive while adapting and evolving with the socio-economic context. The existence of museums and heritage interpretations centers promotes the enhancement of know-how, skills and knowledge. In this cultural dimension, may be associated the many parties/festivals which give rhythm to the pastoral activity (transhumance party, fairs at the descent of animals from the alpine pastures for example). These events are an opportunity for pastoralists, local stakeholders and/or tourists to meet and in all cases to share life moments. This allows keeping an important and dynamic social network which people need to stay on the territory. All these economic and social activities help to stem the depopulation of rural and mountain areas where it was strong in the past

### **2.2.2.3 Links with the environment**

Positive or negative consequences on the environment highly depend on the pastoral practices i.e. animal species, presence time, loading and driving modes of the herd. Indeed, it is difficult, if not foolish, to generalize any impact on all pastoral areas. However, trend can be identified.

In terms of natural risks protection pastoral activities seems to be more positive. As said before avalanches risks can be decreased by grazing. In pastoral areas, grazing allows reducing risks of fire. Indeed, animals clear efficiently and at low cost, areas where

machineries cannot go. Moreover, they create passages that facilitate interventions of people in the case of fight against the fire. Animals also allow maintenance and creation of firebreak zones. Finally, they reduce the quantity of organic matter on the ground and so decrease the quantity of flammable materials

Given the age of pastoral practices, mountain ecosystems have evolved in conjunction with them, allowing the development of a specific biodiversity. The challenge now is to maintain this biodiversity linked to pastoralism. Even if it is difficult to precisely identify the consequence(s) of a particular practice on each case, it is clear that excessive changes usually lead to loss of biodiversity. For example, in the case of the black grouse, a nonexistent grazing causes the closure of the landscape... This phenomenon is unfavorable to this species which need open areas. Unlike excessive grazing pressure also lead to a decrease in the bird population by the destruction of broods that are on the ground (LOSINGER *et al.*, 2011).

Pastoralism consequences on biodiversity are complex and aim here it is not to detail this topic. It is important to mention that the public authorities are awarded of these issues and may pay practices along the lines environmental goals

Nevertheless, the payment of such services is rare and do not allow to consolidate the mountain agriculture which remains fragile.

## **2.2.3 A fragile agriculture**

### **2.2.3.1 Difficulties of agricultural industries**

In a global context of scale economies, food facilities such as slaughter house and process factory follow a geographical concentration strategy. Concerning the milk industry, this goes with troubles in mountain areas. For some farms which it is difficult to access, collect costs are increased and factory do not always to go in these farms. If we add the fact that the number of dairy farms is decreasing, one can observe a weakened industry. This is even truer for small structures which have difficulties to face concurrence and reach more often their critical size. In the same way, meat industry using small slaughter house have difficulties to maintain their activities. Thus, already areas do not have a slaughter house, as said the economic affairs commission of the national assembly the 9<sup>th</sup> October 2013 (Commission des affaires économiques de l'Assemblée nationale, 2013).

Against these difficulties, industries organize themselves in order to create added value partly using the demarcation of products thanks to origin, quality, etc. However these initiatives alone do not guaranty the perpetuity of existing farms, factories and other facilities. These strategies use the mountain image as it has a good effect on consumer choice and also use quality signs. However this qualitative distinction is mainly due to geographical



origin. So it does not exist in all the massifs and for each production. If the sheep and cattle dairy industry as well as the lamb industry have many quality signs, it is not at all the case for the cattle meat. It is partly due to the fact that products are not sold “ready” to kill but more generally alive and exported to other countries such as Italy and Spain where they are fattened.

Nevertheless these quality signs improve the added value; mountain farmers remain those who have the smallest income.

### 2.2.3.2 Low income

Even if the incomes have improved on the long term, mountain agriculture still does not have improved enough to fill the gap with plain agriculture. Indeed, income of mountain farmers stays about 30 to 40% lower than plain farmers’ income, as it shown in the Figure 6. The last data are from 2006, no major changes have occurred since this year, so we can assume that the situation is the same. Even with compensation subsidies aiming at maintain agriculture in disadvantaged zones, income are not equivalent on all the territory. However it is needed to give precision to this global situation. These results are mainly due to the weight of grazing systems which are structurally disadvantaged compared to crop systems and to the low size of production structure. Here again differences between massifs exist. For example, dairy farms of Savoie which benefit from a PDO valorize well their production and so have good income. Milk is paid twice higher in the Beaufort production basin than the national average cost. While in Auvergne, too small farms do not manage to get the self-financing needed to the improvement of their production equipments. These farms are very precarious and totally dependent on subsidies. (MOREL-A-L'HUISSIER, 2008).

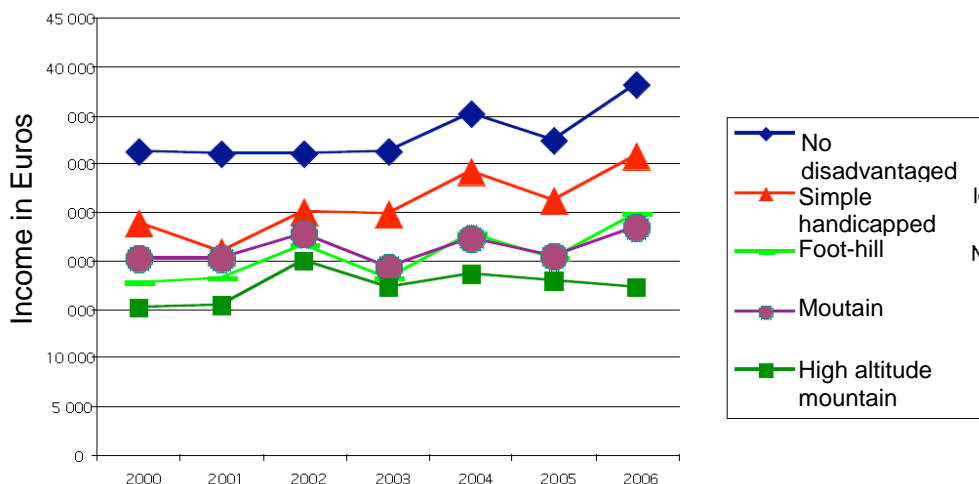


Figure 6 : Evolution of income according to zones (MOREL-A-L'HUISSIER, 2008)

### 2.2.3.3 Subsidies, needed tools to maintain agricultural activities in mountain

Two kinds of subsidies can be distinguished: support subsidies and subsidies directly linked to the production. First ones aim to help agricultural systems which are under more constraints than the classical French agriculture. Second ones are linked to a production which means a farm can get them only if he does the specified production. Different subsidies which concern the mountain are described in the following paragraphs.

#### 2.2.3.3.1 Support subsidies

The main measure of support for mountain agriculture was introduced in 1972: it is the Less Favored Area Compensatory Allowance Scheme (LFACAS). As Mr Morel-A-l'huissier said in his report, « its principle is to compensate financially for the additional costs of production connected to the permanent natural handicaps which they undergo with regard to the regions of plain ». Formerly paid according to the of Livestock Unit (LSU) held by the breeder in winter, it is now paid according to the number of hectares of fodder surfaces situated in disadvantaged zones (MOREL-A-L'HUISSIER, 2008).

These zones are among five: zones of mountain and High Mountain, zones of foot-hill, specific handicapped area and simple handicapped area. Moreover a distinction is made between dry areas and the others. In dry area, an additional subsidy can be allocated to crop surfaces. Amounts assigned by the EU and France to this help are in constant increase as shown in the Figure 7. If we look at it and at the Figure 6 in the same time, one can see that the LFACAS represents about 30% of farmers' income.

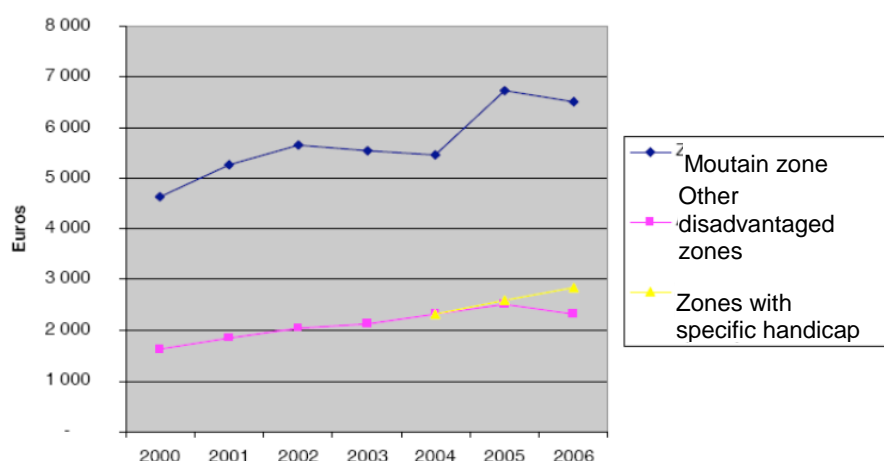


Figure 7 : Average grant per farm (in euros) (MOREL-A-L'HUISSIER, 2008)

In 1992, particularly in order to balance the distribution of subsidies to all agricultural systems, the grass premium (Prime à l'herbe in French) was created. In 2003, it changed its name to the agri-environmental grassland premium, it is part of the agri-environmental

measures. Its objectives are to stabilize grassland surfaces and promote biodiversity by the maintenance of environmentally friendly practices (Ministère de l'agriculture de l'agroalimentaire et de la forêt, 2010). Other agri-environmental measures exist in mountain such as the territorialized agri-environmental measure. These subsidies subject to contract allow payment for services that agriculture makes for the territory.

Many other subsidies have been or are allowed to mountain agriculture: Sustainable agriculture contract helps in order to modernize the breeding buildings, helps for young farmers which are starting farming activity in mountain area, etc.

(MOREL-A-L'HUISSIER, 2008, Ministère de l'agriculture de l'agroalimentaire et de la forêt, 2013).

### **2.2.3.3.2 Subsidies directly linked to the production**

Direct subsidies are awarded based on one or more production present on a farm They can be coupled, conditioned by the realization of a production or decoupled, then allocated under the shape of rights to single payment. Given specificities and complexity of the Single Payment Scheme, they are not presented in this paper especially as they are not at all specific to the mountain context. Coupled helps are also not specific to mountain context but given the fact that our study is about lamb production in mountains, those linked to this production are described.

Since 1982, a premium is awarded to sheep production. It is paid according to the number of head in the flock. After several changes of name and eligibility conditions, the sheep premium is now partially decoupled (FranceAgrimer, 2012). During a time the premium was higher in mountain areas but it is not true anymore. Now the premium is higher according to the commercialization strategy of the farm (Fédération nationale ovine, 2012). In 2013, the amount per ewe and per year was 21€.

## **2.3 Pastoralism in Isère**

On the 533 cities and villages of the French department Isère, more than 60% are located in disadvantaged zones and 80% of those are located in mountain and high mountain areas (Agreste, 2010). So, 271 cities and villages are concerned by pastoral activities. 90 000 ha of pastoral land have been identified in the department. More than 700 breeders provide 24 800 LSU that value these surfaces, so they are 96 000 sheep, 9 850 cattle and 270 horses. Farmers are mostly members of collective structures with the presence on the territory of 85 pastoral groups which represent 80% of LSU and surfaces. These pastoral groups and individual farmers employ about 90 shepherds (FAI, 2009).

### 2.3.1 Different pastoral territories

Pastoral activities are not spread uniformly on the department. In order to adopt coherent land use scheme, the department was split and structured around nine self-determined territories. These pastoral areas are located on the Figure 8. They are all situated in the southern part of the department. In 2010, Rhône-Alpes region has realized with these territories different Pastoral Territorial Plans (PTP). These PTP aims to:

- « ensure the preservation and maintenance of remarkable spaces that are pastoral areas;
- support the sustainable development of vulnerable or disadvantaged areas in mountain through the support of pastoral activity which create jobs and wealth;
- accompany an extensive pastoral activity which compromises with the stakes in biodiversity and in the multi-use of land and allow to value specific products under quality signs” (Région Rhône-Alpes, 2007).

Each of these PTP carries a specific pastoral project stemming from a preliminary diagnosis.

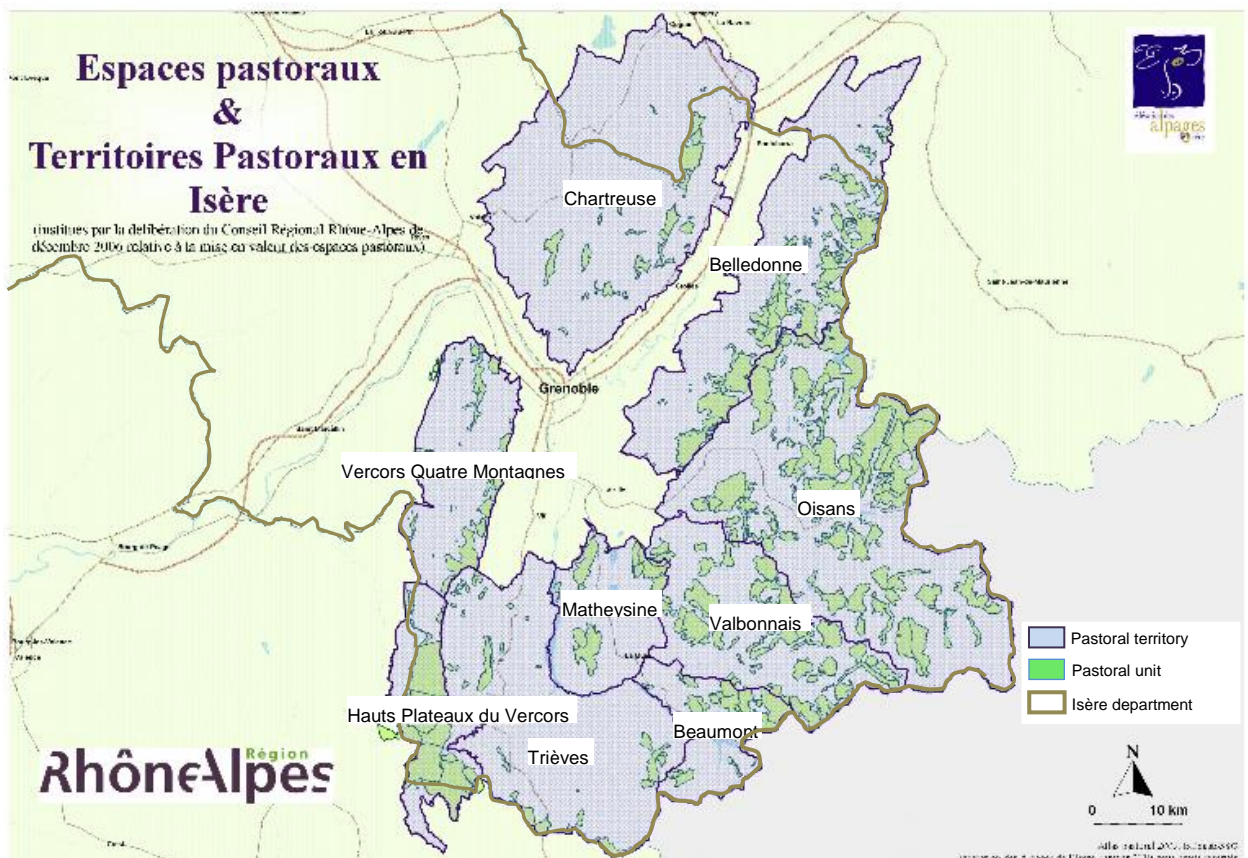


Figure 8 : Map of Isère presenting the different pastoral territories (FAI, 2013a)

Within the frame of PTP, a preliminary study was realized to establish a general diagnosis on each territory. It describes the characteristics of the pastoral activity and the other utilization of pastoral zones. A description of the environmental stakes is also made. All these data preceded a multiannual programming as well as a description of the project animation. (Région Rhône-Alpes, 2007).

The main structuring stakes of pastoral activities can be grouped in the following way:

- **Environmental stakes:** protect the quality of life, the landscape, the quality of ecosystems and their biodiversity;
- **Economic stakes:** take into account the participation of pastoral activities in the economic balances on territories and revalue economically the pastoral areas in all their dimensions ( heritage, know-how, agro-pastoral productions), weave solid links between pastoralism and tourism to create new activities and so strengthen the local economies;
- **Pastoral stakes:** develop the existing by pastoral improvements in order to allow a use in good conditions in a sustainable logic;
- **Social stakes:** create spaces of dialogue allowing reducing the conflicts connected to the multi-use of pastoral areas and to be strong source of proposal, deepening the knowledge on pastoral managements, on behavior and know-how of breeders and shepherds to improve recognition of their skills.

### 2.3.2 Different animals use the alpine pastures

On one hand, the provenance of animals changes from a pastoral territory to another. On the other hand, trends can be observed concerning their species.

Territories of “middle” mountain such as Beaumont, Trièves and Matheysine are mainly grazed by cattle. However, on other territories too, cattle herd exist, mainly on the “easy alpine pastures”. This term “easy alpine pasture” is used to characterize the areas where there are no strong slope, few delicate passages, plentiful fodder resources and many facilities such as water point, access road. Cattle herd on alpine pastures are mainly composed of dairy heifers and meat cow (MALLEBAY, 2011). On the contrary of Savoie and Haute-Savoie departments, Isère is not concerned by traditional cheese-making in alpine pastures, so dairy cows are rare. It is also interesting to note that unlike Pyrenees, all the animals of a herd do not rise in alpine pasture, it is so impossible to find a bull in alpine pastures of Isère.

Other territories with more difficult alpine pastures are occupied by sheep. In 2009, sheep constituted two third of all the animals present in alpine pastures (FAI, 2009). The two main

breeds concerned are Merinos and Prealpes du Sud. Dairy sheep herd are almost inexistent. Generally, animals from different breeders are kept together in order to create herds with one to several thousand heads. Like that breeders can hire a shepherd who keeps after the herd. This group of breeder constitute most of the time a pastoral group (PG). Herds are mainly composed of ewe and ewe lambs which are used to renew the herd. Sometimes few lambs intended for the butcher's shop are present. All these sheep come from different breeding systems explain thereafter.

### **2.3.3 Different sheep breeding system include the use of alpine pastures**

In this part, only the sheep breeding system making the transhumance are evoked. They are presented thanks to the use of the new French book "La relation homme animal en élevage extensif: comprendre le comportement animal pour adapter les techniques et les pratiques pastorales" (Human/animal relationship in extensive breeding system: understand the animal behavior to adapt the pastoral techniques and practices" (DAVOINE *et al.*, 2013).

#### **2.3.3.1 Breeding systems with large transhumance**

Breeders own most of the time large herds, more than 600 ewes and sometimes even several thousand ewes (Institut de l'élevage, 2013b). During winter, animals are in Basse Durance, in Crau plain and in the Rhône delta. These places are quite far from the summer place. It is needed to carry animals with trucks during several hours. Breeders concerned have a really strong historical link with the alpine pasture. Sometimes they have family links with the people of mountainous villages and their surroundings. So they are well socially integrated. However they do not take part in the municipal council and are few present in the local institutions. The long distance between the farm and the summer pastures causes difficulty for farmers who cannot visit often their sheep and even more difficult to participate at dialogue time about alpine pastures management. This large distance and the number of sheep justify the employment of one or more shepherds by one or more breeders.

Some breeders use different alpine pastures as any of them is big enough for the entire flock. Fodder resources available in alpine pastures are absolutely necessary because their farm site are under the pressure of summer drought (LEGEARD, 2006). There is something special in the Crau plain between sheep production and hay production. Pastures have to be « free » at the beginning of summer to produce the famous Crau hay, which is the only product not designated to human consumption with an PDO (MOLENAT *et al.*, 2002). The arrival of these large transhumance herds on the largest alpine pastures are a key element for the equilibrium of pastoral management, because of the number of heads they bring and

the associated logistical equipments. In some cases, breeders making transhumance propose at the mountainous breeders solutions for the winter season or fodder, this strengthen solidarities among breeders. On these systems, lambs production is mainly based on a lambing period in autumn in order to use the last grass growth and the gentle winter in the best way. Spring lambs (means lambs born in spring) are the one from the ewes that were not pregnant after the spring mating period. These lambs are not wanted in these systems. The number of alpine pastures lambs that these systems can produce is highly variable according to resources available and market situation.

### **2.3.3.2 Breeding systems of the Isère plain (mean transhumance)**

The herd size is lower than in the large transhumance system. The farms are not specialized, they have different production unit where techniques are quite intensive. The alpine pastures are not really far, one to three hours truck drive.

Breeders, with a small mountainous culture, are not engaged in the mountain management because of the big distances even if they manage to participate at some meeting concerning the alpine pasture. The historical link does not exist as with the large transhuming breeders.

Animals spent 3 or 4 months in the alpine pastures and breeders visit them only few times in the season. Most of the time, they hire collectively a shepherd to take care of herds from different breeders in the same alpine pastures. In these systems, breeders need to put their herd in mountain to have time for the other productions and to keep fodder resources for the winter.

So, it is necessary for them to bring their ewes in alpine pastures. Lambings are less grouped than in the previous system, even if the autumn lambing is more important. By adding some lambs to the herd which goes in alpine pastures, they valorize their spring resources in a better way and it allows them to spread the lamb sales all over the year. Moreover, these spring lambs only fed with milk of their mother and grass permit to keep cereals produced on the farm for the ewe or for selling.

### **2.3.3.3 Elevage montagnard**

Farms have a small size; the number of head directly depends on the fodder resources available and on the capacity to store them for the winter season. Breeders and animals are located not far from the alpine pastures. Breeders are strongly involved in the decision making process for the territory and for the alpine pasture management.

Alpine pasture is mainly accessible by foot. Breeders can go often on the alpine pasture, see its evolution and manage it well. Animals are in those areas few months per year, kept or not

by a shepherd. Sometimes breeders keep themselves their animals during the summer period.

Between summer (where animals are in alpine pastures) and winter (where animals are inside), breeders use the so-called "intermediary zones". So in these systems, we can notice the use of all the part of the mountain territory according to season and resources available. The role of the alpine pasture is essential for these farms which are limited by the availability of resources because of geographical and climatic conditions. Relation among breeders and with the shepherd are really strong because they each other more often than in the two other systems.



The small size and the tough farming conditions make these breeding system not enough competitive and it is really dependant on subsidies from EU, the State and other actors. Moreover, breeders are not only breeders; they have another job in order to have decent revenue.

**SUMMARY : What you need to keep in mind about mountainous agriculture in France**

- The share of agriculture jobs is more important in mountainous zones than on the entire french territory. → The maintenance of agricultural activities in mountains is needed to keep source of employment.
- The mountainous agriculture is always based on livestock breeding even if it differs from a massif to another. This agriculture has a good image among the consumers. → Possibility to characterize a product thanks to its production area, creation of a “good” concurrence which influences beneficially the quality.
- An agriculture which has many external services and has effects on the other activities present on the territory. → Need to recognize these roles and to find a way to valorize them.
- A weak agriculture where channels have to be strengthened. → It is necessary to create land planning strategies adapted at the different territorial scales. Multidisciplinary partnership and collective initiatives seems necessary.
- Breeders income have to be improved and not only thanks to subsidies. → Need to create added value on territories which profit to the producers and/or stay on the territory.

**What you need to keep in mind about mountainous agriculture in Isère**

- In Isère, the importance of livestock breeding in mountains and pastoralism is high. → It is important to insure the perpetuity and sustainability of pastoral activities.
- Pastoral territories in Isère are really diverse. → Obligation to find different solutions adapted to each situation/territory.
- Different sheep systems use the alpine pastures. → Their diversity and their complementarity need to be known and recognize in order to understand the different stakes existing.

### **3 Alpine pasture lambs, a traditional production**

#### **3.1 History**

##### **3.1.1 Before called tardon**

In this paper the term alpine pasture lambs is the translation of “Agneau d’alpage” which is an expression we used for the initiative to substitute the oldest word “tardon”. This volunteer change of terms is partly due to the fact that the “tardons” has a negative image. The term reminds that these lambs are not really wanted, they are late in the calendar, and they are born from ewes which did not manage to be pregnant early enough. So lambing is during the spring and lambs are not big enough to be sold before the departure for the alpine pasture. Lambs go with their mother in the alpine pasture during the summer. At the descent, mostly end of September / beginning of November, two situations are possible:

- The lamb is ready to be sold for meat without a fattening period in barns, he reached a sufficient growth and fattening levels it could be sold on the autumn fairs such as the one in Champoléon (<http://www.champoleonecrins.com/3-octobre-foire-au-tardons>). In this case, lambs are 4 to 6 months old.
- Or the lamb is too skinny. In this case, either the breeder sell it to breeder specialized in fattening lambs or it fattens it himself. It is for sure not the ideal situation because it costs more money, time and resources. Moreover, depending on year and fodder and crops harvests, it is more or less easy to sell these “skinny” lambs.

In the context of technical improvements and difficulties for sheep breeder to have a decent income, these potential losses incited breeders to limit the number of late lambs in their breeding system, even if they always exist. However other factors contributed to the fall of alpine pasture lambs production. It is however necessary to note that it is difficult to estimate exactly the evolutions of production given that no good data are available.

##### **3.1.2 Decrease of the production**

One of the first elements to be raised is the negative consequence of the implementation of the agri-environmental grassland premium as regards specifically to the production of alpine pasture lambs. The agri-environmental grassland premium is allocated by hectare partly in function of the stocking rate. In Isère, for the collective alpine pastures, the amount by hectare increases according to the stocking rate until a limit of 0,5 LU/ha (see Table 3). The LU calculation does not take into account the lambs if they are less than one years old (Préfecture de l'Isère, 2013). However, lambs at 5 – 6 months old eat as much as their mother if it is not more and breeders cannot put the same number of ewes if lambs are

present in order to avoid overgrazing. This premium thus dissuades the breeders to put lambs in alpine pasture. However these influences could be changed by the new CAP.

*Table 3 : Amount of the agri-environmental grassland premium according to the stocking rates (Préfecture de l'Isère, 2013)*

Stocking rate	Premium amount in Euros/ha
Between 0,05 and 0,15 LU/ha	26
Between 0,10 and 0,35 LU/ha	42
Between 0,30 and 0,50 LU/ha	57

Another factor with hypothetical character is the evolution of the systems of marketing. Indeed, buyers ask for more and more standardized products in order to satisfy the final consumers. This system of fattening with grass in the alpine pasture do not allow to obtain homogenous and uniformed batches of lambs such as the one obtained when fattening is done in buildings. It is why some farmers preferred to change their breeding system and produce mainly lambs raised in sheepfold.

Finally a last phenomenon has negatively influence the production of alpine pasture: the arrival/ come back of wolves. Not only the cases of predation worry the breeders, but the changes of the pastoral practices make more difficult the finish of lambs. (CARAGUEL and DAVOINE, 2013)

### **3.2 Breeding scheme**

In spite of all these difficulties, some breeders continued to produce alpine pasture lambs. It is in particular with them that was realized the production scheme presented on the Figure 9. This scheme is still under construction. Its formalization was begun by another intern of the FAI and improved during this study.

The lambs, born in March – April, go up in the alpine pasture with their mothers, in order to grow in the same time that grass is growing. They should be slaughtered « finished » between the 15<sup>th</sup> of August and the beginning of October just after their descent without going back to the farm. One of the main goals of this production is to improve the use of fodder resources available on the farm and on the alpine pasture as well as to improve the valorization of these spontaneous resources by the herds. Works have been started by the

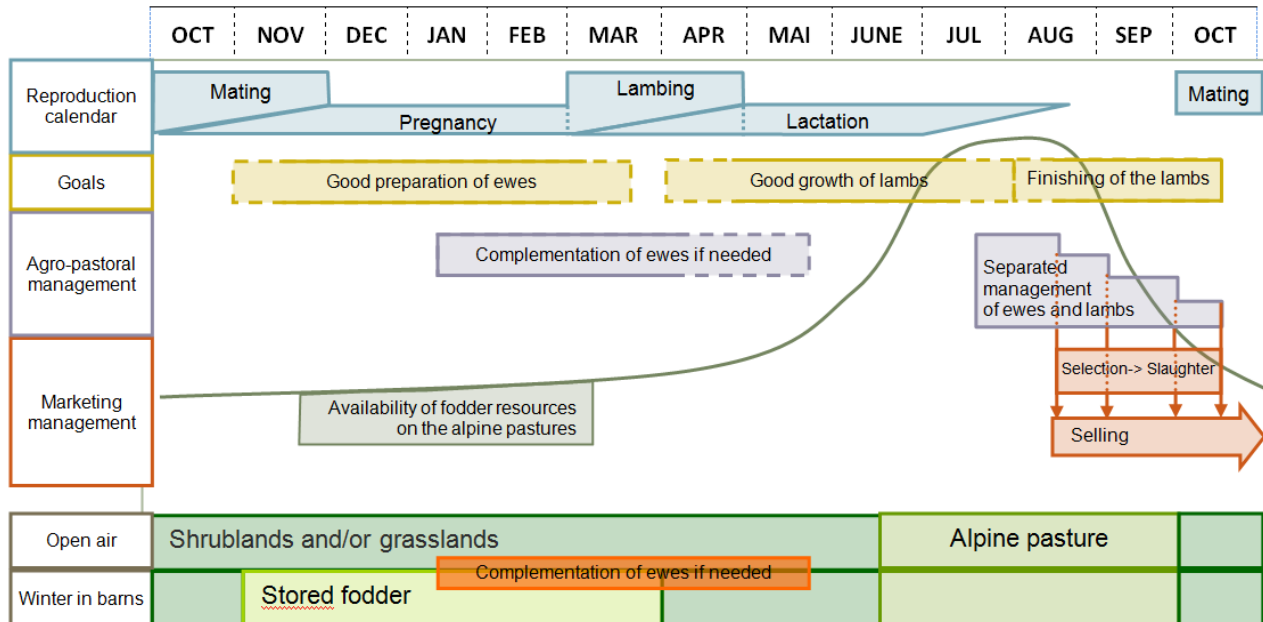


Figure 9 : General scheme of the production of alpine pasture lambs

Dotted lines are used here to mark the variability which can exist from a farm to another one  
FAI in order to achieve this goal. (DE NAILLY, 2013)

**Summary :** What you need to keep in mind about the alpine pasture lambs production...

- The term alpine pasture lambs (Agneau d'alpage in French) takes the place of the term tardon.
- It is a traditional out of season production in the French Alps.
- It is a lamb : born in March-April
  - Raised only with the milk of its mother and grass
  - Going in the alpine pasture with its mother
  - Slaughtered ready to be sold at the descent.
- This production allows the best use of fodder resources available on the farm and on the alpine pasture.

## 4 The Fédération des Alpagnes de l'Isère at the heart of the development of pastoral territories

### 4.1 Presentation

The Fédération des Alpagnes de l'Isère (FAI) (Alpine pasture federation of Isère) is a non-profit organisation considered as a pastoral service located at Les Adrets in the Belledonne mountain range (see Figure 10) It was created in 1982 in the followings of the pastoral law of 1972.

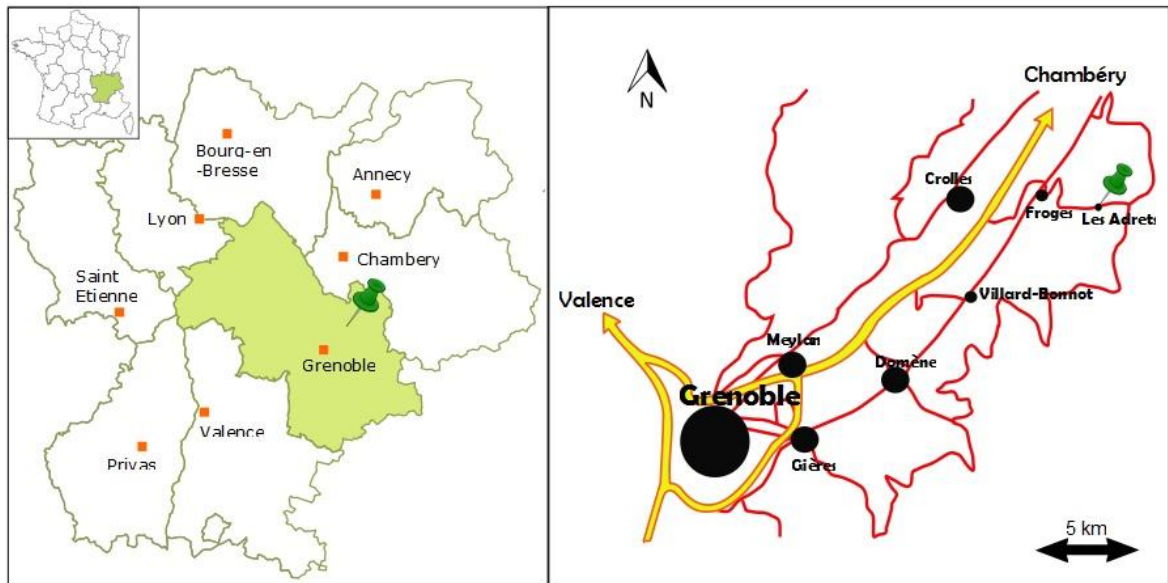


Figure 10 : Localisation of the Fédération des Alpagnes de l'Isère (FAI, 2013d)

It consists of honorary members (those having returned significant services to the association), active members (persons or institutions paying a contribution), right members and finally consultative members. A council of 41 members is in charge of the administration of the non-profit organization. It watches the smooth running as well as the fulfillment of the purpose of the structure. This one is define in the association statutes as followed: the association “contributes to the definition and the implementation of politics of development of pastoral spaces of Isère, by integrating the dimension of the Alpine massif and of the basin of transhumance. For that purpose, it starts and coordinates any concrete actions likely to develop, strengthen and perpetuate pastoral and forest activities in the mountain zone and to harmonize the relations between owners and users of alpine pasture. It also intervenes in any action connected to the use of natural resources in respect for their future and for the integrity of the ecosystems. Besides, it does the promotion and the implementation of any communications actions, sensitization, information, advice and training connected to the pastoral activities and breeding, but it also accompany and organize some touristic activities in alpine pasture of Isère in the respect of human cultural heritage and mountainous heritage.

Finally, it manages decentralized cooperation actions in terms of pastoralism and breeding at the side of public institutions.”(FAI, 2013b).

In order to achieve this goal, different committee share the activities of the association : pastoral improvements, territories, technical committee, prospect, tourism/culture/communication and the last created future of the pastoral structures (FAI, 2013e).

All those committees are animated by an employee and are led by a member. The FAI team is actually composed of eight permanent employees strongly complementary. They realize the actions planned by the associative project:

- Accompany the project leaders and the pastoral actors;
- Act for a responsible, effective pastoralism with good technical capacities;
- Act in terms of professionalization of pastoral actors;
- Act with the collectivities and public actors, in the definition, the implementation and the evaluation of pastoral policies;
- Show wealth and value of pastoral spaces and actors, and the heritage associated to them. (FAI, 2013b).

The FAI works thanks to different funding sources such as the contributions of members, the convention for accompanying project with the State and the local authorities and the services that it makes and which are paid for example. These diverse incomes serve essentially to cover the personnel expenses which constitute the biggest expense item. The FAI is always seeking for new source of funding, in 2013 it answers twice at a call for project made by the government named “Collective mobilization for agroecology”. One of the answers was for the initiative that we are talking about later on: the alpine pasture lambs initiative. Unfortunately, the projects were not selected so it is necessary to find new sources of financing.

## **4.2 The alpine pasture lambs initiative**

### **4.2.1 Story of the project**

In 2010, the departmental council of Isère started a reflection on the economic contribution of alpine pasture in the farms of the department, partly because it finances the pastoral improvements led by the pastoral groups. Its investigation aims to i) have an economic return on the use of public credits that it gives and ii) understand in what the fact of facilitating the mobilization of the fodder resources available in alpine pastures was a way to strengthen the mountain and agro-pastoral economies.

A first group work centered on this economic approach has been created on the impulsion of the departmental council. It gathered the FAI, the agriculture chamber of Isère, the SUACI of Northern Alps, the Breeding institute and the Departmental Direction of the Territory (DDT) for their links with the CAP policies. This work, led by the Departmental Council, have been done by an engineering consulting firm called BLEZAT Consulting (MALLEBAY, 2011). The different persons mobilized brought their contribution (quantified data, testimonies, expertise) and the results show the interest for the breeders to use the alpine pasture, at the same time on the technical plan (fodder resources spread during the year and of high quality) that on the economic plan. The Departmental Council led a space of mediation, which leads actions which can allow to value alpine pasture lambs in a better way and/or to relieve this initiative (canteens, financial supports, etc). This group has been called the platform because of its capacity to gather people with different interests around the same subject.

In order to promote the alpine pasture lambs production and to bring concrete argument to the farmers to orientate their production choices, the establishment of technical references is needed. In 2012, 130 lambs to four breeders have been weighted on two different alpine pastures during the alpine pasture season. As a supplement to these weightings, scores of body condition were twice awarded to the lambs of one breeder to estimate if animals “won” or “lost” body condition over the period. These follows-up have been renewed in 2013 with some changes (number of lambs studied, number of weightings done). These studies have only been possible thanks to the implication and the commitment of the breeders who have diverse motivations to become actors of this initiative.

#### **4.2.2 Motivations formulated by the breeders**

According to the breeders (interviews done from June 2011 to August 2013, breeders meeting at the Col du Coq the 28<sup>th</sup> of June 2013), the initiative can have different meanings but all agree on the need to valorize in a better way the resources available in the alpine pastures (which are today mainly used as a storage place for animals and not really as a productive space) and their products. It is why breeders decide to work together in order to establish common specifications, to reach the production threshold, to share marketing and promotion strategies, in order to sell their lambs in the best way.

At the same time the call for project “Collective mobilization for agroecology” was published by the government. The different partners decide to answer to it in order to create a structure which allows the recognition of their know-how and their products. The idea was to create a Group of Economical and Environmental Interest (GEEI). The GEEI was an opportunity which the actors wish to seize so that the alpine pasture lamb is recognized as the outcome

of a triangular and balanced relation between the territory of production, the breeder and the consumer.

### **4.2.3 FAI role in the initiative and master thesis subject**

The FAI, one of the stakeholders of the alpine pasture lambs initiative, has several missions in it:

- Give the knowledge about alpine pastures of Isère in particular regarding their production potential;
- Mobilize breeders that use the alpine pastures and keep them in touch;
- Characterize the alpine pasture lambs production during the summer;
- Write specifications in order to demand a quality sign;
- Promote the initiative.

The work started in 2012 allows to get the first data concerning the lambs (weights and body condition scores). A comparison of the existing quality signs has also been done. It allowed partners to select the quality sign targeted: it is the Traditional Specialty Guaranteed (TSG). This quality sign, little known in France, can be used for all the farm and food-processed products. Unlike the PDO and the PGI, it does not refer to a specific geographical origin but it aims to protect the traditional know-how such as process, composition of way of producing for example.

After this choice has been made, a first draft of the specifications was written in order to precise the technical production aspects as well as the transport organization or butchery qualities expected. A survey with the distributors (butchers, hypermarkets and supermarkets, out-of-home dining) financed in 2012 was realized at the beginning of 2013 by students of Supagro. The goal of this study was to study the interest for the alpine pasture lamb of the different distributors. It has as results the identification of potential buyers and of their requirements. A carcass weight between 15 and 22 kg appeared as the wanted one (BONNET et al., 2013). Moreover, various communication mediums were realized by the different partners and presented during demonstrations. At the descent from alpine pasture, in order to test the quality of the products and to confront them with consumers expectations, three carcasses have been sold by a butcher in Grenoble and a tasting in a restaurant gather all the partners as described in the Appendix 6. The first remarks standing out from these tests are very positive.

In parallel of these collective actions, the FAI has a more precision mission that consisted in making the specifications written in 2012 evolved. In particular, we need to work on three points:



- The characteristics of the alpine pasture where lambs are raised: “These alpine pastures should belong to the list of the alpine pastures referenced during the pastoral survey, should be located in the Alps and have lamb quarters”;
- The age and the weight at slaughter: “lambs must be old of less than 180 days at the time of the slaughter and have a maximum live weight of 35 kg”;
- The process of conformity assessment of carcasses: “a weight carcass, a classification R3 with minima according to the EUROP<sup>1</sup> classification, a pH < 6.18 hours after the slaughter and the color of meat”.

Not all the characteristics mentioned in the three previous points have been studied in 2013. Indeed, the goals of the FAI for this year were in a first time to define and to identify which alpine pastures are suited to the lambs’ production. This allows to give precision to the first point. In a second time, the aim was to identify and mobilize breeders which were producing alpine pasture lambs at this time. This mobilization should allow the collection of information through the study of lambs’ growth. It was also expected to evaluate the percentage of lambs reaching the expected weights (between 15 and 22 kg defined by the distributors’ survey). The age and the weight at slaughter could thus be commented as well as the conformity of carcasses according to the EUROP classification.

These two missions should allow to answer at the questions listed below:

**Which alpine pastures of the territory studied allow the production of alpine pasture lambs?**

**Which criteria influence the weight of lambs at the descent from alpine pasture?**

**Do lambs reach the weight expectations at the descent?**

The expected results at the end of this study should allow partners to agree on the validation or modification of the specifications mentioned before.

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<sup>1</sup> The EUROP scale is used in many slaughter houses to evaluate the conformation of carcasses (E= exceptional muscular development, P = reduced muscular development). In the same way, the 12345 scale is used to evaluate the fattening conditions.. (SAGOT, 2013)

## **PART 2: Materials and methods**

The territory studied is composed of all the pastoral territories of Isère. They are presented before. In a first time, the method used to identify the potential areas for production of alpine pastures lambs is described. In a second time, materials and methods needed to determine the criteria influencing the weight lamb at the way down of mountainous areas are explained. Finally, we will look at the way to describe and study the weights of lambs.

## **1 Identification of potential areas to produce alpine pastures lambs**

### **1.1 Principle**

Firstly in order to evaluate the feasibility of the production of alpine pastures lambs, a map analysis has been done. Based on geographic criteria, on vegetation composition and on predation risk, the goal was to identify the alpine pastures suited for lamb production. The term “alpine pastures suited for lamb production” means areas where lambs can grow and be fattened enough to be killed when they come down of the mountain. Alpine pastures are most of the time split in several smaller areas that we call here quarters. A quarter can be defined by its vegetation, its principal utility and/or by its utilization period. Some are adapted to lamb production is the so-called “alpine pastures suited for lamb production”. So in order to consider an alpine pasture interesting for lamb production, it is not needed that the entire area is interesting but only one of its quarters.

The needs to identify quarters for lambs production are numerous:

- Estimate areas concerned and their fodder resources qualities in order to evaluate available resources to finally get an idea of the number of lambs which can be produced;
- Improve the management of these specific zones;
- Establish concrete proofs to study in details the feasibility of the creation of a larger initiative around the alpine pasture lambs.

One of the most important brakes to the rise of lambs in alpine pastures is the predation risk mainly by wolves. This risk exists for other kind of sheep as well but lambs are the most vulnerable. Moreover, lambs need to have a regular and important growth which is difficult to reach if the herd is under protection measures. Finally, according to the importance of lambs sell in the revenue of breeders, they prefer keep their lambs in plain or in more populated zones in order to avoid losses. So, the stakes for the FAI are to identify where predation risk are too high to not encourage now the lamb production in these zones in order to:

- Limit economic and moral damages faced by breeders;
- Concentrate human and economic efforts on the areas where lambs production is suitable.

## 1.2 Expected results

The goal is to obtain a map with all the potential areas to produce lambs on the studied territory.

## 1.3 Data used

Researches in literature have been done to find the criteria to take into account for the definition of potential areas for lamb production. Three studies, from the 80s, have been used. (CARAGUEL, 1987, CARNE et al., 1987, PUJOL et al., 1985). Once this definition done, alpine pastures needed to be identified. Two methods could be used to do this task:

- One based on the vegetation: this is the ideal method, but it couldn't be done either the data base are not enough precise like the data base CORINE LAND COVER, or they don't cover all the territory studied like the data base done by the FAI to determine the pastoral value;
- The second one, based on expert knowledge: this is more empiric than the other one, but it has the advantage to need few materials and time. However experts have to be clearly identified.

According to the economic and human possibilities we had, the second method was used. This work has been done at the beginning of 2013.

Finally to evaluate the predation risk is good to know that an alert telephone number has been created in Isère. One of the member of the FAI is available every day to list predation cases. If someone discovers cadavers or harmed domestic animals they have to contact the FAI or another authorized organism. Once the attack is declared, experts go on the attack place to identify the animal responsible for this loss.

The FAI has also in this procedure a listening role which can be important for breeders and shepherds which have troubles with predation. However, shepherds and breeders don't always call the FAI which means this association does not always know the attacks and so some data are missing. So it's why in this study, data collected by the FAI have been compared to the one from the Regional direction of environment, land planning and housing (Direction Régionale de l'Environnement, de l'Aménagement et du Logement, DREAL). A

demand has been done to this governmental service in order to obtain the official data. At the time of the study, the data for 2013 was not available; it is why they are not presented on this paper.

## **1.4 Data processing**

In order to produce the waited maps, three kinds of data have been processed under GIS with the program ArcGIS:

- Limits of pastoral units: they are determined through pastoral surveys which take place approximately every ten years. A survey is currently done. Limits are draw by breeders, shepherds and elected people from mountain communes;
- Limits of potential areas for production defined by experts;
- Predation site obtained with the DREAL data.

These three types of data have been added in the following order:

- The base level is constituted of the limits of pastoral units;
- Limits of interesting areas have been added. The overlapping areas are considerate as potential areas for lamb production without taking into account the predation risk. Three cases are occurring: these areas correspond either to entire pastoral units, either to parts of pastoral unit or even some areas which are not in pastoral units;
- Finally the points where predation occurred have been added to the two previous information level. So, the pastoral territories where lamb production could take place are: territories where lambs areas have been identified and where the number of predation cases is less than 10 on the lambs' areas. This level has been defined by experts.

## **2 Criterion influencing lambs weight at their descent**

### **2.1 Principle**

In the past, studies have been done to evaluate alpine pasture lambs growth. They were done in the eighties, so it was necessary to do one study again to have more accurate data. Indeed, selection scheme of animals done in the last thirty years could influence the behavior and the physiology of animals. A study of the growth of lambs from different breeders using different alpine pastures has been done. This growth study has been completed by information linked to each lamb such as the sex, the way of birth (= the size of the litter) and the age.

## **2.2 Expected results**

This study of alpine pasture lambs growth aims to:

- Evaluate the growths on the farm if it is possible and essentially on the alpine pastures;
- Identify the criteria which encourage the growth in the alpine pastures and so help to reach the “wanted” weight at the descent;
- Establish references allowing us to evaluate the feasibility of the “alpine pasture lambs” initiative;
- And last to involve breeders in this initiative.

So a list of criteria influencing the lambs’ weight at the descent is expected.

## **2.3 Data used**

The first kind of data used was the lambs’ weight. These weights have been obtained thanks to four weightings done on the farm before that lambs go in the alpine pasture, during the summer on the alpine pasture and at their way down the alpine pasture (descent). In 2013, these collects of data have been done on four different herd owned by four different farmers who are using three different alpine pastures. This growth study has been realized following the protocols used in the previous studies. (CARNE et al., 1987, PUJOL et al., 1985, CARAGUEL, 1987).

Data linked to each lamb are the second kind of data used. They come from the lambing book of each farm. They concern: the birth date, the sex and the way of birth (single or twin).

## **2.4 Data acquisition methods**

### **2.4.1 Lamb growth study**

#### **2.4.1.1 Farms “choice”**

Some experiments and data have been done in 2012 in volunteer farms. These farms have been contacted again in 2013 to be a part of the study this year. They accepted to be part of the study again except one. At this stage we had four volunteer farmers whose three on the same alpine pasture called Col du Coq. It seems interesting to us to find another herd on a different alpine pastures in order to have more data to compare. This fifth breeder has been found but unfortunately climatic conditions make it impossible to weight the lambs from a farmer who has his lamb on the Col du Coq. So, the study was finally done on four farms using three alpine pastures. The table 5 describes the different farms engaged regarding the geographic position of the farm and of the alpine pasture. It is evident that it would have been

better to do the study on a bigger number of farms but financial constraints of the FAI could not afford it.

*Table 4 : Farms engaged in the lambs growth study in 2013*

Farm	Breeder	Farm site	Alpine pasture	Massif
<b>Bouvier</b>	M. Bouvier	Noth-Isère (plain)	Col du Coq	Chartreuse
<b>GAEC Philipierre</b>	M. Veyron	North-Isère (plain)	Col du Coq	Chartreuse
<b>GAEC du Taillefer</b>	M. Salvi	Oisans (mountain)	Pré Gentil	Oisans
<b>La ferme aux bisons</b>	M. Girard	Oisans (mountain)	Le Soreiller	Oisans

This step of research of farmers willing to participate at the study and more widely at the initiative was important on two aspects. In a first time, we needed to find lambs for our study. Moreover this research allowed us to evaluate informally the interests that breeders could have for the initiative. In addition, this study of growth helps us to maintain their implication and their interest for the action done.

### **2.4.1.2 Animal choice**

In the study of Carne et al. (1987), 80 lambs have weighted for each farm. It was 40 female and 40 male, 44 single born and 36 twins. For the two other studies, at least 50% of the lambs born during the spring have been weighted. (CARAGUEL, 1987, PUJOL et al., 1985). We decided to use the second method, a maximum of lambs have been weighted. However, specific conditions occurred (difficulty to group the herd on the alpine pasture for example) and so we could not weight the same lambs each time.

### **2.4.1.3 Dates and places of weighting**

The study was essentially on growth in alpine pastures, so it was necessary to weigh the lambs at their way up to the alpine pastures and one at their descent from there. These weightings have been done for the four herds as done in the previous studies (CARAGUEL, 1987, PUJOL et al., 1985, CARNE et al., 1987). In addition, in a farm we have done a weighting one month before that lambs go in the mountains. Moreover, the Col du Coq is easily accessible, so an intermediary weighting between the way up and the way down took place. The last weighting time at the Col du Coq was also done in the alpine pastures, one month before the end of the alpine pastures season. After this one, it was not possible to do one more weighting.

All the other weightings have been done on the farms one week before or after the movement of animals from a place to another. A specific situation occurred regarding the herd of Mr. Salvi because male and female lambs did not come back at the same time from the alpine pasture. The Table 6 sums up the information regarding the date and the place of weighting.

*Table 5 : Dates of weighing and their localisation (in alpine pasture for the grey cases)*

Breeder	Weighing 1	Weighing 2 / Way up	Weighing 3	Weighing 4 / Descent
<b>Mr. Bouvier</b>	30/04/2013	12/06/2013	20/08/2013	11/09/2013
<b>Mr. Veyron</b>		12/06/2013	20/08/2013	11/09/2013
<b>Mr. Salvi</b>		20/06/2013		26/09/2013 for the ♂ 11/10/2013 for the ♀
<b>Mr. Girard</b>		20/06/2013		04/10/2013

In order to facilitate the analysis and the understanding of the data, weighting of way up and descent have been called weighting 2 and weighting 4 for all the animals, even if they were weighted only twice.

#### **2.4.1.4 Weighing tools**

The FAI does not have its own tool, so we used the equipment of farmers. Mr. Bouvier lent us his mechanic weighing cage from the brand Marechalle® for all the weightings. All the weightings at the way up have been done with this cage excepted at Mr. Veyron farm because he owns the same weighing cage. Afterward, the weighed device was improved with the use of load bars MP600 (visible on the photo below the cage). These bars need to be associated to an indicator of weighed. At first, we used the indicator Trutest EziWeigh2, then, in a second time we used the indicator Gallagher W610.

The weight was rounded off in 0,5kg near when we



*Figure 11 : Use of the weighing cage Marechalle® with load bars in an alpine pasture context*



used the cage only and in 0,1 kg when we used the load bars.

## 2.4.2 Information concerning each lamb

In addition to the weigh, information on birth date, way of birth (single or double/twin) and sex have been collected thanks to the lambing book of each farm. One more variable has been created which mix the effect of the way of birth and the sex. So four new categories appeared: the single male lamb (sm), the single female lamb (sf), the double male lamb (dm) and the double female lamb (df). However, we were still lacking a kind of information in order to calculate the average daily gain (ADG) during the period where animals stay on the farm: it is the birth weight. This factor has been estimated differently from a farm to another as it shows in the Table 7.

*Tableau 6 : Estimation des poids de naissance des agneaux sur chaque élevage*

Breeder	Estimation method	Estimated weight
<b>Mr. Bouvier</b>	Done by the breeder at the lambing	3,5 to 5,5 kg (5 kg if lacking data)
<b>Mr. Veyron</b>	Done with breeder agreement	4,5 kg for doubles 5 kg for singles
<b>Mr. Salvi</b>	Done with breeder agreement	4,5 kg for doubles 5 kg for singles
<b>Mr. Girard</b>	Done with breeder agreement	3 kg for doubles 3,5 kg for singles

Moreover, the precision level was not the same from a herd to another. Two breeders, Mr. Bouvier and Mr. Girard write down the exact day of birth instead of the two other breeders who have a precision level to the week near. Thus an average date of birth has been attributed to their lambs. Therefore, the maximum gap between the real birth date and the estimated one is 4 days, which can bring some errors in the estimation of the ADG at the farm.

## 2.5 Data processing

The data collected should allow the hierarchical organization of the criteria influencing the lambs' weights at the descent. To understand and analyze these data, three types of treatments have been made. They are summarized in the Figure 12. The analysis by breeder allows at first to estimate the performances of every breeding. Secondly, the analysis by alpine pasture allows to see if all the lambs (from different breeders) behave and grow in the same way on the same alpine pasture. It allows to see if the "breeder" effect is important. Finally a global analysis is made on all the lambs.

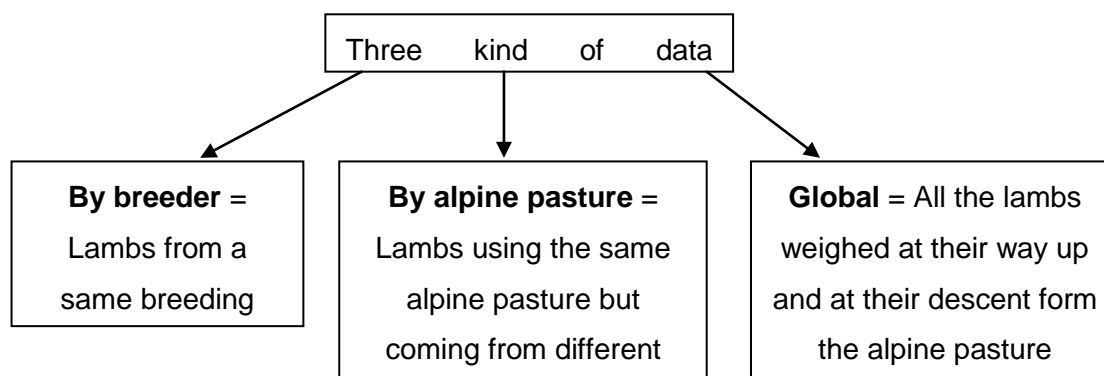


Figure 12: Presentation of the three kind of data treatment

Data have been treated with the program Excel Stat. Whatever the kind of treatment done, the procedure is the same. The different steps as well as the statistic tests used are presented in the Table 8.

Table 7: Steps and statistic tests made during the data treatment

Steps	Actions done
<b>Data cleaning</b>	Deletion of lambs with a single weighing and/or an unknown date of birth
<b>Data description</b>	Descriptive statistics, use of box plots and various graphs
<b>Deep cleaning of the data</b>	Deletion of lambs with absurd data discovered at the previous stage
<b>Comparison of weights according to studied criteria</b>	Analyses of variance thanks to the test ANOVA with an trust interval of 95 % and a tolerance threshold of 0,0001
<b>Comparison of ADG according to studied criteria</b>	
<b>Correlation of the weight at the descent with the other quantitative variables</b>	Realization of various tests of correlation (Pearson type) and hierarchical ascending classifications to see if various classes can be created

## **3 Conformity of weights with marketing criteria**

### **3.1 Principle**

In the specifications written in 2012, one of the criteria was the production of lambs of less than 35kg alive. Yet, the “distributor” study realized in 2013 show that the potential buyers wish carcasses between 15 and 22 kg (BONNET et al., 2013). So the initially defined criterion, not justified, was not taking into account. It is a question from now on of estimating the number of lamb respecting the new weighty criterion.

### **3.2 Expected results**

It is expected a quantification of lambs respecting the new weighty criterion in the population of studied lambs. It is also a question, if possible, to describe the groups of lambs not respecting these criteria to complete the analysis of the criteria influencing the weights at the descent.

### **3.3 Used data**

The used set of data is the same that the one used to define the criteria influencing the lambs' weight at the descent. The only data which were added are the ones allowing to define the expected weights. These data come from the « distributors » study realized at the beginning of 2013.

### **3.4 Data processing**

Given that we do not have data on the weights carcasses, it is necessary to convert the weights carcass wanted to their equivalents in live weight. As a reminder, the weight carcass has to be between 15 and 22 kg to meet the requirements of potential buyers. If we consider a slaughter yield of 50% and that we neglect the losses during maturation<sup>2</sup>, we obtain thresholds of 30 and 44 kg in live weight) (Groupe économie de l'élevage de l'Institut de l'élevage, 2013).

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<sup>2</sup> These losses are 1% of the cold carcass weight obtained after slaughter and drying (Groupe économie de l'élevage de l'Institut de l'élevage, 2013). It represents 0,5 % of the live weight. For a carcass weight 15 kg, the gap between the obtained live weights if we consider or not the losses during maturation is of 300g. This gap is of 400g for a carcass weight of 22kg. It is negligible with regard to the degree of precision of the used balances.

So three groups of lambs will be studied:

- The lambs too light the one with a live weight under 30 kg;
- The wanted lambs: with a live weight between 30 and 44 kg;
- The lambs too heavy: with a live weight above 44 kg

The characteristics of the lambs present in these three categories will be studied in order to see if a specific kind of lamb is better suited to the consumers' expectations.

In order to have more precise results than the one we get from the correlation tests, we made different classes:

- Classes of weight at the way up: the first class put together the lambs which have a weight under or equal to 10 kg, the following classes go from 5 kg to 5 kg by including the superior border (for example between 10 kg and inclusive 15 kg;] 10; 15]);
- Classes of age at the descent: the first class is constituted of lambs which have less than 150 days; the following classes have amplitude of 10 days, until the last class groups the lambs of more than 220 days.

These different classes (weight at the way up and age at the descent) have been analyzed thanks to the creation of contingency tables and the use of  $\text{Khi}^2$  test.

## **PART 3: Results**

In the first place, the mapping of alpine pastures of Isère is presented with an identification of those of them which are adapted to lambs production. In a second step, the results on the growth of lambs are described at different levels: farm, alpine pasture and finally for all lambs weighed. Finally, the third part presents the lambs which are in the weight range desired when they come down the mountain.

## 1 Potential areas to produce lambs

### 1.1 Criteria of an alpine pasture for lambs

According to literature and experts knowledge, a good alpine pasture for lambs should have different characteristics allowing lambs to have a regular growth. These characteristics are defined in the Table 1.

*Table 1: Positives and negatives aspects of alpine pastures in order to produce lambs (CARNE et al., 1987)*

*\* Added to the work of Carne and al.*

<b>Optimal description of a lambs alpine pasture</b>	<ul style="list-style-type: none"> <li>• High Altitude</li> <li>• Large altitudinal gradient</li> <li>• Large proportion of plant species with high specific index (in other word high number of good forage species, often small)</li> <li>• Large number of water points</li> <li>• Early start of summer pasture</li> <li>• Low risk of predation*</li> </ul>
<b>Conditions to avoid</b>	<ul style="list-style-type: none"> <li>• Large encroachment</li> <li>• Large proportion of species with low appetite</li> <li>• Obligation for the herd to make many trips</li> </ul>

The perfect alpine pasture so described, is not the only one able to finish lambs. An important factor not mentioned above is the way to drive animals. Indeed, the shepherd and/or the breeder have an important role in the ability to finish lambs using alpine pasture.

### 1.2 Identified areas as lambs alpine pasture

The Figure 13 shows in blue the pastoral unit of Isère listed in 2013. Added to these surfaces, alpine pastures for lambs appear in green on the map. On the whole department, they represent a bit more of 7 000 hectares. Most of the alpine pastures for lambs are located in Oisans, then in Valbonnais (approximately 30%), in Belledonne (15%) and in Chartreuse (5%). In Chartreuse, only one pastoral unit has been identified as a good alpine pasture to produce and finish lamb: its name is Col du Coq. Its identification didn't follow the same rules than the other ones. Indeed, the experts had not listed this pasture. But

according to farmers knowledge and the growth monitoring done on lambs grazing on it, it appears that lambs can be finished. Even if the best parts for lambs are not accessible for them anymore, they can be finished. Indeed, this area is located in the natural reserve "Hauts de Chartreuse" where pastoralism is regulated. Therefore, the pastoral unit is classified as a sensible natural area.

At first glance, the pastoral areas of Matheysine, Trièves and Vercors don't have alpine pastures adapted to lamb production. Vercors alpine pastures due to their Mediterranean influence and drying tendencies do not provide conditions for a satisfactory growth of lambs.

The relatively low altitude of the plateau Matheysin around 1000 m, does not allow the emergence of adequate grasslands. For Trièves, the situation is quite similar to the Matheysine. Low pastures with slopes less marked are more suited to cattle.

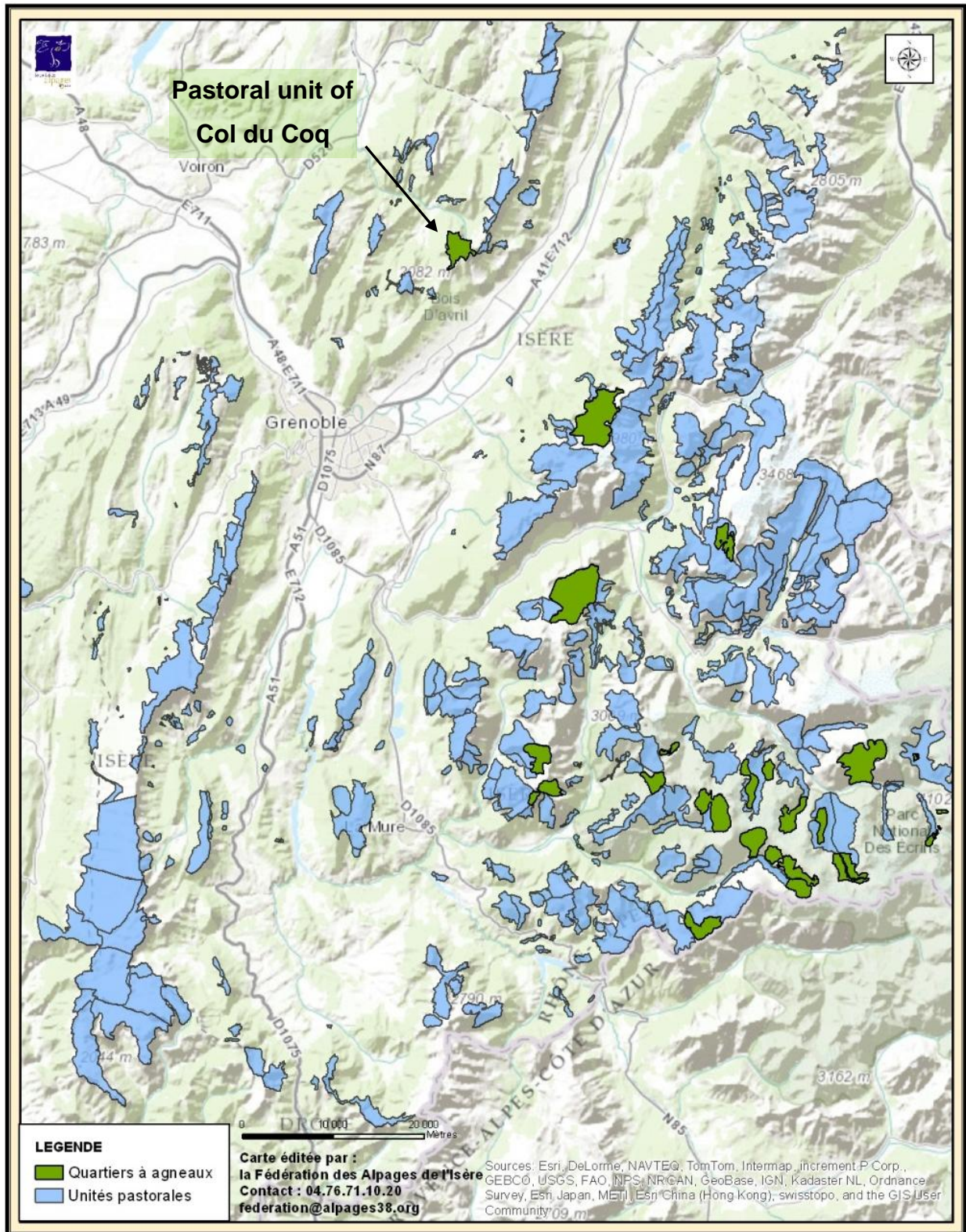


Figure 13: Map showing the potential areas to produce lambs according to expert knowledges (FAI, 2013c)



### 1.3 Maps of predation

Figures 14, 15 and 16 identify cases of predation found across the south of the department of Isère, area where alpine pastures are. These three cards are used to represent the evolution of the number of cases over the period 2010-2012. To differentiate the years when the attacks took place a colour code is used (yellow for 2010, orange for 2011 and red for 2012). Map 15, although containing information contained in the two others maps is not used alone because it does not show all the attacks because of the points' superposition. Black arrows represent the hypothetical movement of wolves over the years.

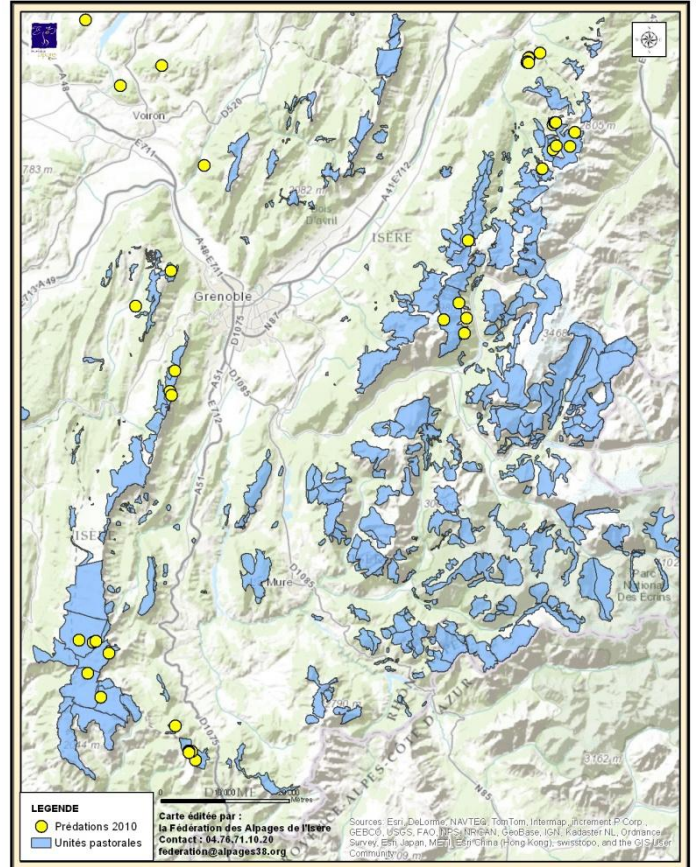


Figure 16 : Map showing the predation cases in 2010 (FAI, 2013c)

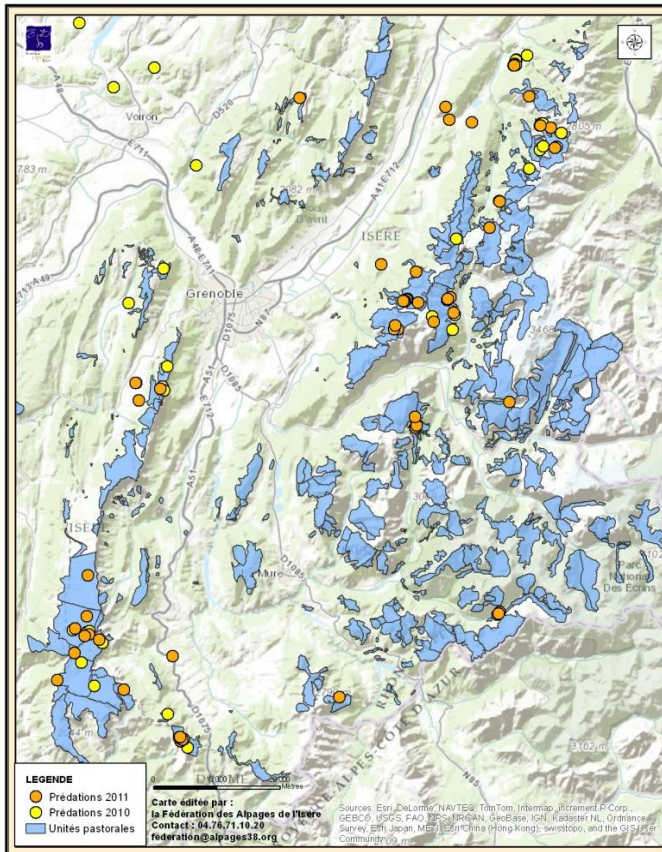


Figure 15: Map showing the predation cases in 2010 and 2011 (FAI, 2013c)

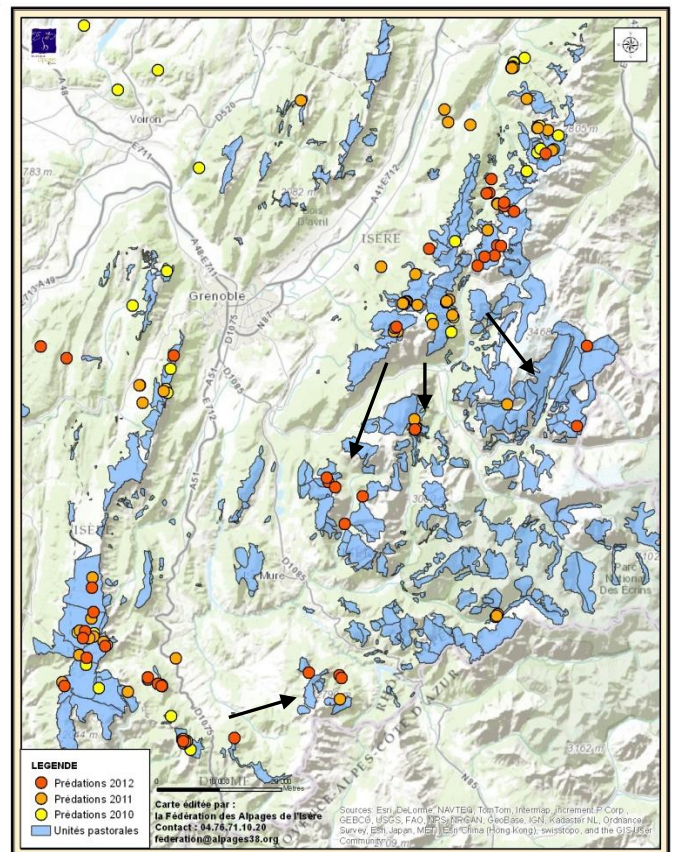


Figure 14 : Map showing the predation cases from 2010 to 2012 (FAI, 2013c)

It is not possible to establish trends over 3 years in terms of evolution of the number of cases (40 in 2010, 59 in 2011 and 46 in 2012) or victims (128, 243 and 203). However, it is interesting to note that the majority of cases involve few victims for an average of 3.8 victims per attack and more than 50 % of attacks make 1 or 2 victims. It would be interesting to know the nature of the victims (sheep, lambs ...) in order to better assess the risks for lambs.

In comparing the three maps representing the predation from 2010 to 2012, several observations are possible:

- Areas where predation occurred in 2010 were again concerned the following years, with exception of the Isère plains northwest ;
- Areas affected by these particular cases would extend south from the Belledonne or from the Vercors as show the arrows in Figure 15. However these are only assumptions made that need to be verified.

Lamb production seems not feasible in areas where many predations occurred during these three years. On the other hand, the area affected by the wolves presence seems to expand and can therefore cause problems in new areas in the years to come.

## **1.4 Crossing of the various zones**

If now, the predation risk factor is added to the potential areas for lambs production, we obtain the Figure 17. This map, centered on the previous alpine pastures identified, allows to have a more precise list of the areas where we need to concentrate the first efforts in order to produce alpine pasture lamb.

Si maintenant, le facteur « risque de prédation » est intégré aux aires potentielles de production, il est possible d'obtenir la Figure 17. Cette carte, centrée sur les alpages identifiés précédemment, permet de mieux préciser les territoires pastoraux sur lesquels concentrer les premiers efforts pour la production d'agneaux.

Although lamb quarters are present on the Belledonne mountain range (bounded by the red line on the map), it seems difficult to raise lambs there given the important risk of predation. The trouble in the wolves' areas is not only about the potential risk of losing animals but also and especially the changes of practices that the risk implies. For example, in order to protect the herd, shepherd gathers the animals during the night. To do that more easily, animals are grouped during the day too. So, concurrences phenomenon for fodder resources are

occurring a lot to the detriment of lambs. Furthermore, these groupings imply generally additional times of walking which cost a lot in terms of energy and that decrease lamb's growth. Finally if the shepherd is not with the herd at the right time, which is late in the evening and early in the morning, to lock and release the animals, we can observe a decrease of the grazing time. Indeed, animals graze preferentially at the least hot hours and lay down while ruminating the rest of the day. Therefore, if the grazing time is reduced, lambs eat less and so grow less.

For the other areas having lambs quarters, predation risk is really low and much localized. Some alpine pastures which could allow lambs production are close to attack places. So a more precise analysis and discussions with breeders and shepherds would be needed in order to improve the current mapping.

The Table 9 summarizes the data collected in regard of the possibility to produce alpine pasture lambs and the predation risk at the scale of the pastoral territories. This table is not at all a definitive one. It brings first tracks of work and to determine in which zones the production is facilitated or not. Even in the zones where the production seems little possible, particular conditions (in terms of herd management for example) could allow the production of lambs. It is even possible that lambs are actually produced on these zones without we know it.

*Tableau 8 : Summary of the lambs production areas according to the resources and to the predation*

Pastoral territory	Surfaces of alpine pastures suited for lamb production	Number of predation cases		Production possible?
		On the territory	On the « lambs areas »	
<b>Oisans</b>	3332 ha	16	2	Yes
<b>Valbonnais</b>	2433 ha	7	3	Yes
<b>Beaumont</b>	0 ha	1	0	No
<b>Trièves</b>	0 ha	33	0	No
<b>Vercors</b>	0 ha	26	0	No
<b>Matheysine</b>	0 ha	1	0	No
<b>Belledonne</b>	1059 ha	55	17	No
<b>Chartreuse</b>	341 ha	0	0	Yes

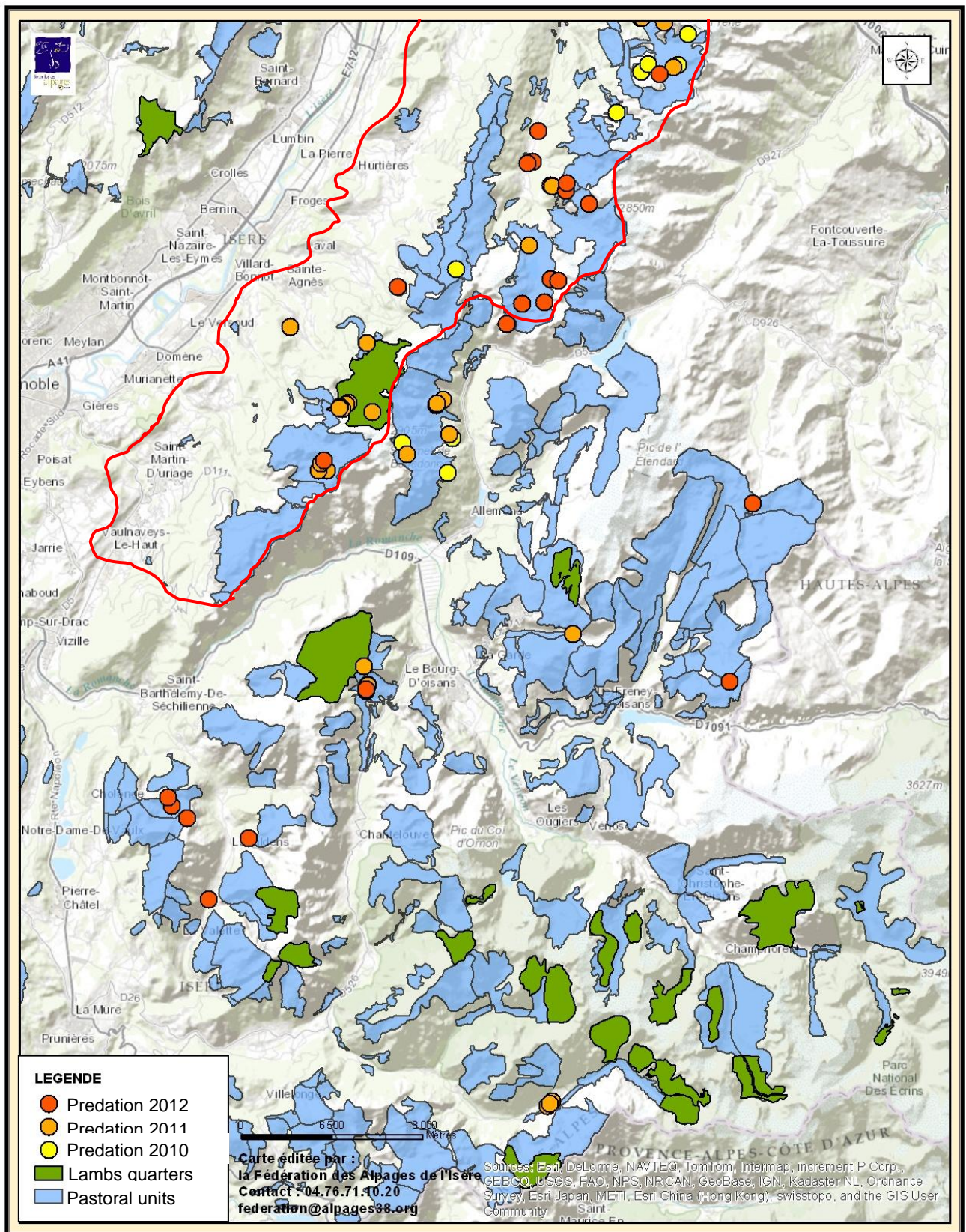


Figure 17: Map allowing us to localize the areas best suited to produce alpine pasture lambs (FAI, 2013c)

## 2 Lambs growth

In a first time, data have been analyzed by farms. Then, the growth and the weight of lambs are studied for the alpine pasture called Col du Coq because it was the only alpine pasture where we followed different farmers. Finally, data will be gathered to try to establish commons trends to the four breeding system.

In order to facilitate the readings and the understanding, the words “double” and “single” are used to mention respectively a lamb from a litter of two lambs and for a lamb which is single born. The abbreviation W1, W2, W3 and W4 are used to speak about the weight obtained respectively at the weightings 1, 2, 3 and 4. As a reminder, the weighting 1 is an intermediary between the weight at birth and the weight at the way up which is known thanks to the second weighting (W2). The weighting 3 is also an intermediary between the time lambs went up in the mountain and the time they go down (W4). The Average Daily Gain on the farm and on the alpine pastures are noted with the abbreviations ADGfarm and ADGalp.

The « mixed » effect allows estimating the impact of the aggregation of data concerning the sex and the way of birth for every lamb... For example, male lamb was born single; it will be up to the single male category (sm). In the same way three other categories exist: single female (sf), double male (dm) and double female (df).

### 2.1 By farm

#### 2.1.1 On Mr. Bouvier farm

##### Data description:

On this farm, 88 lambs have been weighted. However after cleaning the data, analysis have been done on 70 lambs. The weightings done on these 70 lambs are summarized in the Figure 18. This one shows the number of

lambs studied each time. The arrows point out the lambs which have been weighted from a time to another. For example, the four lambs appearing at the W2 are present until the end but they were not in the herd the first we came in the farm.

In this population, two lambing periods occurred: one which concern only 5 lambs and the other one from end of February to mid-march. Around fifty lambs are born between the 3<sup>rd</sup> and the 17<sup>th</sup> of March. The first lambing period gives the opportunity to Mr Bouvier to sell his production in a producers store and to sell lambs all the year round.

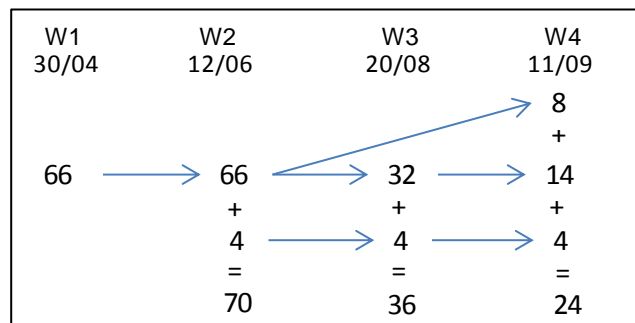


Figure 18 : Summary of the number of lambs weighted in Mr. Bouvier herd

On these 70 lambs, half of it is female, which will facilitate analyses and will not bias them. What it is not the case for the way of birth, because only 25% of the population studied consist of twins lambs.

The Figure 19 presents the growth curves of lambs according to their appurtenance at the four “mixed” categories. Differences of weight exist between categories. For example, the weight of double females (df) seems lower than the other categories at the way up (W2). These observations are completed by the following variance analyses.

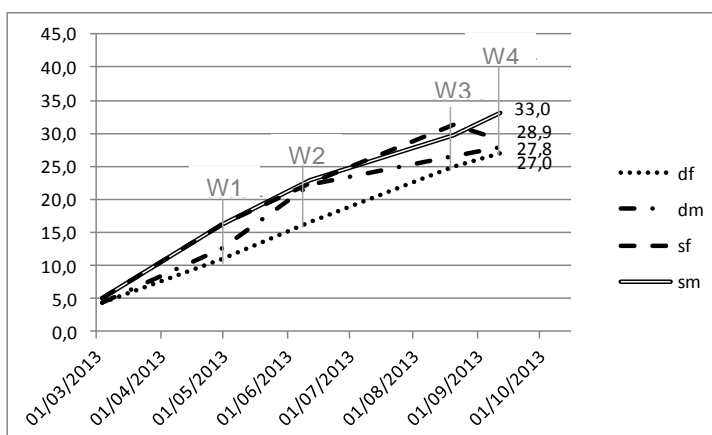


Figure 19 : Curves of growth of the lambs of Mr. Bouvier according to the categories: single males ( sm ); single females ( sf ); double males ( dm ) and double females ( df )

The weights are expressed in kg.

Table 9: ADG at the farm and at the alpine pasture (in g/d) for the lambs of Mr Bouvier according to the “mixed” effect

	ADGfarm	ADGalp
<b>df</b>	128 ± 25	118 ± 16
<b>dm</b>	190 ± 49	60 ± 67
<b>sf</b>	173 ± 38	92 ± 19
<b>sm</b>	173 ± 51	104 ± 35
	<b>167 ± 46</b>	<b>98 ± 36</b>

The Table 9 presents the average values of the ADG at the farm and at the alpine pasture as well as the standard deviations associated for the four “mixed” categories. In the view of this table, the ADG at the alpine pasture of the double males seem lower than those of the other categories. However this bad result is established on only three lambs and among them, one lost weight during the alpine pasture season and that happens only on this animal. So it is possible to wonder about the reliability of this result.

Data analyses :

All the results produced by different ANOVA tests are summarized in the Table 10. In the first phase of life of lambs, that is on the farm, the “way of birth” influences the lambs weight, the single born are heavier than the doubles. However, these differences disappeared as animals grow and it is not possible to see any differences according to this criterion at the descent of animals. So at the descent, it is only possible to see a significant difference between the single males and the double females. The first ones are globally heavier of 6 kg.

*Table 10: Summary of the sex, way of birth and mixed effects with regard to the weights and the ADG on Mr Bouvier’s lambs*

*Only the significant differences appear in the table below. When no significant results are obtained, the abbreviation NS is used.*

*The abbreviations used in the column mixed effect are: sm for single males, sf for single females, dm for double males and df for doubles females. The capital letter S is used to mention all the simple lambs (sm and sf).*

		Sex effect	Way of birth effect	Mixed effect
Weights	Between birth and way up (W1)	NS	Weights of singles > weights of doubles	S > df
	At the way up (W2)	NS	Weights of singles > weights of doubles	(S and dm) > df
	During alpine pasture season (W3)	NS	NS	NS
	At the descent (W4)	NS	NS	sm > df
ADG	At the farm	NS	NS	(sf and dm) > df
	At the alpine pasture	NS	NS	df > dm

After comparing the quantitative and qualitative data among them, now we aim at the establishment of correlation between the different quantitative data in order to determine which factors influence the weight of lambs at the descent. The coefficients of determination R<sup>2</sup> are presented in the

Table 11.



Table 11: Coefficients of determination  $R^2$  obtained for different correlation tests from the data of Mr Bouvier herd

The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	ADGfarm	ADGalp	W1	W2	W3	W4	Age at W4
ADGexp	<b>1,00</b>	0,02	0,60	0,77	0,58	0,49	0,00
ADGalp	0,02	<b>1,00</b>	0,02	0,06	0,15	0,16	0,09
Weighting 1	0,60	0,02	<b>1,00</b>	0,84	0,58	0,56	0,26
Weighting 2	0,77	0,06	0,84	<b>1,00</b>	0,69	0,61	0,25
Weighting 3	0,58	0,15	0,58	0,69	<b>1,00</b>	0,82	0,00
Weighting 4	0,49	0,16	0,56	0,61	0,82	<b>1,00</b>	0,08
Age at W4	0,00	0,09	0,26	0,25	0,00	0,08	<b>1,00</b>

The weight at the descent is correlated to the other weights. The correlation increases with the diminution of days between weightings. In other words, the more weightings are moved closer, the more their correlation is strong, what is quite logical.

More surprisingly, the weight at the descent (W4) is more correlated to the ADG at the farm than at the alpine pasture. So the growing period before the alpine pasture season is significantly more important than the one in the alpine pasture to explain the weight at the descent. This is partly explained by ADG significantly higher in the farm than in the alpine pasture (167 g/d against 98 g/d). Moreover, a difference in terms of duration of periods exists. For this farm, lambs have spent in average 10 days more in the farm than in the alpine pastures. So the crossing of these two observations explains the weight gain more important in the farm than in the alpine pasture, thus the best correlation.

The weight at the way up and the ADGalp are not at all correlated ( $R^2$  closed to 0). This means that the weight at the way up does not influence the weight gain during the alpine pasture season. It is thus important to take up heavy enough lambs to obtain the weight wished at the descent.

What you need to keep in mind about Mr Bouvier's lambs ...

- The weight at the descent is strongly correlated to the weight at the way up.
- The weight gain during the alpine season does not depend on the weight or on the age at the way up.
- The period on the farm has more consequences than the period in the alpine pastures on the last weight measured.

## 2.1.2 On Mr. Veyron farm

### Data description:

284 lambs of the GAEC Philippierre have been weighted. After cleaning the data and deletion of a lamb with an absurd value, the analysis is on 219 lambs. Among them, we do not have information about the sex and the way of birth for six lambs.

For this herd, we do not have precise data regarding the birth date. However two lambing periods can be distinguished. The biggest one concerns 85% of the lambs and occurs during the entire month of March. The second one is on the two last weeks of April.

On the considered population, the part of female is lower (45 %) than that of males, it does not represent the reality of the births. Indeed, on this herd, some female used for the herd renewal have not been weighted. 26 % of the lambs are doubles.

The Figure 21 allows to visualize the growths of Mr. Veyron's lambs according to the category they belong. During the three weightings, single lambs seem heavier than double ones. However, the trend is less clear between male and female. So the way of birth seems more important to explain the weight of lambs.

### Data analysis:

The Table 12 reports significant differences between the quantitative variables (weights and ADG) and the qualitative ones. In the column mixed effect when one or more categories do not appear, it means that there are no significant differences with the other categories.

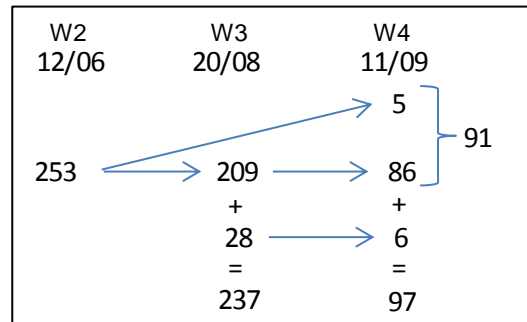


Figure 20 : Summary of the number of lambs weighted in Mr. Veyron herd

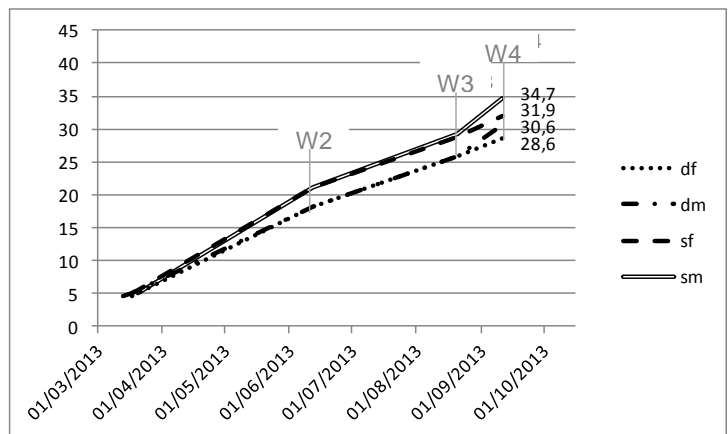


Figure 21: Curves of growth of the lambs of Mr. Veyron according to the categories: single males ( sm ); single females ( sf ); double males ( dm ) and double females ( df )

The weights are expressed in kg.

Table 12: Summary of the sex, way of birth and mixed effects with regard to the weights and the ADG on Mr Veyron's lambs

Only the significant differences appear in the table below. When no significant results are obtained, the abbreviation NS is used.

The abbreviations used in the column mixed effect are: *sm* for single males, *sf* for single females, *dm* for double males and *df* for doubles females. The capital letter *S* is used to mention all the simple lambs (*sm* and *sf*). It is the same for the letter *D* which put together the categories *dm* and *df*.

		Sex effect	Way of birth effect	Mixed effect
Weights	At the way up (W2)	NS	Weights of singles > weights of doubles	S > D
	During the alpine pasture season (W3)	NS	Weights of singles > weights of doubles	NS
	At the descent (W3)	Males weight > Females weight	Weights of singles > weights of doubles	sm > dm sm > sf > df
ADG	At the farm	NS	ADG of singles > ADG of doubles	S > D
	At the alpine pasture	NS	NS	NS

At the descent, males are heavier than females and that was not true for the previous weightings. This suggests that the ADG of males in the alpine pasture was better than the one of females. However this hypothesis is not confirmed by the ANOVA test between the ADGalp and the sex effect. Differences of weights between the singles and the doubles remain throughout the life of lambs. At the descent, the simple males are heavier than the other categories of lambs.

The quantitative variables are now compared. The Table 13 shows the coefficients of determination  $R^2$  obtained by different correlation tests.

Table 13: Coefficients of determination  $R^2$  obtained for different correlation tests from the data of Mr Veyron's herd

The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	ADGfarm	ADGalp	Weighting 2	Weighting 3	Weighting 4
ADGfarm	<b>1</b>	0,105	0,348	0,340	0,250
ADGalp	0,105	<b>1</b>	0,015	0,193	0,363
Weighting 2	0,348	0,015	<b>1</b>	0,683	0,751
Weighting 3	0,340	0,193	0,683	<b>1</b>	0,811
Weighting 4	0,250	0,363	0,751	0,811	<b>1</b>

The ADG in the farm has to be analyzed with precaution as we do not have the exact birth dates. The only correlations existing here concern weights. Indeed, they are all correlated between them. The weight at the way up explains strongly the one at the descent. So it is necessary to put in the alpine pasture lambs which are heavy enough if Mr. Veyron wants to produce lambs meeting the requirements of buyers. Moreover, the ADGalp is once again not correlated to the weight at the way up. So there is no a compensation phenomenon: the light lambs do not catch up their growth delay.

What you need to keep in mind about Mr. Veyron's lambs...

- At the descent, the average weight of male is greater than that of female.
- The average weight of doubles at the descent is lower than that of singles.
- The weight at the descent is correlated to the weight at the way up.
- The weight differences observed at the way up to alpine pasture remain at the descent. The ADGalp is quite similar for all the lambs.
- Weight gain in the alpine pasture does not depend on weight or age at the way up.

### 2.1.3 On Mr. Girard farm

Data description:

At Mr. Girard's farm, 143 lambs have been weighted. Because it is not easy to access at the alpine pasture Mr. Girard, only two weightings have been possible: one just before the way up

W2 20/06		W4 03/10
139	→	134
		+
		4
		=
		138

Figure 22: Summary of the number of lambs weighted in Mr Girard herd

which the 20<sup>th</sup> of June has concerned 139 lambs and one at the descent the 3<sup>rd</sup> of October for 138 lambs among them 4 have not been weighted before (see Figure 22). So on this herd; analysis will be on 134 lambs.

Almost 90 % of the lambing occurs in less than a month between the 25<sup>th</sup> of March and the 22<sup>nd</sup> of April. It will be interesting later on to see if there are growth differences between the most of the lambs and the 8 lambs born at the end of February.

On the 134 lambs, the share of single is clearly greater (82%). This is due at breeders choices in terms of selection and partly to the fact that the herd is composed of pure Merinos breed which do not have a really high prolificity (1,2 lambs in average according to the regional breeding house of PACA). However, male and female are almost equally represented (48 % of female).

By observing the Figure 23, it is hard to identify the moment where the weightings 2 took place. While on the other farms, a « break » is visible on the rights, here this change of slope is much less clear. On this observation, a hypothesis can be established on the fact that the ADG on the farm and the ADG on the alpine pasture are not different for each given categories.

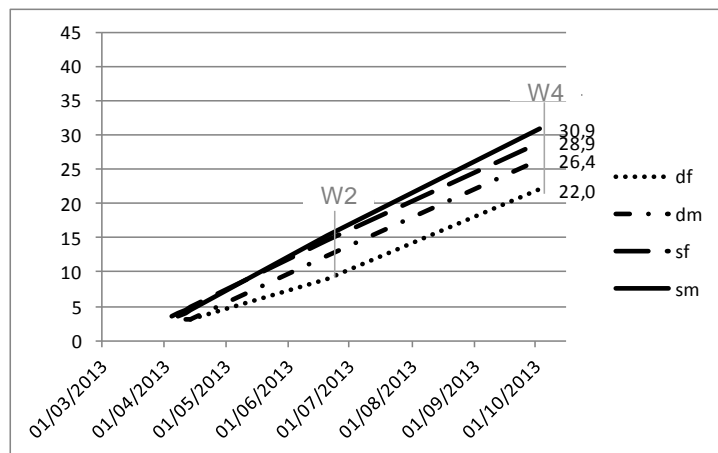


Figure 23: Curves of growth of the lambs of Mr Girard according to the categories: single males ( sm ); single females ( sf ); double males ( dm ) and double females ( df )  
The weights are expressed in kg.

Data analysis:

In order to verify the formulated hypothesis, a Z-test on the means of the two variables (ADGfarm and ADGalp) has been made. With a significance level alpha of 0,05, it is not possible to differentiate the averages. It confirms the visual observations. By completing this analysis with an F-test on the variances, it emerges from it that the variances are significantly different. The ADG obtained at the alpine pasture are more homogenous than the one in the farm, as visible in the Table 14

Table 14: ADG at the farm and at the alpine pasture (in g/d) for the lambs of Mr Younan

	ADGfarm	ADGalp
<b>df</b>	88 ± 17	125 ± 16
<b>dm</b>	142 ± 50	133 ± 37
<b>sf</b>	145 ± 39	137 ± 23
<b>sm</b>	160 ± 37	148 ± 33
	<b>148 ± 42</b>	<b>140 ± 30</b>

The Table 15 shows the significant differences between the variables of the study was done for the other farms.

Table 15: *Summary of the sex, way of birth and mixed effects with regard to the weights and the ADG on Mr Girard's lambs*

*Only the significant differences appear in the table below. When no significant results are obtained, the abbreviation NS is used.*

*The abbreviations used in the column mixed effect are: sm for single males, sf for single females, dm for double males and df for doubles females. The capital letter S is used to mention all the simple lambs (sm and sf).*

		Sex effect	Way of birth effect	Mixed effect
ADG	At the way up (W2)	NS	Weights of singles > weights of doubles	S > dm > df
	At the descent (W4)	Males weights > Females weights	Weights of singles > weights of doubles	sm > (sf and dm) > df
	At the farm	Males ADG > Females ADG	ADG of singles > ADG of doubles	(S and dm) > df
	At the alpine pasture	NS	NS	sm > df

For the two weightings, singles were significantly heavier than twins. While no difference appeared between males and females for the weighed at the way up, the situation changes for the benefit of males at the descent which are then almost 2 kg more.

The ADG at the farm are higher for single and for the males. If we gather these two criteria, only the double females (df) have clearly lower ADG. For the ADG at the alpine pasture, we cannot see a difference anymore according to the sex and way of birth effect. However, towards the mixed effect, the single males have a better ADG than the double females (see Table 14).

The Table 16 summarizes the coefficients of determination  $R^2$  obtained after the comparison of different quantitative variables.

Table 16: Coefficients of determination  $R^2$  obtained for different correlation tests from the data of Mr Girard's herd

The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	ADGfarm	ADGalp	Weighting 2	Weighting 4	Age at weighting 4
ADGfarm	<b>1</b>	0,122	0,645	0,618	0,000
ADGalp	0,122	<b>1</b>	0,018	0,500	0,098
Weighting 2	0,645	0,018	<b>1</b>	0,632	0,318
Weighting 4	0,618	0,500	0,632	<b>1</b>	0,044
Age at weighting 4	0,000	0,098	0,318	0,044	<b>1</b>

Once more, the weight at the way up (W2) is positively correlated to the weight at the descent (W4). For the first time, this last one is correlated to the ADG at the alpine pasture. However, it is more strongly correlated to the ADG at the farm. This shows the need for lambs to have a “good start” of growth.

After these analyses, it does not seem that the age at the descent is correlated to the lambs weight at the same moment ( $R^2=0,034$ ). To visualize this information, a scatter graphs used visible in Appendix 4. It allows to distinguish two groups: the one surrounded in orange on the graph consists of the oldest lambs born during the first period of lambing and the other one surrounded in black made by the other lambs. The oldest lambs are not heavier than the other ones. However they all weight more than 30 kg. This observation allows us to advice this breeder on the best period for lambing. More lambs are older, the more they consumed resources. In other words to achieve the same weight older lambs will cost them more. Mr. Girard should favor a lambing starting in late March.

What you need to keep in mind about Mr. Girard's lambs...

- The average weight of males at the descent is greater than the one of females.
- Doubles are heavier than single at the descent.
- The weight at the descent is correlated with the one at the way up.
- The ADGfarm and ADGalp are not different for the entire herd, that means that there is no break of the growth when animals go up in the alpine pasture.
- The weight differences observed at the way up to alpine pasture remain at the descent.
- Weight gain in the alpine pasture does not depend on weight or age at the way up.
- Older lambs are not heavier than other lambs.
- The period before the alpine pasture season explains more the weights at the descent than the alpine pasture period. Mr. Girard need to take care that its lambs do a good start of growth in order to have heavy enough lambs at the descent.

## 2.1.4 On Mr. Salvi farm

### Data description:

At the Gaec du Taillefer (farm's name), 382 lambs have been weighted but only 252 twice. On this farm, males came down the mountain earlier and were weighted the 26<sup>th</sup> of September whereas the female have been weighted four days after they came down so the 11<sup>th</sup> of October. This difference is due to the fact that males are essentially sold for the Muslim fest Aïd El-Khebir. So breeders want to have them on the farm in order to show them to the buyers. This allows them to complete their alimentation with richer food in order to improve their fattening.

W2 20/06	W4 11/10 for ♂ 26/09 for ♀
300	→ 252
	+ 82
	= 334

Figure 24: Summary of the number of lambs weighted in Mr. Salvi herd

On this farm, birth dates are not known with precision. The lambing book is updated every two weeks. It is still possible to say that lambs are born between the 7<sup>th</sup> of March and the 2<sup>nd</sup> of April.

On the 252 lambs, some information are missing: four regarding the sex and one concerning the way of birth. 130 females are in the population studied which represent 52% of the sample. Unlike the other farms, here, the way of birth "double" is the main represented (53%).

For the weighting at the way up, it seems that differences are explained by the way of birth while at the descent, differences seems more linked to the sex. At the descent, doubles weight 35,4 kg in average against 38,3 kg for the single lambs.

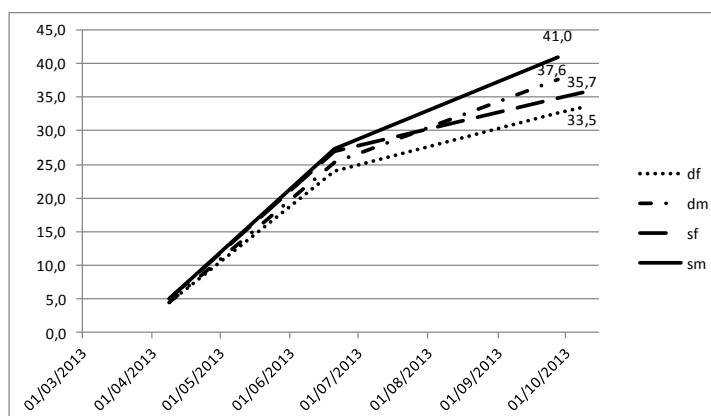


Figure 25: Curves of growth of the lambs of Mr Salvi according to the categories: single males (sm); single females (sf); double males (dm) and double females (df)

The weights are expressed in kg.

Table 17: ADG at the farm and at the alpine pasture (in g/d) for the lambs of Mr Salvi according to the "mixed" effect

	ADGfarm	ADGalp
df	280 ± 66	86 ± 42v
dm	295 ± 70	125 ± 38
sf	313 ± 61	80 ± 25
sm	318 ± 72	138 ± 37
	<b>301 ± 70</b>	<b>106 ± 42</b>

Judging by the slope of the curves before and after that animal went up in the mountain; it seems that ADG at the farm is higher than the one in alpine pasture. This is confirmed if we look at the Table 17. However, it also appears that the ADG of females is lower during the alpine



pasture; we can question ourselves to explain this. Due to the fact that males and females have not been weighted at the same time, it is possible that the conditions were different and impact negatively the females' weights at the descent. This hypothesis is unfortunately not verifiable.

Data analysis:

In order to compare quantitative and qualitative data, different ANOVA tests have been made. The significant results are presented in the Table 18.

*Table 18: Summary of the sex, way of birth and mixed effects with regard to the weights and the ADG on Mr Salvi's lambs*

*Only the significant differences appear in the table below. When no significant results are obtained, the abbreviation NS is used.*

*The abbreviations used in the column mixed effect are: sm for single males, sf for single females, dm for double males and df for doubles females. The capital letter S is used to mention all the simple lambs (sm and sf). In the same way: D=df+dm, M=sm+dm and F=sf+df.*

		Sex effect	Way of birth effect	Mixed effect
Weights	At the way up	NS	Weights of singles > weights of doubles	sm > D sf > df
	At the descent	Males weight > Females weight	Weights of singles > weights of doubles	sm > sf sm > dm > df
ADG	At the farm	NS	Singles ADG > Doubles ADG	S > df
	At the alpine pasture	Males ADG > Females ADG	NS	M > F

While weights differences were not significant before the alpine pasture season, they become it at the descent. This is partly due to the fact that males ADGalp is higher than the one of female.

After comparing the quantitative and qualitative data between them, the aim now is to establish correlation between different quantitative variables in order to determine which factors influence the lambs' weight at the descent. These one are summarized in the Table 19.

Table 19: Coefficients of determination  $R^2$  obtained for different correlation tests from the data of Mr Salvi's herd

The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	ADGfarm	ADGalp	Weighting 2	Weighting 4	Age at weighting 4
ADGfarm	<b>1</b>	0,056	0,428	0,361	0,196
ADGalp	0,056	<b>1</b>	0,035	0,486	0,004
Weighting 2	0,428	0,035	<b>1</b>	0,688	0,073
Weighting 4	0,361	0,486	0,688	<b>1</b>	0,025
Age at weighting 4	0,196	0,004	0,073	0,025	<b>1</b>

The weight at the descent is only correlated to the weight at the way up. It underlines one more time the importance to put lambs heavy enough to the alpine pasture.

What you need to keep in mind about Mr. Salvi's lambs...

- The average weight of male lambs is higher than the one of female.
- At the descent, doubles are lighter than single lambs.
- Single males are heavier than the other categories at the descent.
- The gain during the alpine pasture season depends on the sex (males grow faster) but neither on the weight or on the age at the way up.

## 2.1.5 Comparison of farms

The Table 20 summarizes the observations done in all the farms by comparing the quantitative and qualitative variables.

Table 20: Comparison of results obtained on the four farms studied with regard of the sex, way of birth and mixed effects

Only the results found on most of the farms are presented in the table. Numbers in brackets announce the frequency of the observation. When no significant results are obtained, the abbreviation NS is used.

The abbreviations used in the column mixed effect are: sm for single males, sf for single females, dm for double males and df for doubles females. The capital letter S is used to mention all the simple lambs (sm and sf). In the same way: D=df+dm, M=sm+dm and F=sf+df. The term REST is used to mention the other categories (sf, dm and df).

		Sex effect	Way of birth effect	Mixed effect
Weights	At the way up	NS (4)	Weights of singles > Weights of doubles (4)	S > df (4) sm > dm (3)
	At the descent	Males weight > Females weight (3)	Weights of singles > Weights of doubles (3)	sm > REST (3-4)
ADG	At the farm	NS (3)	ADG of singles > ADG of doubles (3)	S > df (4)
	At the alpine pasture	NS (3)	NS (4)	NS

At the descent, the weight of males is higher than the one of females, which was not the case before. Moreover, it is not possible to differentiate the ADGalp according to the sex. These two observations imply that differences exist but that they are not significant. Indeed, a low difference (not significant) at the way up can be aggravated by a higher ADGalp (not significantly different) and thus cause a significant difference at the descent. However, before advising anyone, it is necessary to see if females reach also the required weights.

Singles have better results than twins. For this criterion too, a deeper studied of the weights at the descent is needed. At the first reading, it could be advice to farmers to target the production of simple. However, that would have negative impacts on the global economic results of the farm (Institut de l'élevage, 2013a).

A last conclusion can be made; single males have higher weights than the other categories. Afterward, it is interesting to see if the weights of these lambs stay on the expected range or overtakes it in order to optimize the slaughter dates.

The Table 21 allows to compare existing correlation between the different quantitative variables according to the breeder.

Table 21: Coefficients of determination  $R^2$  obtained for the different herds

The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	Mr. Bouvier	Mr. Veyron	Mr. Girard	Mr. Salvi
ADGfarm – Weighting 2	0,77	0,348	0,645	0,428
ADGfarm – Weighting 4	0,49	0,250	0,618	0,361
ADGalp – Weighting 2	0,06	0,015	0,018	0,035
ADGalp – Weighting 4	0,16	0,363	0,5	0,486
Weighting 2 – Weighting 4	0,61	0,751	0,632	0,688
Weighting 4 –Age at W4	0,08		0,044	

The only correlation present on each herd is the one between the weight at the way up and at the way down. It suggests that lambs have to be heavy enough on the way up for being directly sold at the descent with an expected weight without fattening period.

What you need to keep in mind on the comparison of results from different farms...

This degree of analysis allows to advise the breeders individually and to understand better the observations made on all the lambs.

- At the descent, the average weight of male is greater than that of female.
- At the descent, the average weight of single is greater than that of doubles.
- At the descent, simple males are heavier than lambs from the other categories.
- The weight at the descent is correlated to the weigh at the descent. SO, it is important that lambs go in the alpine pasture with a sufficient weight.

➡ Before advising the breeders, other analyses are needed. It is a question in particular of seeing which proportions of lambs have weights at the descent included in meanwhile expected (between 30 and 44 kg of live weight).

## 2.2 On the alpine pasture Col du Coq

On the Col du Coq, lambs are from the farms of Mr. Bouvier and Mr. Veyron. Lambs from these two breeders have been grouped to create a new population. A new variable is added corresponding to the farm of origin. Given that on this alpine pasture, the herd is managed collectively by a hired shepherd, the pastoral practices do not count for the variability between lambs. The data collected at weighting 1 are not used in this part because there were realized only in one herd.

### Data description:

The study for the Col du Coq is on 289 lambs. The summary of the weightings is visible in the Figure 26. This population is composed of 45% of females and 25% of doubles. 85% of births occurred between the 28<sup>th</sup> of February and the 28<sup>th</sup> of March.

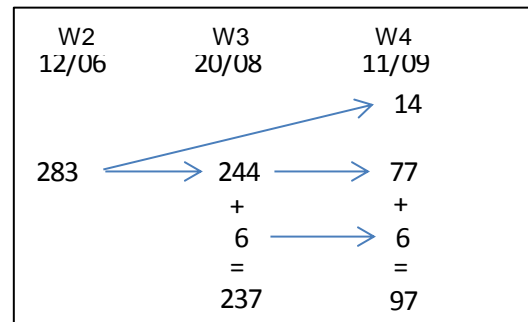


Figure 26: Summary of the number of lambs weighted for the Col du Coq

The Figure 27 offers a visualization of growth curves of lambs spending their summer at the Col du Coq. Single lambs seem heavier than doubles during the three weightings, even if differences seem lower at the descent. However, ADG at the farm and at the alpine pastures of double lambs do not seem different (we do not see a break in the slope). That means that they do not suffer from a disruption of their growth. Their weight gain seems more homogenous on the entire studied period.

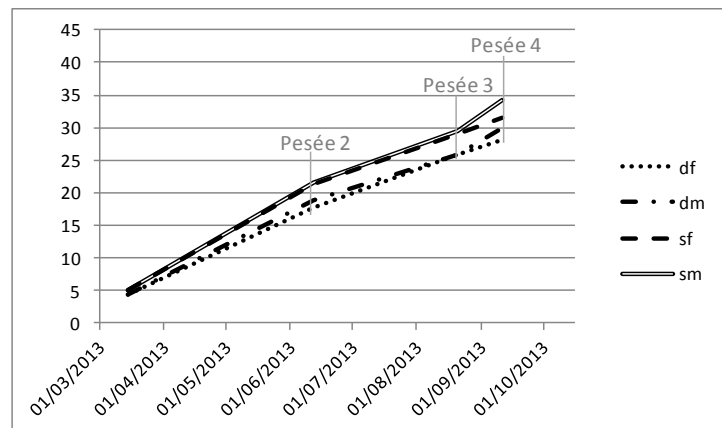


Figure 27: Curves of growth of the lambs of the Col du Coq according to the categories: single males (sm); single females (sf); double males (dm) and double females (df)

The weights are expressed in kg.

### Data analysis:

In order to compare quantitative and qualitative variables, different ANOVA tests have been done. The significant results are presented in the Table 22. The breeder effect is added to

evaluate if lambs from a breeder or another react in the same way during the alpine pasture season. This effect gathers mainly the breeding practices before the alpine pasture time given the fact that lambs are all managed in the same way by the shepherd. It can also be linked at the genetic characteristics of each herd. It is difficult to analyze this factor as far as the two breeders cross Merinos ewes with rams that have good butchery characteristics. We do not precisely enough the degree of cross breeding to integrate it in our analysis. The breeders are called Breeder 1 and Breeder 2 because our goal is not to see who has the best results rather than evaluating in breeders practices influence the weight gain during the alpine pasture season.

*Table 22: Summary of the sex, way of birth, mixed effects and breeder with regard to the weights and the ADG on lambs of the Col du Coq alpine pasture*

*Only the significant differences appear in the table below. When no significant results are obtained, the abbreviation NS is used.*

*The abbreviations used in the column mixed effect are: sm for single males, sf for single females, dm for double males and df for doubles females. The capital letter S is used to mention all the simple lambs (sm and sf). It is the same for the letter D which put together the categories dm and df.*

		Sex effect	Way of birth effect	Mixed effect	Breeder effect
Weights	At the way up	NS	Weight of singles > Weight of doubles	S > D	Breeder 1 > Breeder 2
	During the alpine pasture season	NS	Weight of singles > Weight of doubles	S > D	NS
	At the descent	Males weight > females weight	NS	sm > sf > df sm > dm	Breeder 2 > Breeder 1
ADG	At the farm	NS	ADG of singles > ADG of doubles	S > D	Breeder 2 > Breeder 1
	At the alpine pasture	NS	NS	NS	Breeder 2 > Breeder 1

On this alpine pasture, sex has an important effect. It will be interesting to see if the females manage to reach the expected weight for selling them directly at the descent. If it is not the case, a different management for females lambs and their mother could be envisaged. The single males have a higher weight of at least 2,5 kg.

A breeder effect can be observed, a deeper analysis of the practices of these two breeders would be necessary to explain this result. However, this effect can be spited in two

subeffects: the alimentation/management on the farm before the alpine pasture time and the degree of crossbreeding. Even if we do not have precise data, we know that lambs are more crossed for the breeder and he has heavier lambs at the descent.

To explain the weight at the descent, this variable is compared to other quantitative variables thanks to correlation tests. The results of these different tests are presented in the Table 23.

Table 23: Coefficients of determination  $R^2$  obtained for different correlation tests for the lambs of the Col du Coq

The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	ADGfarm	ADGalp	Weighting 2	Weighting 3	Weighting 4	Age at weighting 4
ADGfarm	<b>1</b>	0,069	0,395	0,361	0,303	0,340
ADGalp	0,069	<b>1</b>	0,000	0,169	0,309	0,105
Weighting 2	0,395	0,000	<b>1</b>	0,676	0,683	0,150
Weighting 3	0,361	0,169	0,676	<b>1</b>	0,810	0,017
Weighting 4	0,303	0,309	0,683	0,810	<b>1</b>	0,013
Age at W4	0,340	0,105	0,150	0,017	0,013	<b>1</b>

No variables others than the weights are correlated to the weight at the descent. It shows once again the importance to have heavy enough lambs on the way up.

#### What you need to keep in mind about lambs from the col du Coq alpine pasture...

This level of analysis allows us to delete the effects of alpine pasture quality, in terms of the quantity and the quality of available fodder resources. The effect « pastoral practices » is also erased because the herd is kept by only one shepherd.

- The average weight of males at the descent is higher than the one of females.
- At the descent the average weight of single males is higher than the ones of other categories.
- The breeder effect is visible for almost all the variables. Given that this effect is essentially linked to period where animals are on the farm, it shows once again the importance of lambs' growth at the farm. This can also due to the fact of crossbreeding within the herd. Indeed, weights at descent are higher on the most crossbred herd.

## 2.3 For all the lambs weighted

This part of the study is about all the lambs weighted at their way up and at their descent from alpine pastures. It allows to check the general trends. But we need to consider them carefully as the number of lambs from a breeder to another varies greatly.

### Data description:

The analysis is on 500 lambs weighted twice. This population is composed of 52 % of females and 36 % of doubles. 50% of the lambs come from the farm of Mr. Salvi while 27 % from Mr. Girard, 18 % from Mr. Veyron and 5 % from Mr. Bouvier. We need to keep in mind these percentages for the understanding of the results.

Most of the lambing occurred between the 21<sup>st</sup> of February and the 2<sup>nd</sup> of April. The birth pick is situated in March.

According to the curves visible in the Figure 28, it seems that the sex effect has stronger consequences that the way of birth effects at the descent. Indeed, the curves of single males and double males are really close; it is even difficult to distinguish them. The situation is quite similar for females. At the way up, the average weights of the four categories seems equivalent. So differences at the way down should be linked to the ADGalp. This hypothesis will be checked later on in this paper.

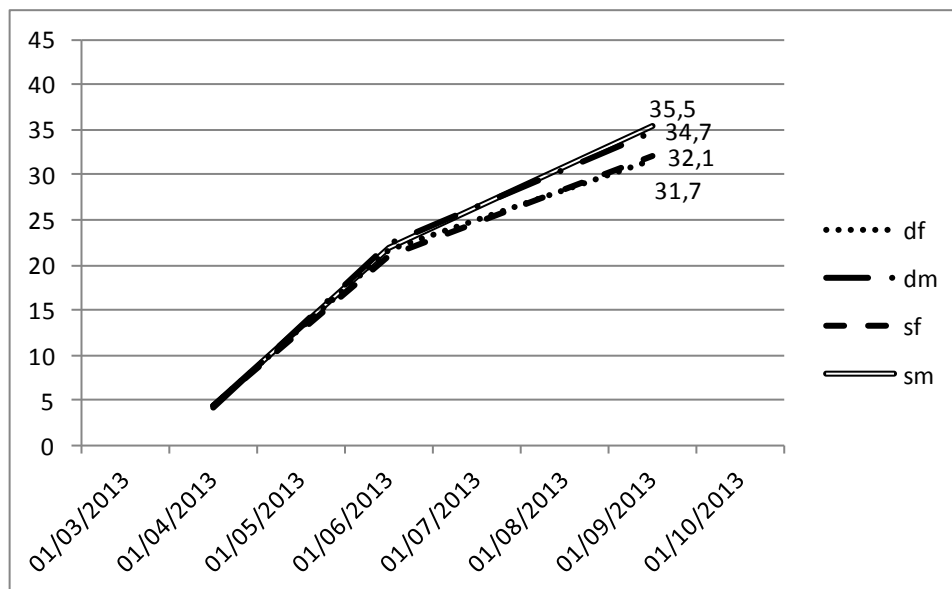


Figure 28: Curves of growth of the lambs according to the categories: single males (sm); single females (sf); double males (dm) and double females (df)

The weights are expressed in kg.



### Data analysis:

To verify the hypothesis written above, ANOVA tests between quantitative and qualitative data have been done. The Table 24 presents the significant results obtained.

*Table 24: Summary of the sex, way of birth, mixed effects and breeder with regard to the weights and the ADG on all lambs of the study*

*Only the significant differences appear in the table below. When no significant results are obtained, the abbreviation NS is used.*

*The abbreviations used in the column mixed effect are: sm for single males, sf for single females, dm for double males and df for doubles females. The capital letter S is used to mention all the simple lambs (sm and sf). In the same way: D=dm+df, M=sm+dm and F=sf+df.*

*The abbreviation B1 is used to mention the breeder 1.*

		Sex effect	Way of birth effect	Mixed effect	Breeder effect
Weights	At the way up	Males weight > Females weight	Weight of singles > Weight of doubles	NS	B1 > (B2, B3) > B4
	At the descent	Males weight > Females weight	Weight of singles > Weight of doubles	M > F	B1 > (B2, B3) > B4
ADG	At the farm	Males ADG > Females ADG	ADG of singles > ADG of doubles	sm > dm > sf > df	B1 > B2 > B3 > B4
	At the alpine pasture	Males ADG > Females ADG	NS	NS	B4 > B2 > (B1, B3)

The obtained results confirm the visual observations concerning the differences of weight at the descent according to the sex of lambs. The male lambs are in average heavier than the females. They also confirm that it is not possible to see any differences between the four categories of the mixed effect at the way up but they bring information on the differences according to the sex and the way of birth. The way of birth effect not visible on the curves appears here. Double lambs are lighter than the singles. On the contrary, the obtained results refute the hypothesis concerning the ADGalp in regards of the four categories. No significant differences could be observed.

With regard to the breeder effect, the hierarchical organization of the weights is identical on the way up and at the descent. However, it is not true for the ADG. Indeed, the lambs of the breeder 4 which had the lowest ADG at the farm have the highest in the alpine pasture. An essential factor could explain this weight difference. The breeder 4 is the only one to produce pure Merinos lams, the other cross their ewes with butcher quality rams. As for the best ADG in alpine pasture, one of the explanations could be the management of the herd in summer.

Indeed, this herd is the only one which is not kept. Animals are free on the entire alpine pasture. However, it would be necessary to check if this result is not also or only linked to the fodder resources available in the alpine pasture.

Let us linger now in comparison of the quantitative variables. The correlations are presented in Table 25 by means of the coefficients of determination  $R^2$ .

Table 25: Coefficients of determination  $R^2$  obtained for different correlation tests on all lambs  
The tinted cells indicate the values of  $R^2$  superior to 0,5. It corresponds to the existence of correlations.

	ADGfarm	ADGalp	Weighting 2	Weighting 4	Age at W4	Alpine pasture duration
ADGfarm	<b>1</b>	0,011	0,677	0,541	0,077	0,029
ADGalp	0,011	<b>1</b>	0,032	0,144	0,101	0,126
Weighting 2	0,677	0,032	<b>1</b>	0,698	0,044	0,001
Weighting 4	0,541	0,144	0,698	<b>1</b>	0,002	0,012
Age at W4	0,077	0,101	0,044	0,002	<b>1</b>	0,036
Alpine pasture duration	0,029	0,126	0,001	0,012	0,036	<b>1</b>

The weights at the way up and at the descent are positively correlated. The scatter graphs, the trends curves and the coefficient of determination are presented in the Appendix 5.

The ADG at the farm explains at a great extend the weight at the way up and also the weight at the descent. The phase of growth at the farm must be thus followed with attention to obtain lambs meeting the weight requirements at the descent.

## 2.4 Conclusions for the lambs growth study

The three analysis levels have shown similar results:

- Males are heavier at the descent than females;
- The weight at the end of the alpine pasture season is highly correlated to the weight at the way up and so at the growing phase on the farm.

During the comparison between farms and the analysis on all lambs, it appears that single weight more than double lambs at the descent.

During the comparison between farms and the analysis on the Col du Coq, it appears that the single males have a weight higher than other categories of lambs.

The analysis levels gathering different breedings allow to identify a new variable influencing the weight at the descent: the breeder effect. This effect groups two essential components: the lambs breed and the feeding strategy before that animals go in the alpine pasture. More lambs are cross breed, more they get heavy. However, it is difficult to evaluate the effect of the alimentation before the alpine pasture because we do not have enough information about it.

#### What you need to keep in mind about the alpine pasture lambs studied...

This level of analysis is done to see if global observations can be made. However, it is more difficult to understand the results because of the increase of variables number and the low number of breeders.

- The average weight of males at the descent is higher than the one of females.
- The average weight of doubles at the descent is lower than the one of singles.
- Need to see if the lightest categories still reach the expected weights while respecting the specification about the age at slaughter.
- The weight at the descent is correlated to the weight at the way up and at the ADG on the farm. The growth phase at the farm is thus essential to reach the requirements in terms of weight at the descent.
- The breeder effect is not negligible. It could be linked to the breed used by the breeders.
- In order to understand in a more precise way the results, it would be necessary to increase the number of breeders in the study.

### **3 Conformity of weights at the descent**

In view of the results above, many questions have to be clarified:

- What percentage of lambs reaches a live weight between 30 and 44 kg?
- Do females reach sufficient weights at the descent?
- Is there a difference of distribution of the single and doubles lambs according to the classes?
- Are not the simple males too heavy at the descent?
- Are lambs matching the age requirements of specifications at the descent (less than 180 days at slaughter)?
- Does the breed effect have consequences on the weight at the descent?

The weight recommendation (between 30 and 44 kg of live weight) is valid for food chain other than direct selling. Breeders on the study are all using the direct selling to sell their lambs. They have troubles to find buyers and these limits could be useless. On the other hand, in a future quality approach, it will be necessary to control the production in order to establish clear specifications. It should allow consumers to know exactly what the product that they have in their plate is. It remains at the different partners in the initiative to choose which criteria are important and which distribution channel they prefer.

In order to answer at these questions, data on the 500 lambs weighted twice are used.

If we keep the weight criterion defined by the specifications, worth knowing a live weight less than 35 kg, 62 % of the 500 lambs fit this criterion. However among this 62 %, some lambs are too light to be sold, so this number is less in reality.

If now we use the threshold of the distributor survey (BONNET et al., 2013), and so a goal of live weight between 30 and 44 kg, 63 % of lambs seems ready for selling. While 31 % is too light and 6 % too heavy.

The Figure 29 allows to analyze the distribution of weight classes at the descent in regards of the sex. The main part of the too light lambs is composed of females. This can bring different questions:

- Should breeders manage differently the female before the alpine pasture season or is it better to prefer a fattening period after the alpine pasture time? To answer at this question, it would be necessary to do an economic analysis to see which solution as the lowest production costs;
- Which female are selected to renew the herd? This will allow us to see the real final part allocated to sales and so to if the percentages vary.

The Figure 30 allows an easy and visual interpretation of the distribution of single and double lambs according to the weight classes they belong at the descent. Trends for the weights at the

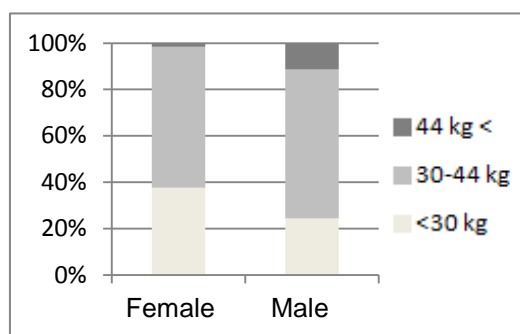


Figure 29: Distribution of female and male according to weight classes at the descent

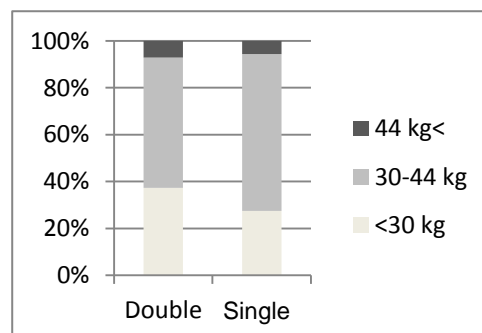


Figure 30: Distribution of single and double lambs according to the weight classes at the descent

descent are less clear when we look at the way of birth. However, doubles seems more represented in the too light lambs than the single.

The Figure 31 shows the distribution of the four categories (double females df, double males dm, single females sf and single males sm) with regards of the weight classes at the descent. The fear that single males are too heavy at the descent does not seem to be justified. It is also difficult to highlight significant trends.

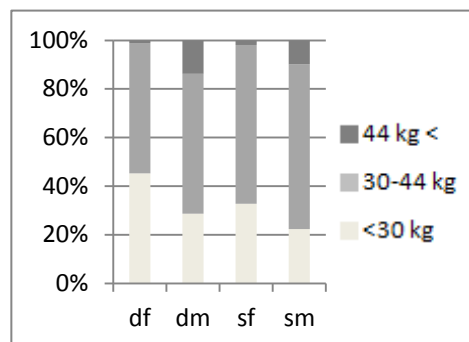


Figure 31: Distribution of lambs according to the mixed effect and the weight classes at the descent

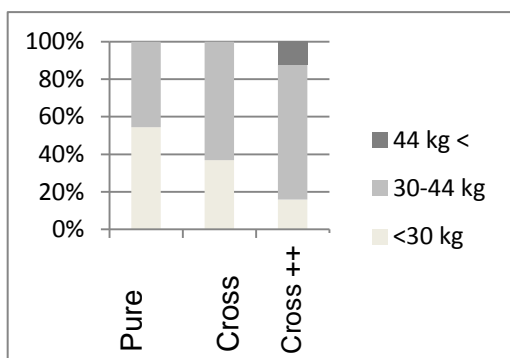


Figure 32: Distribution of the breed effect according to the weight classes at the descent

The Figure 32 allows to estimate the breed effect on the weights at the descent. The pure breed lambs come from the Merinos breed only. The cross breed lambs have Merinos mother and a father with good butcher qualities. For the cross breed ++, the mother are already cross breed closed to the breed Alps commons which a crossbreed between Merinos and Ile de France mainly (Bureau des ressources génétiques, 2013).

The breeder use also rams with butcher quality that explains the best weights at the descent. The goal is not to say in the specifications which breed or breeds are allowed to produce alpine pasture lambs but rather to understand what are the characteristics influencing the weights at the descent in order to advise farmers in the best way.

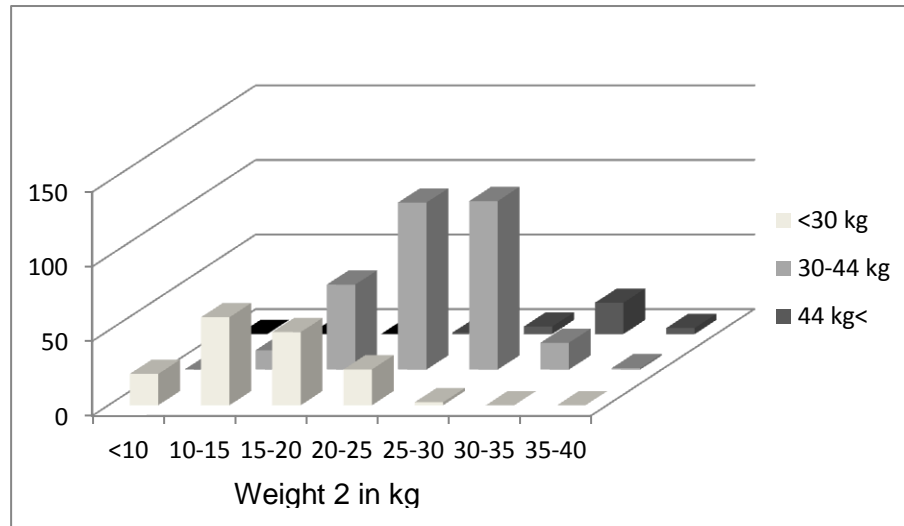


Figure 33: Distribution of the weights at the descent according to the weights at the way up

During all the study, the importance of the weight at the way up in regards to the weight at the descent have been noticed. Now we want to define the ideal weight at the way up to have lambs with the expected weight. The weights at the way up were grouped by classes going from 5 kg to 5 kg as visible in the Figure 33. The superior threshold is meanwhile included. In the view of this figure, it is possible to say that the weights on the way up must be ideally situated between 15 and 30 kg. On the studied population, 363 lambs weighed between 15 and 30 kg at the way up and 78% of them came down the mountain with an expected weight, while 62% of the entire population went down with an expected weight. This rule of choice of lambs to taken up to the alpine pasture would thus allow to improve the part of lambs reaching a sufficient weight.

In the previous results, no correlation was found between the age and the weight at the descent. This means that no correlation exist between the ages at the way up and the weight at the descent. It is thus not possible to define an optimum age at the way up. The weight at the way up is the most important factor which explains the weight at the descent. However, it is necessary that lambs are respecting a criterion of age at the descent. Indeed, the current specifications fix a maximum age at slaughter of 180 days. And it is also planned and necessary that lambs are killed right at their descent from alpine pasture. So lambs at the descent have to be maximum at the age of the one defined for slaughter, that is a maximum age of 180 days at the descent. In the studied population, it is therefore necessary to look at the distribution of the lambs according to their weights at descent and to their age, as it is done in the Figure 34.

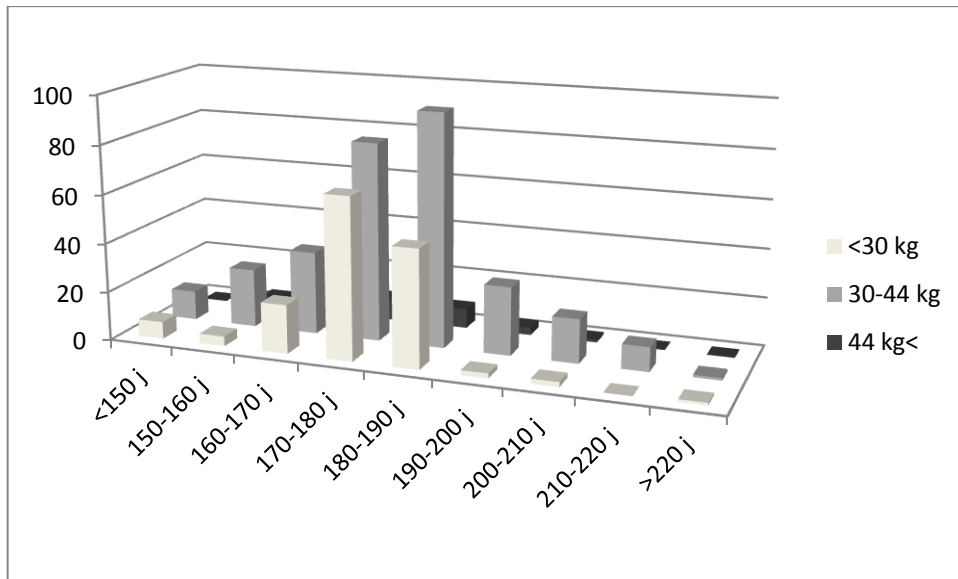


Figure 34: Distribution of lambs in weight classes (in kg) in function of their age (in days) at the descent from alpine pasture

The lambs with an expected weight seem more numerous with an age older than 180 days at the descent. Results of descriptive statistics on the lambs of the classes 30 to 44 kg of live weight at the descent presented in the Figure 35 give precision on this observation. In fact, 50 % of lambs have an age older than 180 days. It is thus possible to wonder about the legitimacy of this threshold in the specifications.

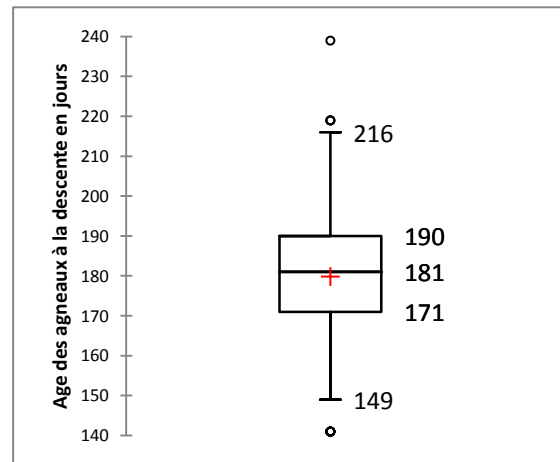


Figure 35: Analysis of the ages at the descent for lambs belonging to the classes of weight 30 to 44 kg

If we keep this threshold, it will be necessary to work on the birth date for some farms. Or it is possible to change this threshold in order to be more representative of the reality and without too big changes in practices.

What you need to keep in mind to produce lambs fitting the requirements about age and weight at the descent from alpine pasture...

- 63% of the lambs studied reach the required weight at the descent.
- The main part of too light lambs at the descent is composed of females. SO it could be imagine having specific management according to the sex.
- On some farms, it could be envisaged to differentiate the management practices for double and single lambs.
- The weight of single males is not too high. This categories gathers the biggest percentage of lambs in the desired classes.
- The age of lambs at the descent is higher (median in 181 days) than the one planned in the specifications (180 days).
- Lambs weight increased with their cross breeding degree. However, the breed choice is often linked to many reasons. And the purpose now it is not to oblige breeders to choose a breed or another. The goal is mainly to understand the aptitudes of each breed in order to improve and adapt their management.
- The weight at the way up is the most important quantitative variable to explain the weight at the descent.
- To produce lambs fitting the carcass weight requirements (15 to 22kg) of the classical distributors channel, lambs should ideally weight between 15 and 30 kg at their way up.
- The criterion of age at the way up is not important regarding the weight at the descen. However this criterion should be defined in order to keep a good quality level and to respect the specifications.



## **PART 4: Discussion**

The concerned actors agree on the need to valorize alpine pasture in a better way. So, they decided to concentrate their action around the production of alpine pasture lambs. The final goal of the initiative is to obtain the quality sign Traditional Specialty Guaranteed for this production. Thus, a collective initiative was born, this one group the breeders, the agriculture chamber of Isère, the Federation of the alpine pastures of Isère (FAI) and the Departmental Council of Isère.

As a reminder, this study aims to advice changes in the specifications written to demand the quality sign based on the answer at three questions:

- Which alpine pastures of the territory studied allow the production of alpine pasture lambs?
- Which criteria influence the weight of lambs at the descent from alpine pasture?
- Do lambs reach the weight expectations at the descent?

The answers at these questions would allow changes of specifications. But before presenting them, we will discuss the results and methods used.

## **1 Discussion around the results**

### **1.1 Identification of potential areas to produce alpine pasture lambs**

The crossing of experts' knowledge and data about the predation cases allowed the realization of a map listing the alpine pastures of interest for the production of alpine pasture lambs.

The mapping of potential areas with regard to the floral, pedological, climatic and topographic conditions was realized thanks to experts' knowledge. It is essentially based on empirical knowledge. A verification step on the field would have been helpful to verify the vegetation type on the different places. This step was planned but because of exceptional climatic conditions in 2013, it was not done.

Moreover, the FAI does not have precise data on the vegetation, it is hard to evaluate the resources and so the number of lamb which can be fattened on these alpine pastures. But even if it had the data, we can wonder if it is really useful in this initiative to quantify fodder resources to evaluate the potential number of lambs which can be produce in alpine pastures. For example, the Col du Coq alpine pasture was not spotted in the light of the necessary criteria for the identification of a good alpine pasture for lambs' production. However, lambs are produced in this alpine pasture. So the list established currently and

presented in this study is not exhaustive. The human capacities to manage a herd and to produce lambs are not included in this study, even if these one can greatly influence the production feasible on an area.

The other element took into account for the mapping is the predation risk. This one has been evaluated by the number and the localization of predation cases which occurred between 2010 and 2012. These data have been sent by the DREAL and they only concern the cases where compensation was given to the farmer. Compensations are only given when persons authorized to say if the attack has been done by the wolves recognize that this predator is responsible. If attacks are done by other predators, they are not taken into account in this study. That can eventually leads to an underestimation of the predation risk. In order to evaluate more precisely the predation pressure it would be necessary the DREAL if they can give us the lists of the compensated and not compensated cases.

Another factor could lead to an underestimation of predation cases: it is when breeders do not ask for compensation. It is hard to evaluate their number, but this one should be really small given that breeders want generally that their losses are compensated. Moreover, the attack declarations help to build strong arguments against the wolves' presence. Indeed, more the number of recognized attacks is high, more the protection costs are high too and more the breeding systems are weak. (BATAILLE and LECONTE, 2013).

## **1.2 Growth study and weight at the descent**

The experimental protocol which is used in this study bases itself on works which were made in the same context. Indeed, there were also done to evaluate the lambs' growth in alpine pasture and to determinate which factors influence the weight at the descent. It was thus studies of pastoral systems. This allows to have comparable results than the ones we get. Indeed, according to Carne et al., the ideal weight at the way up is of 15 kg minimum, what is the case in our study too. The other results we obtained are similar to the ones obtained in the oldest studies. Moreover, in all studies, the importance of the growth before the alpine pasture season is mentioned. However one difference with the study of Mr. Caraguel has to be noticed. In its study, an ideal weight between 55 and 67 days at the way up was found whereas we did not found any relevant thresholds. (PUJOL et al., 1985, CARNE et al., 1987, CARAGUEL, 1987)

But the used protocol does not correspond to:

- The protocol used within the framework of performances control, which consists at weighting the lams twice, the first between 21 and 46 days after birth and the second one between 59 and 92 days. These two weightings permit to determinate the weight

at typical age of 30 days and of 70 days and the corresponding ADG. This allows to create common references to all breedings and so to compare them (France Génétique Elevage, 2012) ;

- The one used by INRA in the framework of their research which consists at weighting the lambs each 21 days since their 21<sup>st</sup> day to evaluate their growth (BEN HAMOUDA and OTHMANE, 2011).

The first protocol could be applied in order to have more precise data on the period where animals are still on the farm. For this period we have little information while the study reveals the necessity for lambs to have a growth at this moment. However, it seems difficult to apply perfectly the protocol in all the farms, in particular in farms where the lambing period last more than 25 days or where different lambing periods are used because of the need to weight all the animals between 21 and 46 days. So if this protocol is applied we will need to make the first weighting at the optimum moment, it is to say when the biggest number of lambs have the right age. Now if we look at the second method, it is really précised one, but it seems hard to apply it in our case given the number of weightings needed for each lambs, 6 weightings at minima until they are slaughtered. Access conditions of some alpine pasture will not allow the realization of weighting during the alpine pasture season. Moreover, the available human and financial resources cannot afford a study of this size.

Whatever the protocol chosen, it will be necessary to uniformize the data at the maximum. For example, the weights at birth have been estimated with the breeders, this can be an error sources. For the next study, it could be interesting to ask farmers if they can weight some of their lambs. The perfect situation will be that a technician from the agriculture chamber or the FAI goes on the farm but this is not realistic because births do not occur at the same date and that the followed farms are often quite far and so the driving costs will be really high. The precision gain does not seem sufficient in regards of the resources needed to do it. If breeders do not want to weight their lambs at their birth, it could also be possible to use the weights that the performances control uses or to continue with the method we used.

It will also be good to encourage breeders to note the exact date of birth or at least to write the lambs born each week; this will improved the estimation of ADG on the farm.

Another element could be improved; it is the use of the same material all along the study. Indeed, we used different tools to weight the lambs. The good things are that we had more and more precise tools and that the change occurred for all the breedings so it does not influence between farms. FAI or breeders together could buy good weighting tools in

common and share it. Another thing linked to the material is that at the beginning we had to read each weight and lamb numbers then write it down, this can be a source of error. At the end, with electronic materials this source of error is less important

A last thing could be difficult to improve, it is the moment of weighting animals. Indeed all the weightings are not done in the same conditions: not at the same hour and not with the same climatic conditions. When a weighting was planned and it was raining, we cancelled it because if lambs are wet, they have water in their wools and so they will seem heavier that they are. However we did not know if animals had a full stomach or not when we weighted, this can also influence the results.

The results we get in 2013 need to be strengthened in the following years. One year of study is not sufficient to establish reliable and generally applicable conclusions to all the farms and to all the alpine pastures. Indeed, the climatic conditions can strongly vary from a year to another, for example, so it is another factor which can influence the growth of fodder resources and so the growth of lambs. This year animals went late in the alpine pasture (second half of June against first usually) because of the late snowy conditions in altitude. However, breeders and shepherds said that it was still a good year and that animals do not suffer of it. Moreover, a study in the next years could allow to validate the technical production scheme and to evaluate the results for each farm in order to see if this year was not an abnormal one.

In 2013, the study was only done by the FAI; it is in particular why data studied mainly concerned the period where animals are in alpine pastures. In the hypothesis that the study will be done on the entire life of the lambs, this work should be shared between the technicians of the Agriculture chamber and the FAI. Indeed, this first organism is more qualified in terms of farm system analysis. Thus, it would be necessary to use at the most and especially in an optimal way the skills that have every structure. In order to help these structures, a new protocol could be used.

The estimation of the percentage of lambs reaching the expected weight at the descent was done with the same set of data that the study of lambs growth. So the remarks done before are still valid for this study. Based only on the weight criteria at the descent, this study is not complete to say if lambs are ready to be sold. Indeed the degree of finish of a lamb depends on its muscular development (its conformation) and of its fattening stage. So in the future it will be necessary to take into account this element in order to have a more representative idea of how many lambs are ready to be sold at the descent.

## 2 Modifications of specifications

To demand a TSG, specifications have to be written. A first draft was done in 2012, now the goal is to improve it in regards of the results we obtained. The changes concern the characteristics of alpine pasture, the age and the weight at slaughter and the conformity of carcasses. The criteria written in 2012 are presented in the Table 26.

Table 26: Criteria of the first specifications which need to be modified

Subject	Points to be mastered and/or controlled	Indicators / Method to control	Associated documents
Characteristics of alpine pasture	Belonging to the list of alpine pastures defined by the pastoral survey	Documentary control	Pastoral survey
	Located in the Alps	Documentary control	Administrative map of the Alps
	Presence of lambs quarters : Natural space with spontaneous lawns and where the flora and fauna diversity is remarkable	Vegetation samplings (high rate of nitrogen, high desired plants)	Report of the technician, calendar of use of the alpine pasture quarters
Age and weight at slaughter	Maximum age of 180 days	Documentary control and weighting	Lambing book
	Maximum weight of 35 kg		
Conformity assessment	Carcass weight	Weighting	Ticket of weighting
	Conformation, fattening stage, color and firmness of fat : EUROP classification with at minima R3	Classification of the carcass at the slaughter house	Assessment report on carcasses
	PH<6 18h after slaughter	Measure thanks to a pH-meter at least 18h after slaughter	Measurements results
	Meat color	Measure with a spectrophotometer	

Regarding the characteristics of alpine pastures, the first point can be kept as it is. On the contrary, the two other ones would need changes. The second point “localization within the Alps” does not seem relevant if the goal is to obtain in a TSG. Indeed, this quality sign is not

linked to a geographic area, it allows to value specific know-how or practices. So it would be better to delete it. Finally the third seems too limitative because it is only based on vegetation criteria. And we have seen in the results that it is possible to produce alpine pasture lambs where we supposed it was not. The human efforts, the lambs' management on the farm and on the alpine pasture can allow to finish lambs in different areas. It would thus seem more relevant to write: "Presence of lambs quarters and/or management practices of which is proved allows the production of lambs respecting the other criteria or the specifications."

The distributors' survey shows that buyers prefer carcasses between 15 and 22 kg. However, the distribution way is not yet defined; it is possible that these weights are not adapted to all the distribution channels. It is thus possible to wonder what the interest of those restrictions is. So it seems difficult in the current situation of the initiative to define precisely a weight criterion. However, it seems evident that the previous maximum threshold of 35 kg in live weight (around 17,5 kg in carcass weight) is too low. If a value has to be put now, it would be advisable to put a maximum limit at 44 kg in live weight. As for the maximum age, the limit of 180 days appears a little bit low too in view of the results of the study. A limit of 210 days would be more suited. This new condition corresponds at the maximum age defined in the technical specifications defining the minimum criteria to fulfill in order to get the Red Label quality sign. Although it is not the aimed quality sign, it allows to take place at the same level as this one (INAO, 2012). This means that it would be necessary that breeders update their lambing book day by day.

Finally on the concern of the assessment process at the slaughter house, it will be necessary to check if the three slaughter house existing in Isère can carry out all the measurements mentioned. It would be absurd to impose criteria which cannot be respected by the structures already on the territory while the initiative aims to be local. For example, the slaughter house of Bourg-d'Oisans does not assess the conformation and the fattening level of carcasses. Two ways could be imagined to get read of this difficulty: i) the deletion of these criteria which cannot be respected or ii) the adaptation of the existing structures to fulfill the specifications. However, this last solution will cost a lot and it is hard to find any idea to finance this change.

On the view of all these information, the changed criteria of specifications could look like in the Table 27. The question marks are used to remind that some criteria still need to be modified.

Table 27: Criteria of specifications after modifications

Subject	Points to be mastered and/or controlled	Indicators / Method to control	Associated documents
Characteristics of alpine pasture	Belonging to the list of alpine pastures defined by the pastoral survey	Documentary control	Pastoral survey
	Presence of lambs quarters and/or management practices of which is proved allows the production of lambs respecting the other criteria or the specifications	Flora study Evaluation of lambs at the descent of alpine pasture	Technician and expert reports
Age and weight at slaughter	Maximum age of 210 days	Documentary control and weightings	Lambing book
	Maximum weight of 44 kg		
Conformity assessment	Carcass weight??	Weighting	Ticket of weighting
	PH<6 18h after slaughter??	Measure thanks to a pH-meter at least 18h after slaughter	Measurements results
	Meat color??	Measure with a spectrophotometer	

Questions without answers are still numerous. However, the first results of the study and the tasting done are encouraging to continue this initiative. The professional has evaluated that this meat has a great potential of development. The butcher engaged in the tries of marketing sold the carcasses before he received them. The consumers study planned in 2014 should bring some answers. Furthermore, the motivation of the various partners should allow to bring this project to a successful conclusion and eventually to obtain the desired labeling if the financing sources are found.



## **General conclusion**

The present study allows to reach the initial objective which was to improve some criteria of the specifications for the production of alpine pasture lambs. Numerous studies still need to be done and the conclusion of such an initiative is not certain. Its continuity clearly depends on the fact that partners are capable to reach new sources of funding. However, on the view of the motivation of the different partners, the return of the professionals and the first customer welcome, the initiative is promising.

This initiative « Alpine pasture lambs » could bring benefits at the mountainous economies of pastoral territories where this production is feasible. It will allow to strengthen the sheep farms which are using the alpine pasture and will help to keep the added value on the territory which is necessary for people to stay where they live. However, this initiative is only a way among other to arrive at this consolidation of economies. It will thus be necessary to make links with the other opportunities such as the creation and the remuneration for tourist activities or remunerations for services provided by the pastoralism. For example, the alpine pasture lambs could be the reason of the creation of a touristic event in alpine pasture which could link productive, touristic and social functions of these areas. It is therefore essential to develop complementarities between the various initiatives which take place in each territory in order that they strengthen each other. It is also possible to imagine spreading this initiative on other production. The other initiative on alpine pasture meats will then benefit from the knowledge and experience accumulated during the Alpine Pasture Lamb initiative.

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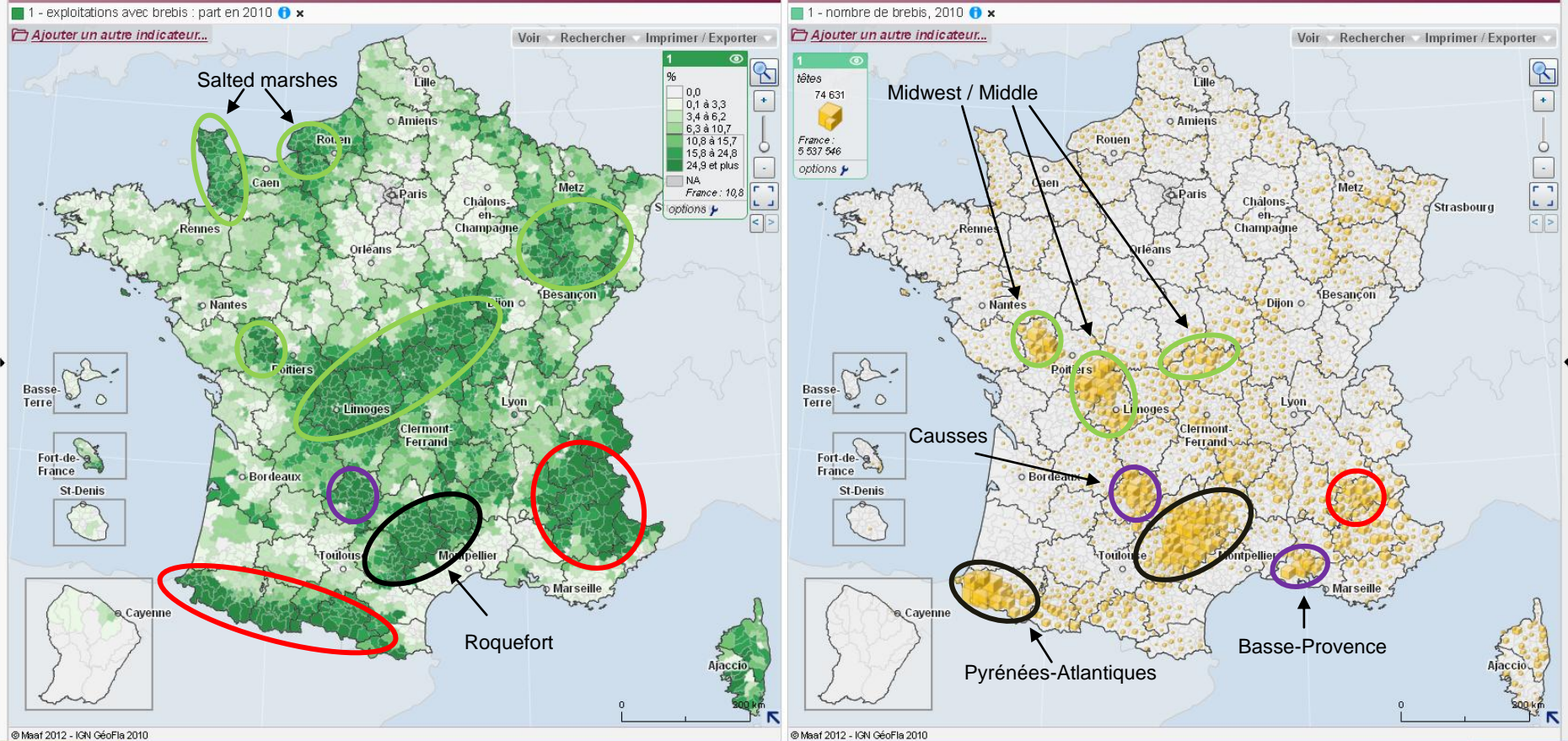
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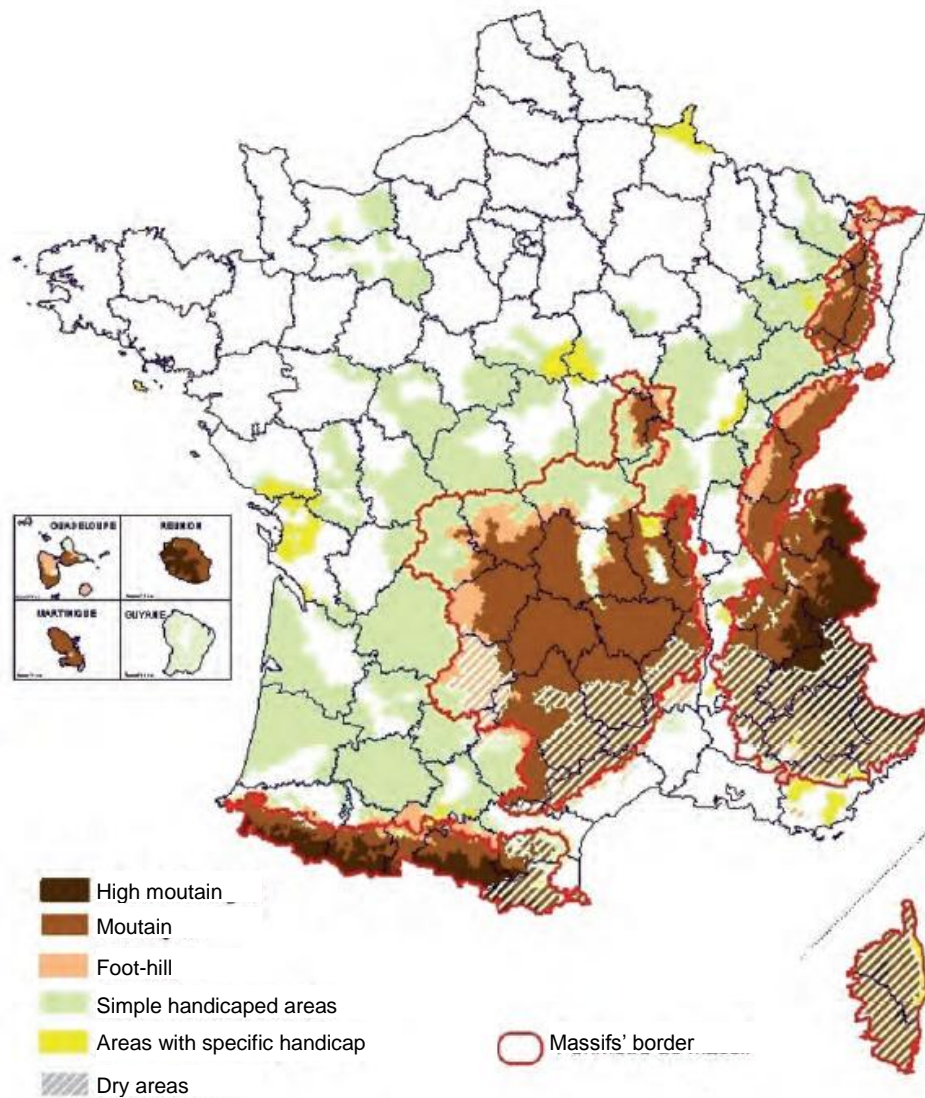
## **APPENDICES**

Appendix 1 : Identification of sheep production basins in France through the comparison of number of farms with sheep and the number of sheep by canton (Agreste, 2010)



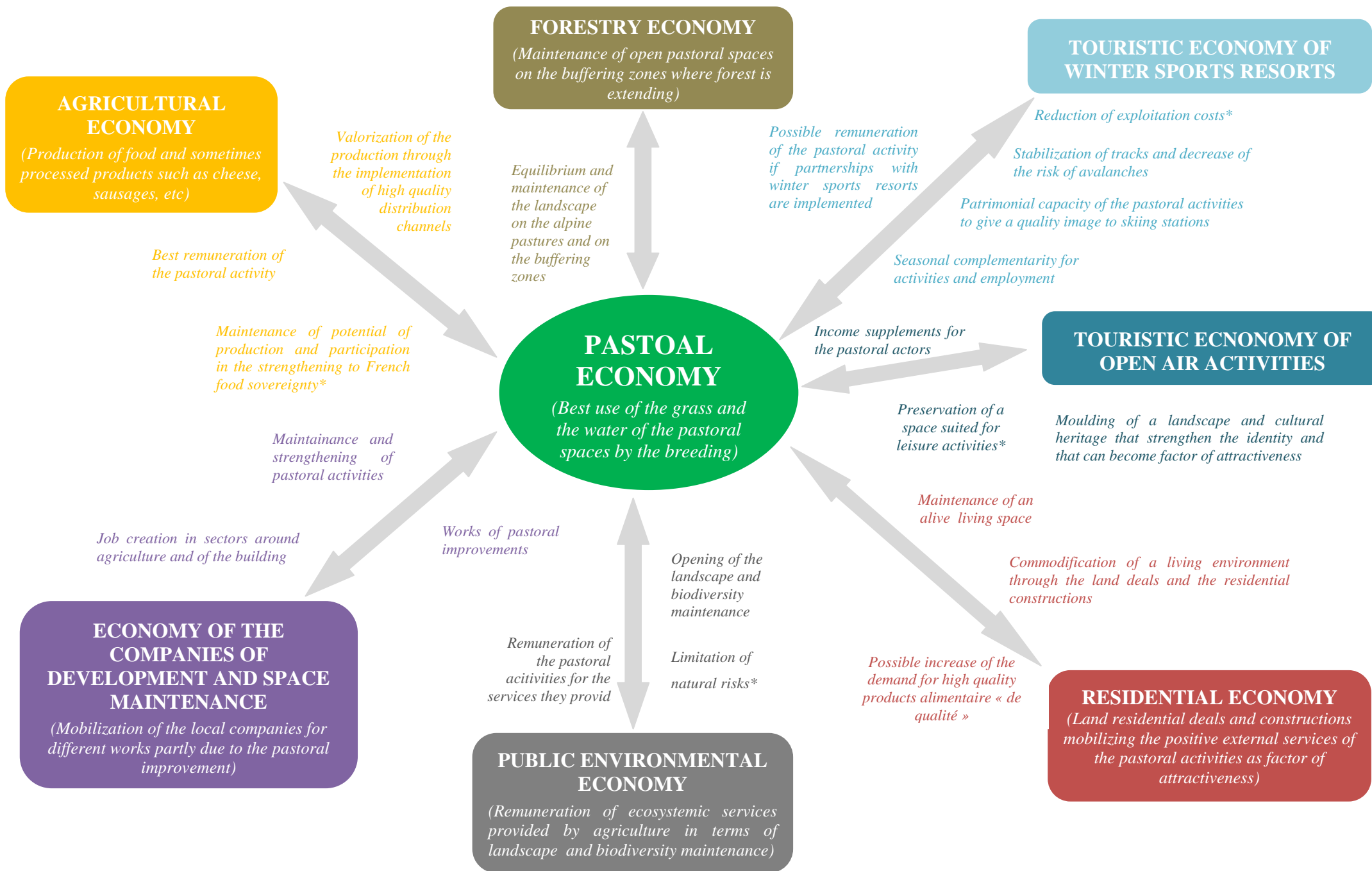
- Dairy systems
- Mountainous systems
- Grazer systems
- Other systems

Appendix 2 : Map of France showing the distribution of disadvantaged areas and the massifs (Ministère de l'agriculture )



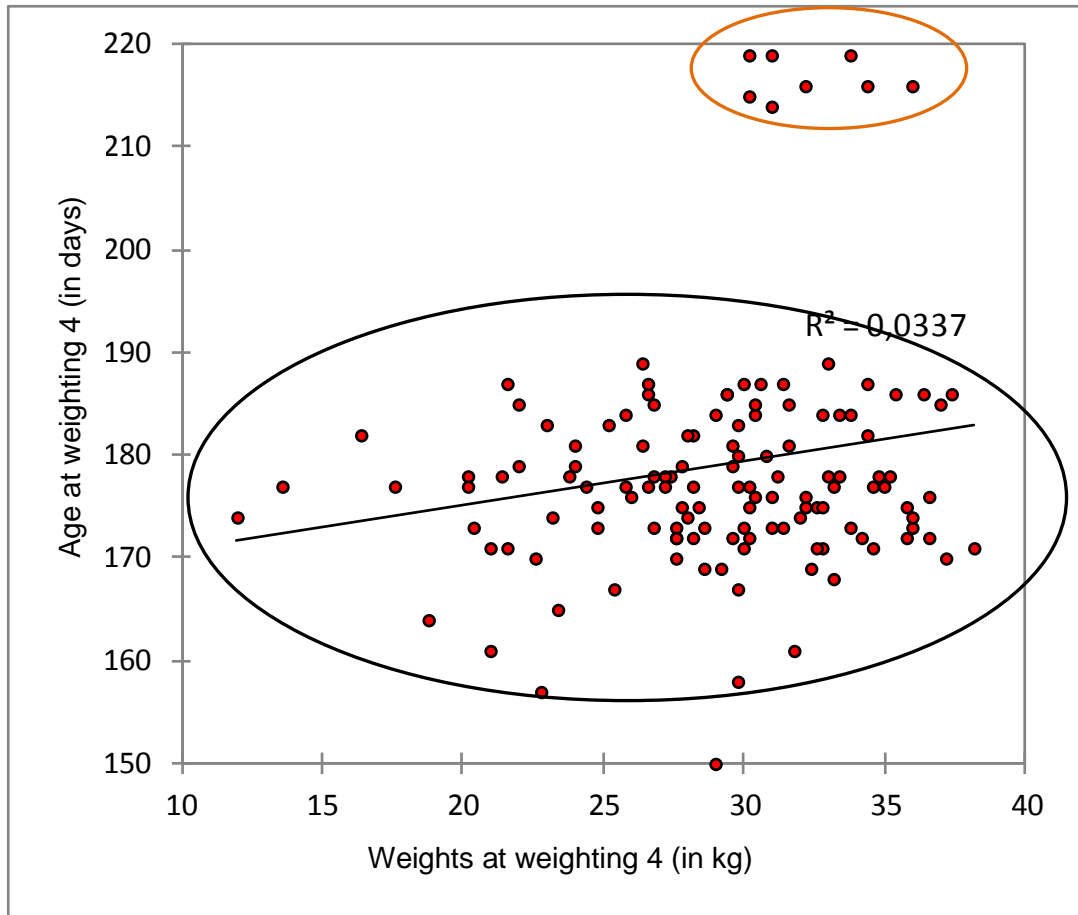
Appendix 3 : Systemic equilibrium of mountainous economies (Suran, 2012)

\*Added informations

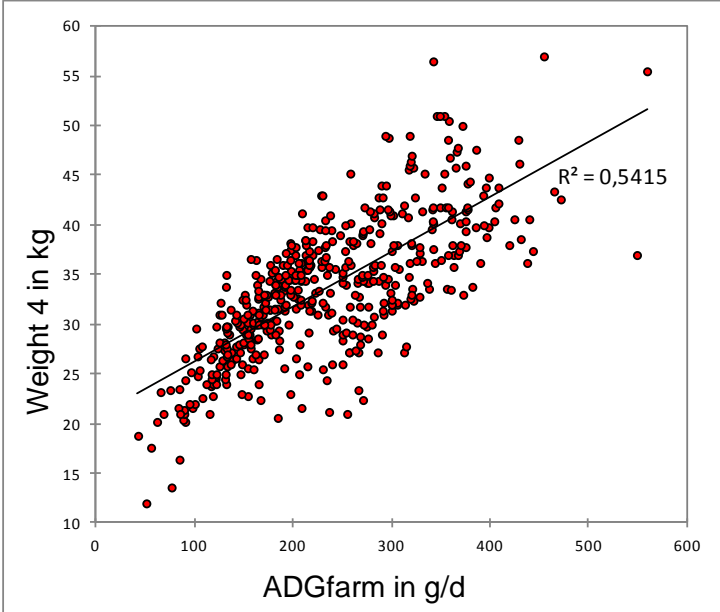
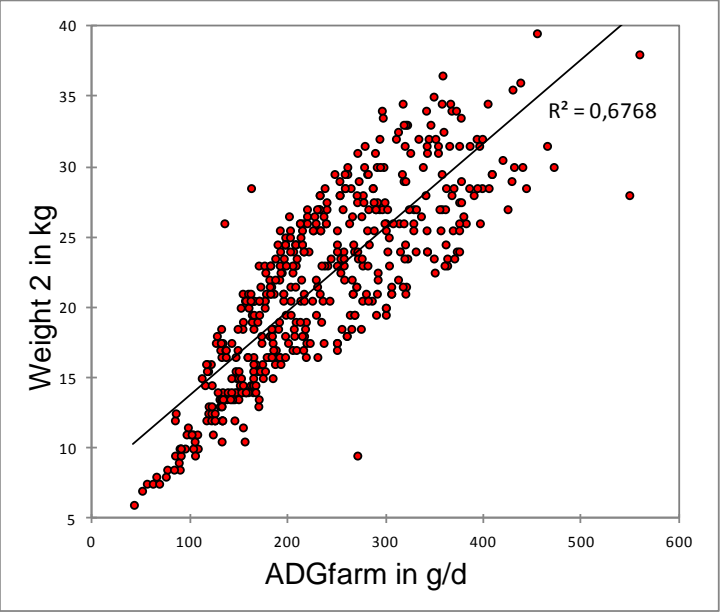
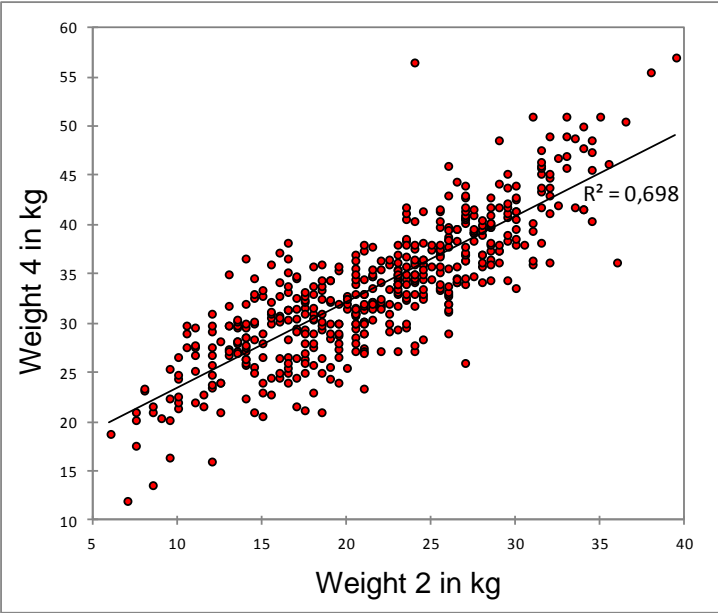




Appendix 4 : Distribution of weights at the descent regarding the age of lambs at the same time on Mr. Girard herd



Appendix 5 : Scatter graphs and correlation curves obtained on all the lambs during the comparison of different quantitative variables



## Isère

**FILIÈRE /** Les éleveurs ovins voudraient retrouver la valeur ajoutée d'un savoir-faire de moins en moins usité, celui de l'agneau d'alpage. Mais il faut qu'une dynamique de filière émerge associant les producteurs et les metteurs en marché, afin d'en faire un produit haut de gamme.

# L'agneau veut reconquérir les alpages

C'est un projet qui pourrait leur échapper, mais ils s'en réjouiraient car cela voudrait dire que l'idée était bonne. Des éleveurs ovins, la Fédération des alpages de l'Isère (FAI), la chambre d'agriculture s'interrogent sur l'opportunité et surtout la faisabilité de produire « un agneau d'alpage ». N'y aurait-il donc plus d'agneaux en alpage de nos jours ? Bien sûr que non, mais cette dénomination ne concernerait que des jeunes ovins nourris exclusivement à l'herbe jusqu'au jour de l'abattage.

### Stockage

« Aujourd'hui, les alpages sont essentiellement utilisés pour le stockage d'animaux et non pour une production avec valeur ajoutée économique », indique-t-on du côté de la FAI, mettant ainsi le doigt sur une évolution des pratiques agricoles. « Les bergers et les transhumants savaient utiliser les quartiers d'agneaux, explique Hélène Baudoux, technicienne ovine à la chambre d'agricul-

ture de l'Isère. Ce sont des endroits aux caractéristiques (floristiques, d'exposition, géographiques) particulières favorisant un bon élevage des agneaux. Mais sous la pression de l'agrandissement des troupeaux, la réduction de la main-d'œuvre en montagne, l'accentuation de la prédation, ces zones favorables ne sont plus exploitées à leur juste valeur. En même temps, les agneaux ont souvent été gardés en plaine pour les engraisser » afin de répondre à un approvisionnement constant des marchés. L'agneau d'alpage ne répond qu'à une saisonnalité naturelle, avec une naissance en mars/avril, une croissance et une finition entre juillet et septembre pour un abattage au début du mois d'octobre : l'exact contraire du dessaisonnement prôné depuis plusieurs années pour répondre à la demande de consommation. Mais l'agneau d'alpage veut couvrir un marché saisonnier et à valeur ajoutée. « Ce type de produit est obtenu de façon vertueuse », insiste Denis Re-



breyend, président de la FAI. On sait faire mais on ne met pas en avant. Et cela touche l'économie montagnarde, car ce type de production, même si elle est pour l'instant confidentielle, contribue à une montagne habitée et vivante. »

### Déphasage

Le projet repose avant tout sur des bases économiques. Un élément déclencheur vient rappeler aux éleveurs que les choses ne sont pas gravées dans le marbre : la date de la fête musulmane de l'Aïd-el-Khébiri, en lien avec les phases lunaires, avance chaque année d'une dizaine de jours. Ce moment sert de débouché important aux producteurs, car si une partie permet d'écouler quantité de bêtes de réforme, nombreux sont les éleveurs qui avouent vendre à bon prix leurs agneaux à ce moment-là. Jusqu'à 200 euros sur pied pour 35 kg, alors que le prix du marché est de 120 euros. Dans



Pour Denis Rebreyend, président de la FAI, « cette viande est obtenue de façon vertueuse, mais nous ne savons pas la mettre en avant ». A ses côtés, Didier Villard, vice-président de la chambre d'agriculture, soutient la démarche.

**VENTE DIRECTE /** David Charvet, boucher de centre-ville à Grenoble, s'est porté volontaire pour commercialiser l'agneau d'alpage isérois. Opération réussie.

## Un boucher tente l'expérience

Quand il s'agit de bonne chère, David Charvet tend toujours l'oreille. Cogérant de la boucherie-traiteur « Assiettes et vandes », rue Nicolas-Choirier à Grenoble, le professionnel s'est fait une spécialité des produits de qualité à destination d'une clientèle exigeante, souvent attachée à la défense des filières locales. Un de ses bons clients le sachant et travaillant à la chambre d'agriculture se dit un jour que sa boucherie de centre-ville constituerait un excellent terrain d'expérimentation pour la valorisation de l'agneau d'alpage isérois. Quelques jours plus tard, Geoffrey Lafosse, chargé des filières courtes à la chambre, vient présenter la démarche au boucher. « Nous voulions recueillir l'avis d'un professionnel pour alimenter la réflexion des éleveurs et leur permettre de prendre conscience des contraintes qu'impliquait ce type de commercialisation », indique le technicien. David Charvet accepte de tenter l'expérience durant trois semaines. Il est enthousiaste : « C'est la première fois que je fais de l'agneau isérois. J'aime l'idée que ces agneaux n'aient jamais rien brouillé d'autres que l'herbe d'alpage. » Le boucher prend date avec trois éleveurs participant à l'opération. L'un vient de Cessieu, l'autre de Pont-



David Charvet : « J'aime l'idée que ces agneaux n'aient jamais rien brouillé d'autres que l'herbe d'alpage ».

charra, le troisième met ses bêtes sur l'alpage d'Ornon. A peine le professionnel a-t-il posé l'affichette dans sa boutique et expliqué la démarche à ses clients que c'est la ruée. « Ça a tout de suite plu. J'ai vendu les agneaux avant même qu'ils soient arrivés, s'amuse-t-il. Et c'était d'autant plus facile que l'agneau d'alpage n'est pas plus cher que celui de Sisteron. » Mais est-il aussi bon ? Apparemment : les amateurs apprécient sa texture, sa chair non grasse et son goût très fin. Le professionnel, lui, voit la différence « rien qu'à la découpe ». Selon lui, la démarche a un

bel avenir si éleveurs et bouchers acceptent de jouer le jeu : les premiers doivent garantir les délais et les horaires de livraison (« On ne peut pas se permettre d'avoir des livraisons décalées », estime David Charvet), à charge pour les seconds de promouvoir le produit en expliquant la démarche. Quoi qu'il en soit, le boucher de la rue Nicolas-Choirier est prêt à renouveler l'expérience. Tablant sur un débit de trois agneaux par semaine, il songe même à travailler en direct avec l'un des éleveurs. Rendez-vous l'été prochain. ■

Marianne Boileve

quelques années, le déphasage caennais ôtera un revenu important aux producteurs. Il est impératif pour eux de penser à de nouveaux débouchés. « L'idée d'une production spécifique et de qualité permet de répondre à la fois à des préoccupations de filière et de territoire », constate Didier Villard, vice-président de la chambre d'agriculture. C'est en donnant aussi ce type de perspectives valorisantes que l'on peut donner le goût à des jeunes de s'installer en ovins. »

### Attente départementale

Mais la démarche n'est pas encore gagnée. Il faut d'abord savoir si une réelle attente existe. Au début de l'année, une étude a été réalisée auprès de distributeurs par la FAI. Un retour est également attendu de l'aval, boucher ou restaurateur, à la suite d'une mise en situation réalisée en octobre. Le conseil général se déclare également intéressé « car c'est une initiative qui répond à l'attente du Département en matière de produits locaux et d'entretien des alpages. » Une enquête est donc prévue dans l'agglomération

grenobloise vis-à-vis des attentes sur les produits de montagne. « Une communication en matière de produits locaux sera effectuée en 2014, notamment à la foire de Beaucroissant », indique Christine Bosch, du conseil général.

Il faudra ensuite qu'un cahier des charges définisse la notion exacte d'agneau d'alpage avec ses caractéristiques d'élevage ou de conformation. Ainsi que la zone concernée. « Il faut un début et nous avons pensé à l'Osans et à la Charteuse », avance Bruno Caraguel, directeur de la FAI. « L'initiative est iséroise, souligne Florent Salvi, président d'alpage, mais à terme, elle pourrait nous échapper car il faut que ce soit la montagne qui gagne, car ça sont avant tout un imaginaire, une qualité, un goût par rapport à l'alpage qui légitiment la démarche. Le vrai enjeu est d'arriver à une ouverture à tous les alpages quel que soit le département. » Ambitieuse, la démarche reste à caler dans les détails, mais propose un réel challenge à la filière en matière d'image et de valeur ajoutée. ■

Jean-Marc Emprin



« Un imaginaire, un goût, une qualité par rapport à l'alpage légitiment la démarche entamée », estime Florent Salvi, président d'alpage.

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