

LIFE PASTORALP



LIFE16 CCA/IT/000060

Pastures vulnerability and adaptation strategies to climate change impacts in the Alps

Action C.6

PARTICIPATORY SOCIAL ANALYSIS
IN THE ALPAGES OF THE GRAN
PARADISO NATIONAL PARK

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PREFACE

This report is drawn up as part of the activities of Action C.6 “Feasible adaptation strategies: identification and test on pilot areas” in the project LIFE PASTORALP (LIFE16 CCA/IT/000060) “Pastures vulnerability and adaptation strategies to climate change impacts in the Alps”.

The activity mainly concerned the management aspects of the *alpages*, focusing on climate change perception and its effects determined on pastures and animals, both in relation to the *alpage* season, grazing and haymaking activities in the valley floor. All the different problems noticed by the breeders in carrying out their activities were investigated in a more comprehensive way. Starting from each breeder's considerations, they were asked to try to find possible solutions for the future.

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ABSTRACT

The survey on the *alpages* in the Gran Paradiso National Park allowed us to outline the situation of the management of mountain livestock farming, its criticalities, the perception of climate change and the influences on farms.

Climate change is not at the top of the issues for the *alpages* farmers, even if, over the last few years, they have had to face several additional difficulties linked to extreme climatic events or recurrent periods of drought.

The current problems reported by the breeders are mainly three: in the first place we find the damage caused in various ways by wildlife, in the second place the infrastructural deficiencies and the lack of roads, while in the third place the 'bureaucracy'.

Territorial differences influenced most of the answers of the interviewees: there are diversities in morphology and climate, but also strong social, historical and economic influences that affect the current management of the *alpages* and the future vision of this activity.

Many of the problems indicated by the farmers cannot be faced by the individual, but would require public intervention to find a solution, even partial.

Breeders who have reduced the livestock stocking rate or have gone up to the mountains with fewer animals than in the past, have highlighted how this allows them not to consume the pastures entirely. In this way they guarantee a potentially usable reserve in climatically less favorable years.

GLOSSARY

Alpage (or *alpeggio* in Italian): this term indicates both the mountain pastures used by herds and flocks in the summer season, and the structures present on these pastures (houses, stables, milk processing rooms, etc.), but, by extension, also a territory that includes all these aspects. The *alpage* consists of a variable number of *remue* or *tramuto* at higher and higher altitudes. The average period of stay in *alpage* is about 100 days.

Remue (or *tramuto* in Italian): chalet in *alpage*, where the herd and its shepherds stop for the period necessary in order to consume the surrounding pastures. The stops in the different *remues* take place both uphill and downhill as the season progresses, always depending on the availability of forage. The traditional *alpage* consists of the *tramuto piede d'alpe*, several intermediate *tramuti* and the *tramuto tsa* (the one located at the highest altitude).

Mayen: term of Aosta Valley *patois* that indicates the buildings, mowed surfaces and pastures at intermediate altitudes, usually owned by the breeder of the herd or in any case privately owned. The *mayen* is traditionally used in spring and autumn (for an average period of 50 days).

Ru: term used in Aosta Valley and Piedmont (Canavese area). A *ru* is a small-scale artificial irrigation channel built in an alpine environment to bring water from streams to arable lands (crops, meadows and pastures) for irrigation.

METHODOLOGY

During the *alpage* seasons of 2019 and 2020 and the months between these two summers, all breeders who regularly go to the *alpages* in the Gran Paradiso National Park were interviewed, following a questionnaire of 25 points, to look into the main themes connected to PASTORALP (climate change perception and its effects on animals and vegetation), but also into other socio-economical aspects and typical problems of these alpine areas.

Starting from a much broader list that also included the names of farmers who entrust livestock to shepherds for the summer season and owners of the *alpages*, 43 presently used *alpages* were identified; in addition two temporarily unused *alpages* (one - Montan Daynè - with low-altitude structures undergoing restoration, high-altitude pastures not in use, the other - Vaudaletta - was not rented during the seasons under investigation), and one *alpage* on which only a couple of unattended horses is left (Biolley) were surveyed.



Map of the PNGP territory and alpages under investigation.



Pasture at the bottom of the valley, Aosta Valley.



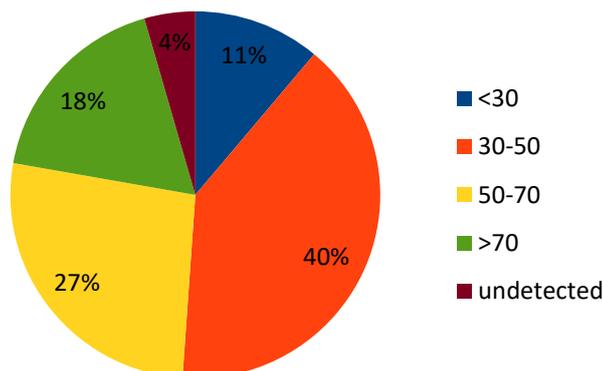
Upper remue, Piedmont.

From a general analysis of all data, it comes out that all people interviewed had big difficulties in having an overall view of the themes considered for this research. Many answers were deeply influenced by the general situation when they were gathered, both about general problems and opinions about climate. In summer 2020 there were also the side-effects of the Covid-19 pandemic, that had an economical, organizational and psychological negative influence on all breeders.

RESULTS

1. Owners and breeders, *alpages*, mountain workers

Almost all interviews were done in the *alpages* to get a better general perception of the local situation and in order to meet all people who work in the farms. The breeders who are not regularly in the *alpages* because they only supervise the animals occasionally or because there are other workers who take care of the animals, were interviewed by phone. When the breeder was a young person, but there were also older relatives, the survey included the whole family, to get a more complete view of the present and future of the farm, but also of the management and problems typical of the past.



Graph 1. Age of the breeders.

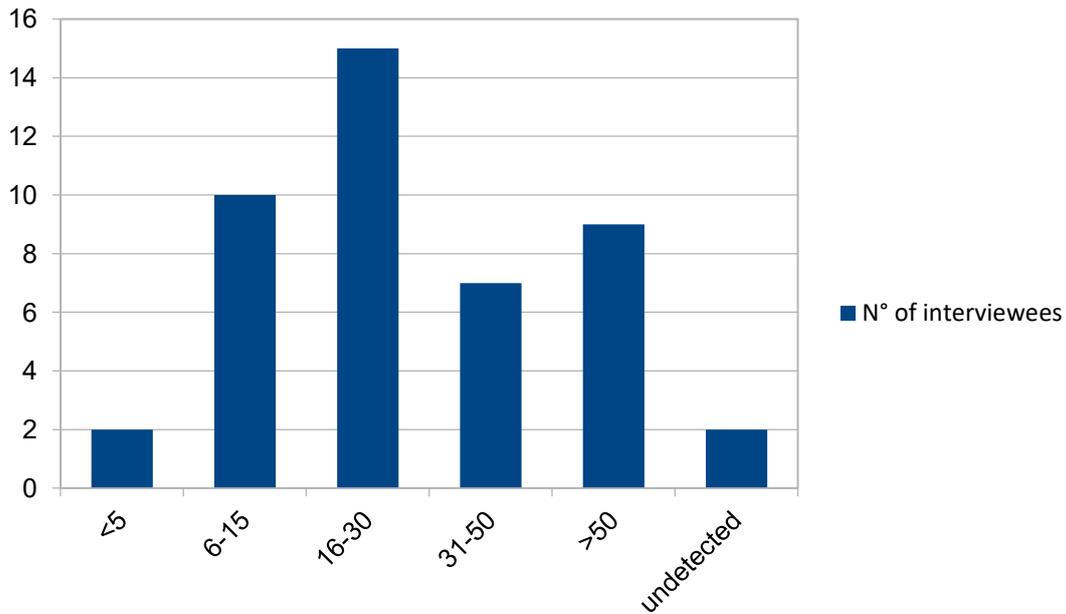
The most representative age group is between 30 and 50, which includes 40% of shepherds, while 27% is between 50 and 70 years old. Particularly relevant is that there are more shepherds over 70 (18% of all the interviewed) than under 30 (only 11%).

Region	Age	<30	30-50	50-70	>70	Undetected	N° of farms
Aosta Valley	(n°)	3	8	6	2	2	21
	(%)	14.3%	38.1%	28.6%	9.5%	9.5%	100.0%
Piedmont	(n°)	2	10	6	6	0	24
	(%)	8.3%	41.7%	25.0%	25.0%	0.0%	100.0%

Table 1. Age ranges of breeders by region.

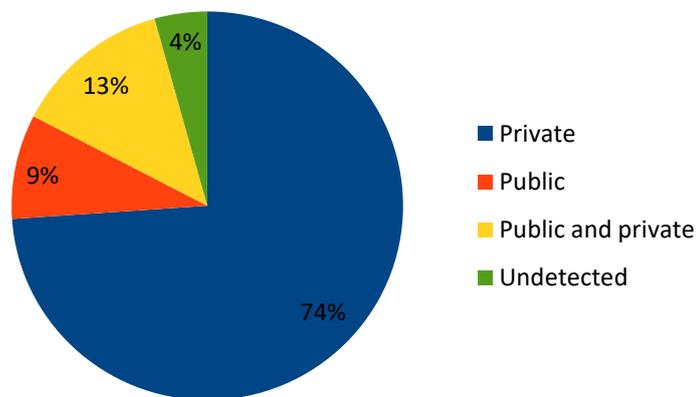
Dividing the results by regions, we can see there is still a general balance between breeders under 50 and over 50, but in Piedmont there is still a strong presence of an older group, with 25% of the breeders interviewed were older than 70. A careful analysis of these farms shows that most of the *alpages* are particularly difficult to reach (lack of roads) or have poor structures.

It was not possible to get a homogeneous answer about the historical aspects: among the interviewees there were those who had only been climbing to that *alpage* for a few seasons (minimum 3 years), as well as those who boasted a presence of several generations in the area (maximum 6 generations or in any case more than 50-70 years). However, all breeders met have always carried out this profession, even if previously they used *alpages* located elsewhere (often in the same valley).



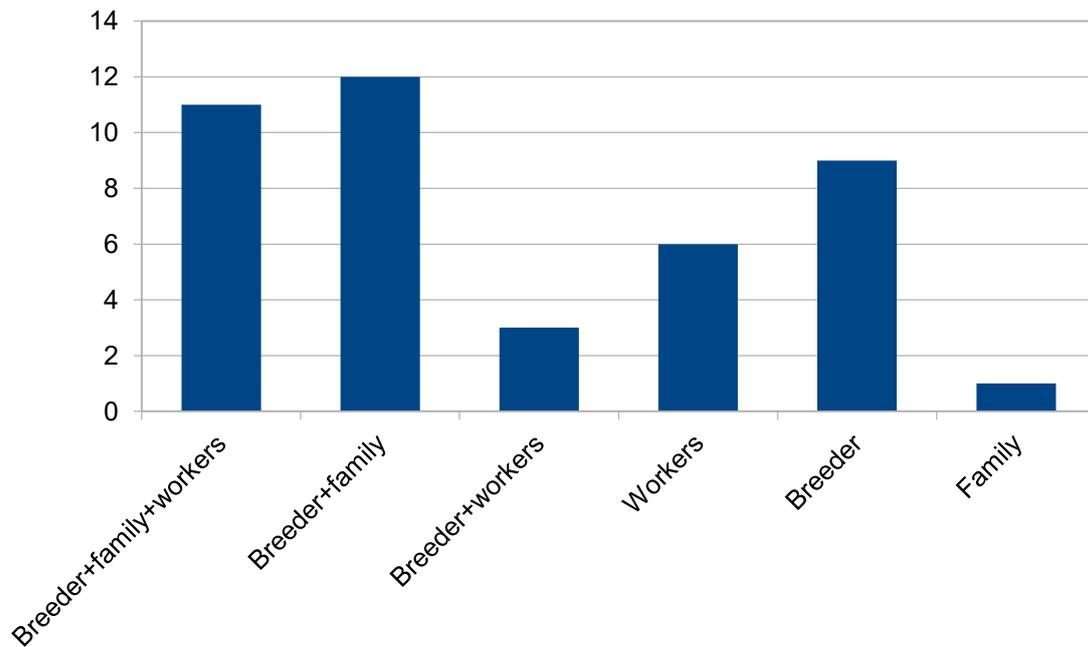
Graph 2. Number of years of use of the alpage by the farmer or his family.

It is important to notice that most of the *alpages* have regularly been used by the same shepherds for more than 16 years, because this has certainly had specific effects (more or less evident) on the territory and pastures. This has to be discussed together with the next result of the research, about the changes in the management of *alpages*.



Graph 3. Ownership of the alpage.

As we can see in the graph above, 3/4 of the *alpages* are privately-owned (they belong to a family or a *consorzio, consorteria*). Only four *alpages* are completely publicly-owned, while six include both public and private areas.



Graph 4. Staff in the alpage.

In the *alpages* taken into consideration for this research, the breeder is usually always present, helped by his family or only by wage workers. There are also *alpages* where the only person who looks after the animals is the owner himself, or where the flock or herd is watched by wage workers, and the owner reaches them only for periodical controls.



Grandmother and grandson, Piedmont.



Family in alpage, Aosta Valley.



Family in alpage, Piedmont.



Shepherd in alpage, Piedmont.



Old cattle breeder, Piedmont.



Family in alpage, Piedmont.

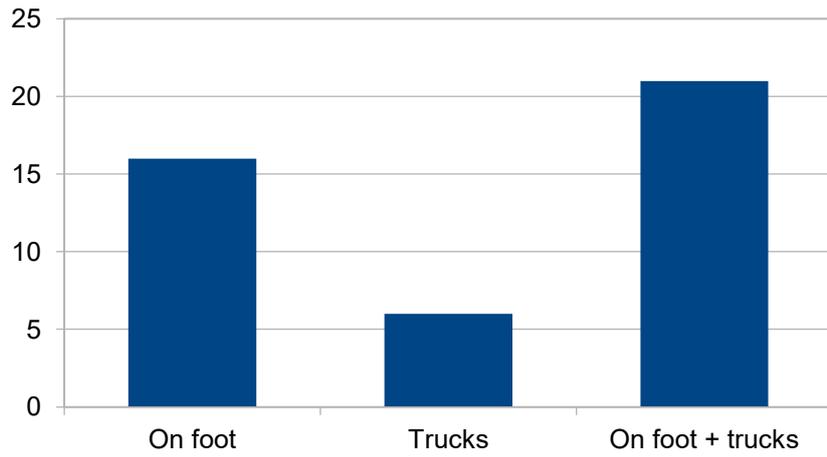
2. Livestock management, transhumance

There are some different typical ways of livestock management:

- a. breeder's own animals (cattle) + a certain proportion of livestock in foster care for summer;
 - b. only animals owned (cattle/flock);
 - c. flock (sheep/goats) made up of animals belonging to different owners, spending only summer season all together, looked after by one or more shepherds (owner and wage workers or only wage workers).
- During the winter season, on the contrary, most animals are kept in a privately-owned or rented stable, while almost all herds graze outside (wandering pasture). This means they go to lowlands of Piedmont (provinces of Torino and Biella) where they move daily to graze meadows, stubble, uncultivated fields. Only one cattle are handled this way.

The transhumance without the use of vehicles is still carried out where it is not too difficult to move with the animals, especially in autumn for the return to the plains and even when long distances must be covered: in this case, it is usually done in one or more stops. In spring, when the animals are less used to walking or it is more difficult to walk through meadows and cultivated areas, the use of trucks for animals transport becomes much more frequent.

In Pont Canavese (TO) and Cogne (AO), when the transhumance takes place, a festival to meet people and to promote local products is organised. The 'Deveteya' of Cogne was born in 2010 and 'La Transumanza' in Pont Canavese one year later, but it has not taken place every year.



Graph 5. How transhumance takes place.



Transhumance festival in Pont Canavese, Piedmont.



Devetéya in Cogne, Aosta Valley.



Going to the Alps, Aosta Valley.



Devetéya in Cogne, Aosta Valley.



The truck unloads the flock at the bottom of the valley, which then continues on foot, Piedmont.



Transhumance festival in Pont Canavese, Piedmont.



The arrival in the alpage with the trucks, Aosta Valley.



Coming downs from the alpage on foot, Aosta Valley.

3. Yearly work organisation

Talking about cattle, we can find a common way of work organisation:

- grazing in the weeks before the transhumance in *alpage* (variable dates depending on the altitude at which the stable is located. For people who live in the valleys - especially in Aosta Valley - this moment coincides with the end of May; those who are in the farmhouse in the plains either begins to graze at the beginning of May, or goes up with the animals to the valley floor to graze meadows around the villages where there are no longer any permanently resident farms, and then reach the first *remue* in June);
- moving to *remue* at lower altitudes usually around June 10th;
- moving to higher altitude *remues* and stay for different periods, according to the forage availability and the grazing area;
- descent from pastures with possible stops at *remue*, for shorter periods than during the ascent at the beginning of the season;
- transhumance at the end of September/beginning of October (sometimes the date is related to festivals that take place in the villages on the valley floor);
- grazing in the meadows owned/rented as long as the season and the altitude allows it (for a shorter period with dairy cows or close to calving, up to December with heifers, and dry cows).

Wandering flocks live outdoor all year round, except in particularly difficult seasons. Just in case fresh grass is missing, shepherds buy hay (+ eventually feed) to feed the animals until grazing can be resumed. In these situations, all the animals are "stopped" in a suitable place for their feeding (usually near a river, to get water when needed).

The situation with goats is totally different, as the work with these animals has completely changed during the last years, particularly because of reappearance of wolf. In fact, goats were left free on higher pastures, and taken back only at the end of the season. In the surveyed *alpages* there were both flock and cattle, or sometimes only goats, belonging to different owners. At the end of the summer season, goats go back to the farms where they usually live and they continue to graze outdoor, if winter is not extremely cold. They usually spend only nights in the stables.

The dates on which the transhumance take place, the movements in the various *remues*, the returns to the stable, etc. are strictly dependent on the climatic and atmospheric conditions, but all the interviewees were agreed in affirming that the annual variations can be a maximum of 7- 10 days ahead or behind the normal schedule.



The flock leaves the mountain pastures towards the wandering grazing season on the plains, Aosta Valley.



Autumn pasture near the stable, Aosta Valley.



Autumn pasture after the alpage, Aosta Valley.



Spring pasture before going to the alpage, Aosta Valley.



Summer haymaking, Aosta Valley.



Pasture next to the villages at the bottom of the valley, Aosta Valley.

4. Grazing management

Grazing on alpine pastures nearly always means that shepherds need to control and manage their animals. As already mentioned, the reappearance of predators has made it absolutely necessary for shepherds to always look after the animals, especially sheep and goats, that until a few years ago were left unattended or not grouped in corrals for the night.

Cows are regularly watched by one or more shepherds, helped by dogs, especially if the cattle are made up of Aosta Chestnut or Aosta Black Pied cows. Particularly in Aosta Valley, the milking cows are taken back to the stable twice a day (at the end of the season only at night). Shepherds often use not only dogs to help them, but also mobile fencings with battery and electric wires.

If mountains are not too steep and animals are quiet, mobile fencings and electric wires can be enough. Dry cows, beef cattle and heifers on high pastures can stay outside all day round and the shepherd controls them only sometimes, or once a day. Only in one place (Ponton, municipality of Cogne) it was found out a pasture with dry cows and heifers watched all day by the shepherd, who also daily moves the mobile fencings.

Sheep and goats are taken back to the *stazzo*, a corral area, at night: it can be surrounded by fixed nets

(electrowelded nets), sometimes with a double fence with electrified nets/wires or only by temporary electric fences. The flock is watched by one or more shepherds, herding dogs and sometimes also by livestock guardian dogs.

Only on one *alpage* in Valle Orco (Bivacco Giraudo) there are still unattended goats, kept under control by their owner only every two weeks. This kind of grazing has not been so frequent anymore for some years, after the reappearance of the wolf. In fact, this is the only place where we still found it.



Corral for the night care of the flock, Aosta Valley.



Shepherd with herding dog and livestock guardian dog in the pasture, Aosta Valley.



Cattle herd surveillance with dogs, Piedmont.



Calf pen next to the alpage, Piedmont.



Unattended heifers, Aosta Valley.



Heifers and calves guarded with corrals, Aosta Valley.



Opening of the corral in the morning, Piedmont.



Grazing with shepherd and wires, Aosta Valley.

5. Innovations and plans for the future

It is almost impossible to summarize all changes made in the *alpages* management: the answers about such themes are extremely different and depend on personal, technical and on the farm setting.

A different animal management is the main change for most breeders during the last years. Some farmers who used to go to the *alpages* with a small flock of sheep and goats together with cattle, stopped this activity because of the costs and additional work entailed by predator attack prevention methods. Only in one place (Nivolet) a very small flock, after some attacks during the previous seasons, graze with the cows and are taken to the stable with them even during the day, if necessary.

Some of the older interviewed shepherds have reduced the number of their animals, while the younger ones have started either their own, or taken over the family farm. In some farms it was decided to start producing milk instead of meat, or vice versa. The farm Prasupiaz in Cogne has integrated the livestock breeding in *alpage* with a typical restaurant and the farm's products selling point.

The main innovations are about milk processing (new spaces for making cheese and selling dairy products, both in the *alpage* and in the valley floor farm), the choice of a breed more inclined to milk-production and a different management of the animals (constant presence of a shepherd and nightly use of corrals for sheep and goats).

Only 45% of the interviewed farmers could express a personal opinion about the future of their farms. Their projects are mainly about improvements of all buildings in the *alpage* (houses and stables), or the search of a better *alpage* (considering both the conditions of the buildings, the ways to reach it, and the quality of the grass for the animals).

Some shepherds would like to stop this kind of work soon, or are not going to the *alpage* anymore, but all the older ones are sure they want to keep on working with the animals as long as they can (meaning their health conditions). Among the younger ones, some want to focus on cheese-making activities and on the quality of dairy products, while a young woman has repeatedly said that her and her farm's future are both related to the need of meeting a person to share life and work with.

After the first lockdown due to Covid-19, a farmer, also owner of agritourism, has declared that it is absolutely necessary to better balance the sources of farm income because one might be stopped or strongly reduced, all of a sudden.



'New' breeds introduction, Aosta Valley.



Tended goats after predations, Piedmont.



Need for structural interventions, Piedmont.



Flock of sheep grazed with cattle, Aosta Valley.

6. Current and ancient issues relating to life and work in the *alpages*

The current problems reported by breeders are mainly three: first of all we find the damage caused in various ways by wildlife, where the damage to the pastures by wild boars has concrete effects, while wolf predations (despite being in the absolute first place) must be considered as a hypothetical danger that can become real in every moment. During the last years, only some farms have been really attacked by wolves, but it is a concrete danger, especially for sheep and goats. It is possible to protect the animals by preventive strategies, but it is expensive and it involves time, effort and additional problems in handling the animals. At the second place, they highlight infrastructural deficiencies and the lack of roads. In some cases, especially on the Piedmont side of the Park, on one or more *remues* that are regularly used, the buildings are extremely old and obsolete, sometimes even damaged by avalanches. In other places, easier renovations would have been enough, or the construction of a dairy room, in accordance with the law, is required. Almost all breeders that go to *alpages* that cannot be reached by a road see this as a priority: some of them are going to look for another *alpage* reached by a road.

At the third place we find the 'bureaucracy'. This word means everything that makes farmers' life more complex: i) the constraints that directly affect the work in the *alpages* (sanitary laws, specific permissions needed to renovate the buildings, particular restrictions related to work to be carried out inside the Park, all aspects that require additional expenses); ii) go to public offices to get and sign official documents during summer, because this interrupts the *alpage* activity; iii) new rules and duties that are particularly difficult for those who are not very familiar with the IT (electronic invoicing, electronic livestock register, etc.).

Another common problem is to find trustworthy and competent workers to be regularly helped by, or to make look after the animals. In summer 2020, due to general European restrictions and closed borders for Covid pandemic, many breeders went to the *alpages* later than usual. Their helpers could not move normally or had to be on quarantine if coming back to Italy from abroad. A farmer from Cogne has looked after his animals all by himself all summer long, because the man who should have helped him had no possibility to come back to Italy.

Other problems that have emerged are: higher price of the *alpages*, no comunitary contributions, the difficulty in selling all products (both meat and dairy products) at an appropriate price, the bad maintenance of paths, the presence of tourists on the mountains, contrasts with Park authority.

About these last two points, all complain about problems of coexistence with tourists, especially those who

have livestock guardian dogs for the defense of the flocks (many in fact have not adopted them, although recognizing their fundamental usefulness, for fear of accidents and complaints, since they work in areas with a high number of hikers). A breeder has declared tourists hardly ever respect the limit of mobile fencings (wires) if they meet them along a path (sometimes it is possible to open them to walk on and then close them again, but this does not really happen). There have also been some incidents caused by the mismanagement of companion dogs during excursions through the *alpages*: since they were not kept on a leash, they frightened and chased grazing animals, scattering them and, in one case, causing injury. The coexistence with tourists in very touristic areas might have negative consequences even on meadows irrigation: a farmer in Cogne has told that meadows near villages cannot be regularly watered because tourists complain, they want to walk on the grass without getting wet and dirty. Talking about the location in a protected area, some think this is an advantage (projects to promote local products, a quality label named "Gran Paradiso Trademark"), but in general this does not sound like being particularly relevant.

Especially on the Aosta Valley side, the owners of sheep and goats refer about many attempts to discourage this kind of activity in the protected area. This might be due to possible bad interactions with wild animals, but shepherds tell that it is possible to co-exist with ungulates (often seen even while grazing). They exclude the danger of hybridizations with domestic goats because they are nearly always watched by shepherds and they are already on the valley floor when ibex begin their mating season (in November-December). Hybridizations could have occurred in the past, when goats were left unattended and not all of them could be found and walked back to the valley floor at the end of the season. Nowadays the regular presence of shepherds and the habit of taking the animals back to the stable at night almost completely limit this problem.

It is notable that only one person mentioned climate as a problem (first place of the list for him): it was not the lack of rain or the high summer temperatures, but long periods of rain and fog.

A very big problem for other areas is that rental prices of *alpages* are always getting higher: here it was seldom talked about this, when the survey was done this area had not been involved in such a difficulty yet. This is connected to the CAP entitlements, and has led to speculations on mountain areas by owner of very high CAP entitlements value, related to very big mountain pastures surfaces. Getting extremely high contributions, these farms can have *alpages* of public ownership from auctions offering amounts of money that are totally impossible for traditional farmers.

During the winter after these interviews, the *alpage* of Djouan in Valsavarenche municipality was on auction. The farm that rented the *alpage* in recent years had already declared it would give up, but no other local farm could reach the same amount of money offered by a temporary association of enterprises. In order to contain this phenomenon, in Aosta Valley the CELVA (Consorzio Enti Locali Valle d'Aosta - Association of Valle d'Aosta local authorities) has suggested to the municipalities more stricter regulations limiting the use of *alpages* to farmers who have cattle of Aosta Valley breed and produce Fontina cheese. This protocol is not compulsory and if a farm forms a temporary association of enterprises with a local farm owner of Aosta Valley cattle it can bypass such regulations.

1st place	2nd place	3rd place	Others
Wolf (14)	Lack of buildings and roads (9)	Wild boars (6)	Wolf (5)
Crumbling buildings and lack of roads (10)	Wolf (7)	Bureaucracy (4)	Relations with the Park (2)
Wild boars (8)	Relations with the Park (4)	Wolf (3)	Coexistence with tourists (2)
Bureaucracy (6)	Wild boars (3)	Low economic yield of the products (3)	Lack of buildings and roads, bad maintenance of paths (2)
Bad weather (1)	Bureaucracy (3)	Coexistence with tourists (2)	Low economic yield of the products (1)
Others (2)	Coexistence with tourists (3)	Unsuitable buildings and lack of roads (3)	Bureaucracy (1)
	Qualified workers are hard to find (2)	Relations with the Park(2)	
	Speculations (1)	Qualified workers are hard to find (1)	
	Few pastures available(1)		
	Low economic yield of the products (1)		

Table 2. Current issues.

The question about problems of the past was not often answered: in general, most people think that in the past, it was possible to work and live better than it is now, though the conditions were less comfortable. The ancient "hard life" (lack of food and less variety, no means of transport but only pack animals to carry everything, extremely essential mountain buildings, child labour) is remembered almost with a nostalgic feeling. It sounds like this used to be a happy time, when many people lived on the mountains (families and many wage workers), the work was economically better and, more than ever, bureaucracy was much easier.



Grasslands damaged by wild boars, Aosta Valley.



Predation on a sheep flock, Aosta Valley.



Alpage in use with serious structural problems, Piedmont.



Steep path to reach the upper remue, Piedmont.



Lack of roads, Aosta Valley.



Path leading to an alpage, Piedmont.



Alpage served by cableway... no longer working, Piedmont.



Alpage without roads used for the whole season, Piedmont.



Area with a strong tourist influx, Aosta Valley.



Path across pastures, Aosta Valley.



Entry into the territory of the Gran Paradiso National Park, Aosta Valley.



Hiking signs, Piedmont.



Herd of goats with constant surveillance, Aosta Valley.



Seasonal workers, Aosta Valley.



Livestock guardian dogs with the flock, Aosta Valley.

7. Management differences between Piedmont and Aosta Valley

Before analysing all data that have been gathered, it is important to highlight a relevant element about management, in order to understand the results. During the interviews, it was not specifically talked about this because it is something just obvious for all breeders.

There is a very big difference between the *alpages* on Aosta Valley side and those on the side of Piedmont due to milk processing. In Aosta Valley the typical cheese is Fontina PDO and its production has to follow a detailed, specific regulation. There are two cheese-making moments, one in the morning and one in the evening. This leads to a rigid working time on *alpage*: animals have regular grazing schedules when they go out to pastures, and when they are walked back to the stable. Each worker has a different, specific role: the cheese maker is a specialized person, while one or more shepherds lead the herd to pastures.

Cows are milked at night, before dawn, they graze in the morning and go back to the stable; after 12 hours they are milked for the second time, they graze again in the evening and then they are taken back to the stable at night.

In Piedmont, the working time is not so rigid. There are different kinds of breeding: not only dairy cows and heifers, like in Aosta Valley, but also sucklers and dry cows. Where milking is practised, there are no regular timetables and often there is no dedicated dairyman, so the animals are walked to pasture only when all the other activities are over, that is in the central hours of the day. Animals go back to the stable (where there are stables big enough for all the animals) only at night.

It is important to highlight these elements because the climate change effects, in particular the increasing temperatures, have a different influence on animals and grazing patterns (and also on the productivity of the animals themselves).



Return to the stable at the end of the morning, Aosta Valley.



Day shelter in the stable, Aosta Valley.



Grazing all day long, Piedmont.



The alpage farmer with a friend, Piedmont.

8. Climate change perception and its effects on seasonal work, definition of a 'good year' climate

The next group of questions in the interview was about climate change, the central element of the Pastoralp project.

All breeders generally agree in stating that, in the last years, there have been abnormal climatic conditions, but at the same time they declare that even in the past, especially at high altitudes, there used to be days characterized by intense rainfall, with snowfalls also in the months of July and August, severe thunderstorms, flood phenomena. The current perception concerns above all the intensification of phenomena (storms, real hurricanes, wind storms), repeated dry seasons for several consecutive years and long dry periods, very high temperatures even at high altitude, periods with frequent hailstorms, winters poor in snowfall, sudden changes in temperature, greater occurrence of alluvial phenomena.

Climate issues have generated different responses depending on the territory: the *alpages* on the Piedmont side have generally suffered less from dry periods, that, on the contrary, have caused big difficulties on the side of Aosta Valley, especially in some valleys.

1st element	2nd element	3rd element	Others
Extreme weather conditions	Long term drought	High temperatures on the mountains	Lack of snow in winter
Drought	Abnormal heat	Strong temperature changes	Hail
High temperatures on the mountains for long periods	Extreme weather conditions (storms, wind storms)	Big changes from one year to the other	Retreat of glaciers
		Weather unpredictability	Always less snow during summer
		More consequent years with long dry periods	More frequent floodings
		Rain periods less divided into different seasons	Frost in warmer months
			Damages due to drought both on the mountains and on the valley floor

Table 3. Perception of climate change in order of importance



Rainy and foggy day, Aosta Valley.



Early season rains, Piedmont.



Herd outdoors during a thunderstorm with hail, Piedmont.



Severe drought on the pastures, Aosta Valley.



Sheep 'heaped' due to the heat, Aosta Valley.



Foggy day, Piedmont.

Some breeders think that what we see nowadays is somehow a 'normal' climate cyclic nature, that there might have already been in the past.

The driest season that anybody can remember was 2003.

Analysing the whole year, they talk about higher temperatures even during the winter season, dry or rainy long periods, early springs with very intense heat that caused a rapid snow melting on the mountains.

The most worrying aspect is drought, which affects activities throughout the year in various ways: direct effects on pastures, but also on hay meadows, drinking water for the animals, possibility of watering meadows and pastures, functioning of hydroelectric power stations that supply electricity to the *alpages*.

All different climate conditions have a different influence on livestock sector: the dates of the arrival and descent from the *alpages*, which depend on the availability of grass for the animals (snow-free soil and vegetation at a sufficiently advanced stage to ensure proper grazing at the beginning of the season, first snowfall or depletion of pastures resources in autumn), and the longer outdoor grazing season in November/December on the meadows around the stables have already been mentioned. But it is also haymaking in summer that is strictly connected with climate conditions.

Wandering shepherds are a different matter because their flocks stay outdoors all year round, so their daily activity constantly depends on weather conditions. For this reason, a 'good year' for them can be intended as a relatively mild weather even in winter, with no snow on the plains and not too much rain well distributed throughout the year.

For all other breeders, the ideal conditions mean a sunny summer with only some rainy days, which permits good grazing and at the same time haymaking, a mild autumn to allow prolonged grazing before taking the animals to the stable and a winter with early and abundant snowfall at high altitude to cover the ground until late spring (ensuring good grass and enough water all summer long). Spring must not begin too early, otherwise the grass will already be in too advanced stages of ripening at the time of the arrival in *alpage*.

For goat breeders, the ideal summer is dry with few rain, as these animals do not like rainfall. Since they cannot be taken back to the stable, it could be dangerous for their health to spend a long time outside in the rain, and they also feed worse on rainy days.

A bad year, on the contrary, means long dry periods or bad weather, hot temperatures even at high altitudes, lack of snow in winter and extreme weather events.

Cattle breeders not grazing outside in winter	Goat breeders	Wandering shepherds
Very snowy winter	Summer with stable weather	Mild weather even in winter
Periodical rain, not too strong	Not extreme summer rainstorms	Periodical rain, not too strong
Clearly defined seasons, no temperature changes nor late frosts	Snowy winter at high altitude	Winter snow only at high altitude
Not extreme heat	Sunny summer	Not extreme heat
Sunny summer	Not extreme heat	
Not too early spring		

Table 4. Ideal climatic trend.

9. Climate changes influence on animals and vegetation

Not all the interviewed breeders were able to indicate effects on vegetation or animals in relation to climate change.

From the point of view of the health or behavior of livestock, there are some main problems: first of all, a serious decline in fertility (especially in cows, but a shift in heat and lower fertility has also been highlighted by some shepherds). The problem is particularly felt in Aosta Valley, where most of the breeders tend to concentrate the births in late autumn/early winter. Cows that by the end of winter have not got pregnant are either slaughtered or lose a year of production. It is widely believed (but to be verified with veterinary

experts and nutritionists) that this is due to internal inflammations related to feeding with very dry grass during the previous dry summer.

Other effects talked about are:

- in spring (even very early), pest infestations (ticks) that animals might suffer from even in summer and autumn;
- in spring, problems with heifers grazing: black flies (*Simuliidae*) bites, that sometimes might even cause their death (they are mainly related to higher temperatures);
- decrease in milk production on the *alpages*, due to strong temperature changes, but also to extreme prolonged heat;
- animals killed by lightnings during strong storms;
- decrease in milk production due to poor quality vegetation because of heat, drought, etc., but also due to the greater movements that animals have to make to feed themselves sufficiently;
- increase in lameness (linked both to the concentration of sheep and goats in the pens at night, and to the climate, as they occur especially if the soil is too dry or too wet).

On the vegetation, the first detected effect is drought, but taking in consideration a long time, it is highlighted how the succession of drought periods, poorly snowy winters and spring frosts have in some areas impoverished the grass.

During the interviews, the following were also mentioned:

- pastures strongly damaged by hailstorms at the beginning of the season;
- portions of pasture damaged or impracticable due to landslides, deposit of material due to floods or avalanches;
- disappearance of some herbaceous species due to heat/drought;
- appearance of herbaceous species typical of lower altitudes at higher altitudes;
- diffusion of bad forage species/small bush in those areas where soil is uncovered because of the drying up of other kind of grass;
- less regrowth after the first grazing;
- less forage in spring/early summer.

It should be emphasized that some breeders have pointed out that the quality of the pastures has improved thanks to the use of mobile corrals. This system allows to better restore fertility and contain bushes.

A further practical effect on activities in the *alpages* linked to drought is the lack of water to operate the existing hydroelectric power stations.



Severe signs of drought on the pastures in August, Aosta Valley.



Drought effects on a high altitude lake, Aosta Valley.



High pastures damaged by drought even before the herd climbed, Aosta Valley.



High-altitude pastures not yet used, damaged by drought, Aosta Valley.

10. Suggested solutions

Considering both all problems previously talked about, and climate change effects, the breeders were asked to suggest possible solutions.

No one has been able to theorize a different management method to face up to the problems related to climate variations, also because no testimonies have been collected from breeders who have had to leave the *alpage* in advance due to drought, lack of water, etc. (this has happened in other Alpine valleys, instead). The biggest date changes were of about one week/10 days. Some breeders who, for different reasons, have now few animals than in the past have highlighted that this allows them not to consume all the grass available for the animals on the mountain pastures, thus ensuring a reserve that can potentially be used in less favourable years.

Nobody thinks about a total change on farm management (for example, meat animals instead of dairy animals, conversion to sheep farming) as a possible solution. This happens because breeding activities have a long tradition, especially in Aosta Valley, where they are strictly connected to local economy and society. The 'Fontina system' ties to the breeding of the Aosta Valley breed, and, on the valley floor, it guarantees that milk is totally collected by local dairies. And then, when summer is over, the land of Aosta Valley does not have enough grasslands for big sheep breeding. All flocks on the *alpages* analyzed for this research come from other regions. Even in ancient times, transhumant flocks were from Biella province.

On the side of Piedmont, though most breeders are still local, in the last years there have been bigger changes in the farm management with a decrease in dairy processing activities and increased presence of beef cattle (suckler cow husbandry).

The structural problems of the *alpages* cannot be solved by the breeders. Generally, they are tenants and not owners of the buildings (and pastures). The (private) owners often have no interest in making large investments to restore the structures, since the costs would be huge, complicated by the lack of viability, not compensable in the short term by the rents received.

Talking about wild animals, they hope there will be official intervention plans against predators, and slaughter plans for wild boars.

Suggested solutions for climate-related problems	Suggested solutions for other problems
Going to <i>alpages</i> with few animals than the maximum possible number	Hunt/controlling interventions of wild animals if they might damage the pastures or attack the herd
Improve/renovate the watering systems	Improve/renovate the existing buildings
	Making new paths and roads to the <i>alpages</i> and renovating the existing ones
	Reduce bureaucracy for work on <i>alpages</i> structures (permissions, etc.)
	Information/awareness campaigns for tourists going to the mountains
	Better protection for shepherds working with livestock guardian dogs
	Twinnings with schools (even abroad) training new specialized <i>alpage</i> -workers

Table 5. Solutions to problems.

11. Changes in the *alpage* system

When it was asked to describe what changes have occurred over the years in the valley where the *alpage* is located, both on the side of Piedmont and Aosta Valley a general abandonment was reported. Many mountain buildings are not used as *remue* anymore, though the pastures around them are still used by cattle. This happens because there are less families and breeders, but at the same time, each herd or flock has more animals. Most frequently, the abandoned *alpages* are those which cannot be reached by a road, though in the Piedmont valleys many *remues* at higher altitudes can still be reached only on foot.

It is also often talked about *alpages* rented by 'speculators', farm not from the same valley or region, that take part to auctions to get publicly-owned *alpages* only with the main aim of receiving the contributions from the European Community. Breeders talked about this, but above all these events occurred in areas near to the territory concerned by the survey.

Pastures were also abandoned, especially at intermediate altitudes between the valley floor and the alpine pastures (many *mayen* are no more used in Aosta Valley). Mountain pastures at highest altitudes were also abandoned: in the past, shepherds used to go to these pastures only for short periods or only small flocks grazed.

Protecting sheep and goats with fencings at night and walking them to pasture during the day can have different effects. In some areas, these fencings have improved the quality of pastures with greater fertility distribution and recovery of abandoned areas prone to bush encroachment. Where there are permanent fencings or where the land morphology does not allow to move the pen, accumulation of manure and trampling (also in entry / exit from the corral) determines degraded areas.

In Piedmont, some *alpages* have bigger cattle than in the past. On the contrary, in Aosta Valley there are now few animals, because many small farms have been closed. Their cattle were usually entrusted to other breeders during summer. In the highest parts of Valle Orco, there is still a breeder who lives in Ceresole Reale even in winter. When he was interviewed, he told that in the past there were many permanent farms in this area.

If there are adequate structures, cheese making is practiced in Aosta Valley with cattle herds, while in Piedmont there are fewer and fewer *alpages* where this occurs and dairy cows are replaced by dry or suckler cows, often without constant custody by the breeder.

Piedmont	Aosta Valley
Abandonment of <i>alpages</i> buildings, especially if they cannot be reached by a road	Abandonment of <i>alpages</i> buildings
<i>Alpages</i> rented by speculators (not officially proved in the valleys taken into consideration)	Appearance of not local farms in auctions to get public-owned <i>alpages</i>
Few breeders, each one with more animals (cattle and flocks)	Animals for summer custody on the <i>alpages</i> are harder to find
Abandonment of pastures at high/very high altitudes	Strong abandonment of <i>mayen</i> at intermediate altitudes
Almost complete disappearance of farms spending winter in the municipalities of the Park, cattle and flocks usually come from the lowland	Disappearance of small flocks, that used to be left free on pastures at higher altitudes than cattle
Few cheese making farms	
More cows not regularly supervised (dry cows, suckler cows, heifers)	

Table 6. Change in the valley where the *alpage* is located.



Abandoned alpage building, Aosta Valley.



Alpage building no longer used, Aosta Valley.



Abandoned alpage, Piedmont.



High-altitude alpage abandoned since many years, Piedmont.



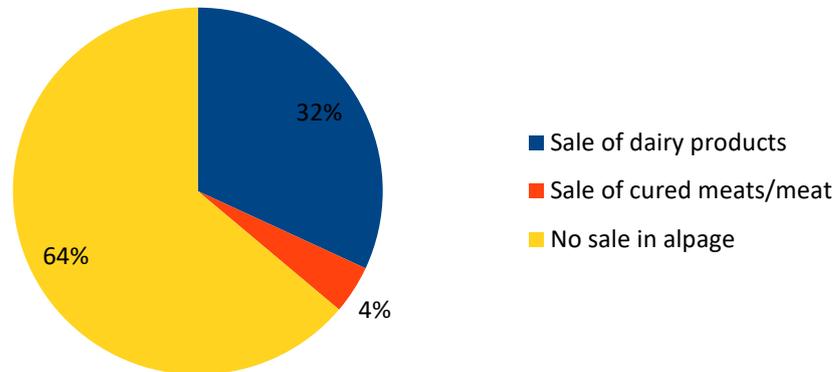
Abandoned stable, Aosta Valley.



The last breeders resident all year round in Ceresole Reale, Piedmont.

12. Cheese making and products selling

Only about one third of the analysed farms make cheese on the *alpages*, and most of them directly sell their products. Only two farms sell their own meat and cured meats. In Aosta Valley, Fontina cheese makers don't sell it immediately on *alpage* because by regulations this PDO cheese needs almost 80 days of ripening. On some *alpages* in Piedmont, processing of milk is only for private use, because there are not any official dairy rooms.



Graph 6. Direct sale in alpage.



PDO Fontina maturing, Aosta Valley.



Cheese making laboratory, Aosta Valley.



Toma maturing, Piedmont.



Cheese making for family use, Piedmont.



Cheese making in alpage, Piedmont.



Shop in the alpage, Piedmont.



Cheese maturing in alpage, Piedmont.



Cream cooling and cheese maturing, Piedmont.

13. Abandonment of pastures

The next question concerns the abandonment or recovery of grazing areas within the *alpage*: part of the interviewees stated that they use the same territory every year. Some breeders have left the pastures that are more difficult to reach or have no buildings, but some pastures are not used anymore because the management of livestock has been changed in relation to the presence of predators or the sheep pastures have been abandoned as these animals are no longer part of the farm.

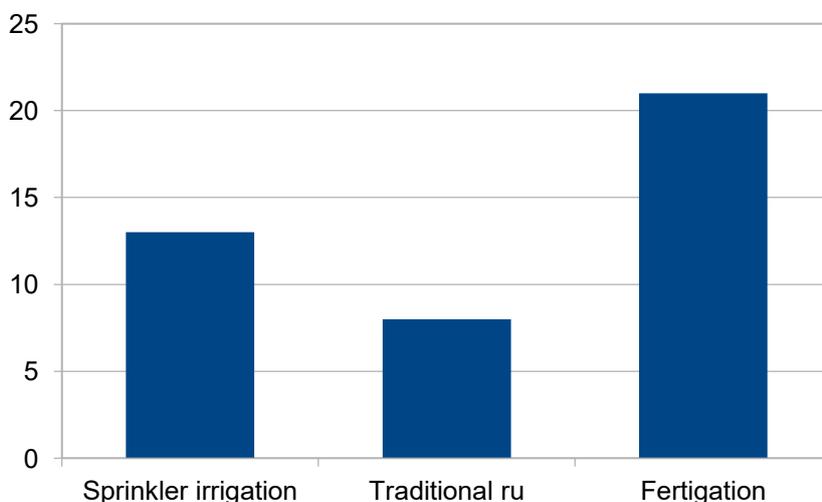
There are even pastures that have recently started being used again, especially at low or medium altitude, most frequently used at the beginning of the season. These grasslands are available for cattle and flocks walking up from the valley floor, because in these areas there are not local farms anymore. In the past, breeders used these grasslands for grazing and haymaking.

14. Watering system and manure distribution

The last analyzed theme is related to irrigation systems. Only 28% of the visited *alpages* irrigate regularly almost a part of the pastures, either with sprinkling or with *rûs* (small streams) or pipes. There is a very big difference between the valleys of Piedmont and those of Aosta Valley, because in Piedmont there are not any permanent irrigation systems. On the contrary, we can find them in Aosta Valley, in many *remues* at lower altitudes. Only in Soana Valley, in the municipality of Campiglia, the owner of some *alpages* had built a system to water them, but nowadays it is not used anymore. The breeders tell that it was taken away some years ago by the Park, but it was not possible to prove this officially. Mobile sprinklers are positioned where necessary and where there is the possibility. The irrigation canals, called *rûs*, created in ancient times specifically for irrigation, are now largely abandoned, mainly because of the amount of labour they required.

In 46% of the PNGP *alpages*, the practice of fertigation of pastures is still used, even if where there are roads, it has often been replaced by manure spreader barrels. Sometimes plastic pipes are used to replace traditional *rûs*. However, it should be noted that, even where the interviewees stated that they use fertigation, the field survey has not always been able to confirm this practice.

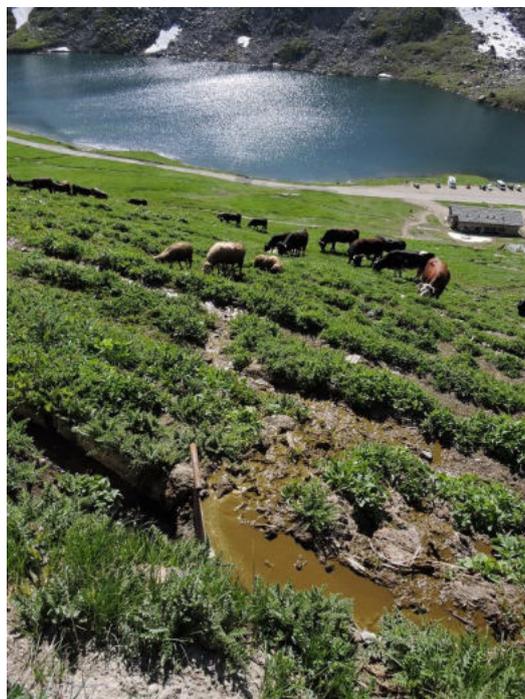
Watering activities and manure distribution, especially in Aosta Valley *alpages*, in ancient times involved workers who had almost exclusively these tasks. Nowadays the same care of the territory is no longer reserved. It is widely believed that greater attention is paid, especially in fertilization of pastures, where the owner is permanently present in the *alpage* and when there is a serious intention to continue the activity in that area.



Graph 7. Irrigation systems in alpage.



Fertigation at the end of the season, Aosta Valley.



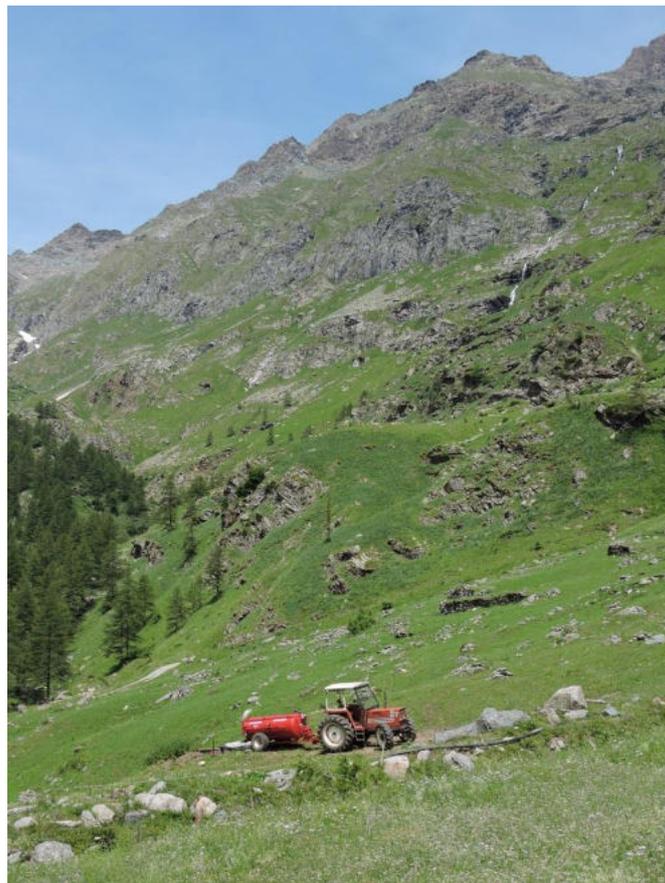
Manure dispersed in pastures under the manure storage structure, Aosta Valley.



Fertigation and stone removal to clear pastures, called "spietramenti", Piedmont.



Distribution of manure on pastures using barrel, Aosta Valley.



Manure spreader barrel, Piedmont.



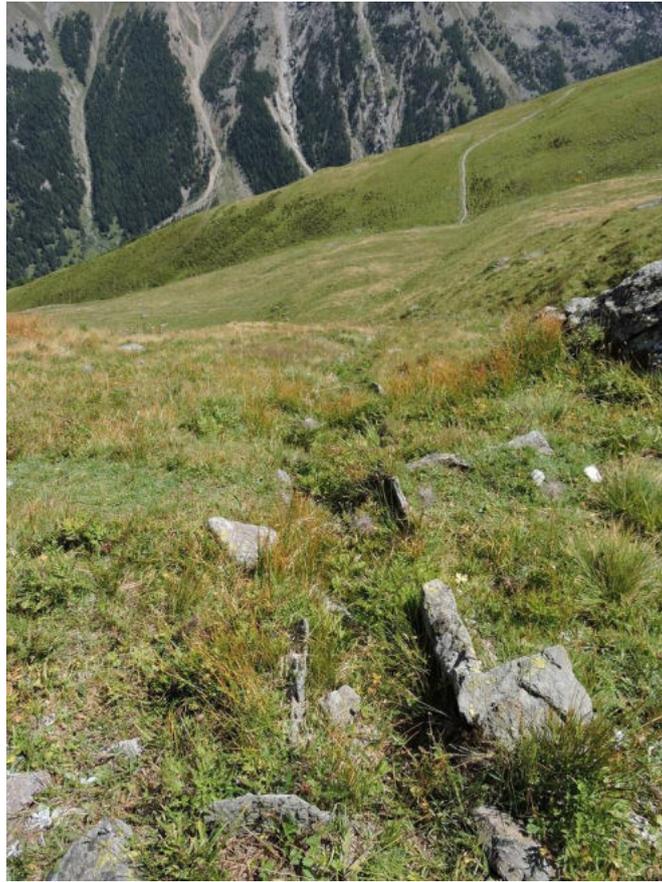
Manure spreader barrel, Aosta Valley.



Pipes for fertigation, Aosta Valley.



Sprinkler irrigation, Aosta Valley.



Old rûs to irrigate pastures, Aosta Valley.



Remains of an ancient ru that carried water from lakes to the pastures on the other side, Aosta Valley.

CONCLUSIONS

The study about the *alpages* of the Gran Paradiso National Park has provided a general overview of the management of animal breeding in the mountains, their problems, the perception of climate change and its influence on farms.

From the interviews we can clearly see that climate change is not what breeders are most worried about, even if, during the last years, they have already had to do with extreme weather conditions or frequent long dry periods. Nonetheless, the prevailing critical issues are others: among these, the effects of wildlife (wolf predations, but above all the additional work necessary to avoid them, and damage by ungulates), everything related to bureaucracy, the buildings deficiencies and lack of roads, economic problems linked to the decreasing yield of products, coexistence with other mountain users, the lack of adequately trained workers.

Territorial differences influenced most of the respondents' answers. For this reason, for various aspects of the survey it was decided to highlight the geographic location (Piedmont and Aosta Valley side) in explaining the results. If, on the one hand, there are differences in geomorphology and climate, on the other there are strong social, historical and economic influences that affect the current management of the *alpages*, but also the future vision of this activity. These aspects cannot be neglected when proposing solutions and strategies, since the animal breeding, even with the presence of some innovative elements, still remains highly traditional.

Most of the problems indicated by the operators cannot be faced by the individual, but would require public intervention for a solution, even partial.

Why are not climate and its recent changes seen as a real problem by the breeders? Many different components have to be analysed to find a possible answer. First, the valleys on the Piedmont side of Gran Paradiso National Park have more rain along the whole season (apart from extreme events), and more frequent foggy days. On the Aosta Valley side there is a different kind of animal management: in fact, milk cows are walked back to the stable during the central hours of the day, and they go out to graze only in the morning and after the milking in the afternoon (this means not before 6 p.m.) so they don't get the negative effects of the hottest hours of the day. In Piedmont this is not possible, because there are more animals and the lack of structures is evident everywhere. And then, in Piedmont, where cheese-making is still a daily activity, milk is processed only once a day, so grazing and milking times are different and not as rigid as in Aosta Valley.

Talking about sheep and goats, because of the regular presence of predators, the less hot hours of the day cannot be used in the best way. If they were left free, sheep and goats would graze early in the morning and late in the afternoon during the hottest days while their protection in corrals means they can graze only when the shepherd is present.

Lastly, many *alpages* in Aosta Valley, especially in *remues* at lower altitudes, have irrigation systems to mitigate, at least in part, the negative effects of drought.

Considering all these problems and analyzing the possible solutions to reduce the climate change effects as much as possible, the suggested strategies are reduced to some essential steps.

Going up to *alpages* with few animals than the maximum sustainable stocking rate allows for better management of pastures and livestock even in climatically unfavourable years. In the driest and most difficult to reach areas, it is not possible to keep sheep together with cows on the pasture. Almost everywhere, the breeding activity of sheep and goats together with cows has been abandoned due to the presence of predators (need for additional workers, increased costs). Furthermore, the typical breeds of these areas (mainly Biellese and Bergamasca sheep) are not suitable to graze in very dry areas – on the contrary, this would be possible for French breeds like Merinos d'Arles.

A reduction in the number of milking cows in favor of dry cows, heifers or beef cattle (sucking cow husbandry) could make productivity less influenced by climate during the *alpage* season. This has already happened on the side of Piedmont, but it was mainly due to infrastructural deficiencies, lack of roads and less need for staff, regardless of any climatic changes. On the Aosta Valley side, farms currently have in Fontina PDO production their main source of income (with the constraint of using Aosta Valley breed cows), therefore it is difficult to think of alternative ways.

A possible solution without abandoning the tradition, even if the number of animals is reduced, is to

integrate animal breeding with tourism (farmhouses and tasting of local products), but this is eventually feasible only if the farm is a family-run.

Interventions to enhance water distribution on pastures are desirable, as well as the creation of water points for watering livestock, in order to help a more homogeneous use of forage and reduce the movement of animals.

Wildlife management is an issue of particular concern to livestock farmers. In recent years its impact has led to radical management changes for farms. Concerning wolf, it should be remembered that the absence of predation is not synonymous with a solved problem. Where there are predators, this has meant even drastic management changes, a workload increase, higher expenses. The assessment of wildlife containment (predators, ungulates) need an official measure by institutions, but it is hoped for an ever greater involvement of the agricultural sector in all decisions-making process. Furthermore, there is no single universally valid solution, but personalized assistance would be needed to evaluate the best strategies for livestock protection, for the introduction of livestock guardian dogs, etc.

The constant presence of livestock guardian dogs is strictly connected to one of the biggest problems that emerged during these interviews: the coexistence with other mountain users. More and more people are regularly going to the mountains, but they hardly ever know the livestock breeding activities: it would be necessary to make informative campaigns for all kinds of public, to educate hikers, cyclists and tourists to respect the mountain pastures, the animals and all equipment used for work.



Tourist frequentation in an area for agricultural and livestock use, Aosta Valley.

On many *alpages* the lack of infrastructure is evident: publicly-owned *alpages* have often been generally renovated, but for private areas it was totally different. Especially on *alpages* that cannot be reached by roads, renovation works would be extremely expensive and the rent received would not cover the costs. A public contribution would therefore be needed to finance the renovation of the buildings, aimed at maintaining them as *alpage* structures.



Renovation of a privately-owned alpage, Aosta Valley.

The loss of economic yield of the local products could also be improved. Though all interviews were done during a long economic crisis period, which has even got worse because of the lockdowns due to Covid-19 pandemic, there are few events to promote local products, and breeders don't always join them. There is a "Gran Paradiso Quality Trademark", but only few cheese-making *alpage* farms have joined (*Gran Prà alpage*, *Azienda Agricola La Gora*, *Azaria alpage*, *Oregge alpage*, all on the side of Piedmont). The Fontina cheese making process, as already mentioned, does not allow to have a product available in the *alpage* season, but a 'Fontina from the *alpages* of Gran Paradiso' could be interesting for the consumers also in other periods of the year. Alternatively, producers could be encouraged to make different dairy products with a lesser maturation in order to be sold in the *alpages* alongside Fontina alone.

Alpages rentals and speculations by large non-local farms are a bigger and more complicated problem because the CAP entitlements system is referred to European agricultural policies. While this report was being finalised, it was discovered that one of the *alpages* in the Park had been rented by breeders from a different region. For another privately-owned *alpage*, whose lease was going to expire the following year, there had already been many offers by companies involved in frauds about the CAP funds.

Waiting for a EU policy, which should consider *alpages* as different areas from the big Central European lowlands or other territories, there should be almost interventions on publicly-owned *alpage*, with calls for tenders that support local farmers or, in any case, those who work with respect for the territory, traditions, local breeds, etc.

In other areas (Susa Valley *alpages*, for example), as well as imposing obligations, it was also asked to pay for a part of the rental by works to improve buildings and pastures.



Donkeys in alpage on the slopes of Gran Paradiso, Aosta Valley.

A further issue to be considered is the lack of specialised workers. In Italy the only kind of school in this area are courses for cheese-makers, that is why farms usually hire either foreigners or local but not specialised people. At the same time, there are many unqualified people who would like to work in the agricultural sector, but they need a theoretical and practical training to be able to carry out the work independently. It would be very important and innovative in Italy to have courses aimed at training shepherds (of sheep and goats or cattle) and general *alpage* workers.

Still in the field of training, many breeders also complain about bureaucracy, but this is due to a lack of knowledge of some operational procedures. Most of them rely on third parties (trade associations and others) even for simple compilation of documents that could be carried out in-house only with a computer connected to internet. Few training hours would be enough to avoid long queues waiting at public offices, which breeders usually don't like at all.

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AREV Associazione Regionale Allevatori Valdostani: <http://www.arev.it/>

ARAP Associazione Regionale Allevatori Piemonte: <https://www.arapiemonte.it/>

