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# A concept proposal to take into account interactions between alpine pasture and farms: the alpine-pasture-farms system

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**Abstract.** Alpine pastures can be found in all European mountain regions. These management units present typical specific features: agronomic features (composition, seasonality), agricultural use through grazing during summer, good common status, importance of environmental and heritage issues, multiple non-agricultural use, etc. As a result, building a specific analysis framework is necessary to study the articulation between farms and alpine pastures management. We offer a bibliographic review in order to (1) identify the variety of topics related to interactions between alpine pastures and farms, and (2) analyze the consistency between topics and methodological approaches (systemic approach or not). Most of these papers deal with articulation of forage resources, linked with technical and economic issues, or in connection with the issue of long-term management of vegetation. Research generally focuses on a part of alpine pastures specific features, and rarely considers the interactions between the different farms that use a same alpine pasture. We propose the concept of alpine-pasture-farms system to compensate for this lack.

**Keywords.** Alpine pasture – Summer mountain pasture – Livestock farming system – Forage system.

***Proposition d'un concept pour prendre en compte les interactions entre alpages et exploitations dans les systèmes agropastoraux : le système alpage-exploitations***

**Résumé.** Les alpages ou estives sont des espaces pastoraux que l'on retrouve dans l'ensemble des massifs montagneux européens. Ce sont des espaces très particuliers à différents titres : caractéristiques agronomiques des ressources (composition, saisonnalité...), valorisation agricole par le pâturage, statut de bien commun, importance des enjeux environnementaux et patrimoniaux, multiusage, etc. La façon dont s'articule la gestion des exploitations avec celle des alpages nécessite de ce fait un cadre d'analyse spécifique. Nous avons réalisé une revue bibliographique afin i) d'identifier la diversité des thématiques ayant trait aux interactions entre alpages et exploitations, et ii) d'analyser la cohérence entre les thématiques étudiées et le type d'approche choisie (approche systémique ou non). La question de l'articulation entre alpages et exploitations se pose le plus souvent en termes d'articulation des ressources fourragères, vis-à-vis d'enjeux technico-économiques ou de gestion à long-terme des végétations. Les travaux étudiés ne prennent en compte qu'une partie des spécificités des alpages et s'intéressent très rarement aux articulations entre les différentes exploitations utilisatrices d'un même alpage. Pour mieux prendre en compte l'ensemble des spécificités des alpages et la façon dont ils interagissent avec l'ensemble des exploitations utilisatrices, nous proposons le concept de système alpage-exploitations.

**Mots-clés.** Alpage – Estive – Système d'élevage – Système fourrager.

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## I – Introduction

Alpine pastures are specific altitude spaces, both by the conditions of environment and their seasonal use by grazing and by their status of common goods or their multipurpose. The alpine pastures have some management autonomy, however interactions between alpine pastures and farms are strong and cannot be reduced to an articulation of feeding resources for livestock.

The alpine pastures, also referred as mountain pastures, summer mountain pastures, highland pastures, etc., appear as very special agricultural areas. These management units are used by a large variety of farms in European mountain regions, which utilize the altitudinal gradient and the associated grass growth. They are usually geographically distant from the farm and located above, valued by the grazing of a summer resource essentially. To cover the different designations that can take these management units, in the text we keep the generic term of “alpine pasture” (term widely used in all the Alpine arc). The alpine pastures are used by farms located in mountain, but also by plain farmers for grazing of all or part of their herds during three to five months, with often a blend of several farms herds (more than one-third of the mountain pastures of the Alpine massif for example).

Like other pastoral areas, alpine pastures represent an exceptional heritage, whether in landscape terms, biodiversity or culturally. This feature explains that they are often located within protected areas (national parks, Nature Reserves, Natura 2000 areas...) and that they are visited by a lot of tourists.

Be used in collective or individual manner by farms, alpine pastures are “common goods” (Ostrom, 1990). By this “common” character of the alpine pastures and their often public land status, environmental and heritage issues should strongly be taken into account in pastoral managing, as it is also needed for the multipurpose managing (tourism, forest...).

The alpine pastures are therefore very specific spaces different of other spaces used by farms. The relationship between farm-specific spaces and common areas like alpine pastures cannot be considered as a simple association of farm plots and led to distinguish three areas of concern related to the management of pastures: (i) the agricultural use of the pastures during a production cycle is strongly conditioned by the geomorphological and pedoclimatic specificities of the alpine pasture, as well as by the agronomic characteristics of the vegetation; (ii) long-term resources management is necessary, because of the status of common goods and the importance of environmental issues; and (iii) the sharing of space between various users, is also indispensable on the alpine pasture.

Research on farming systems (Gibon *et al.*, 1999) adopts a systemic vision to look at interactions “men-herd-resources”. Based on an analysis of practices, these research aims on one hand, to understand the choices made by the actors of an agricultural system and the reasons of these choices, and secondly, to analyse the overall coherence of this management. The articulation between alpine pastures and farms, however, remains little studied through these approaches. To characterize the management logic of the shepherd who must ensure the adequacy between herds needs and pastoral resources during the pasture season, Savini *et al.* (1993) propose a model of the functioning of the alpine pasture in which farms are considered as black boxes outside of the studied system. On the opposite, most of the work on the farms that use alpine pasture is not interested about what happens in alpine pasture and considers that the animals leave the system studied when they pass into the alpine pasture. However the interactions between alpine pastures and farms are numerous and are probably not limited to issues of joint resources. Taking into account the different specificities of the alpine pasture, it appears necessary to build a framework of analysis appropriate to analyse these interactions.

## II – Materials and methods

We realized a literature review in the Scopus database about the articles dealing with interactions between alpine pastures and farms (Nettier *et al.*, 2015). All articles published until January 2015 and dealing with alpine pasture (or a synonym) and farm have been selected (search: TITLE-ABS-KEY [("alpine pasture" OR "mountain pasture" OR "highland pasture" OR "summer pasture" OR "summer range"\*) AND farm \*)]. In this selection of 202 articles, we have added four articles not referenced in Scopus, and we have excluded articles redundant or off-topics. At the end we got in the analysis 62 articles. For each, we identified the object studied and its boundaries, the associated themes, and the type of practices considered. We spotted the systemic approaches, and identified the functions of the alpine pastures considered in the research.

## III – Results

### 1. Themes studied at the interaction between alpine pastures and farms and functions considered

The Fig. 1 shows the relation in the 62 articles between the main themes of the research (items under the graph) and the object considered (colors). Analysis of the feeding functions attributed to the alpine pastures enabled to determine their places in feeding systems. The management time step considered could be the year, or the animal career, and the thematic of interest could be related both to the grazing practices organization on this time step and to long-term livestock choices (animal selection genetic criteria, animal types produced, reproduction periods...). The functions of the alpine pasture towards the farms are not only related to the constitution of a diet for the herds: they may also deal with health, or participate to the production quality of farms (image, physicochemical or organoleptic quality of products), and enabled to reduce the work on farms.

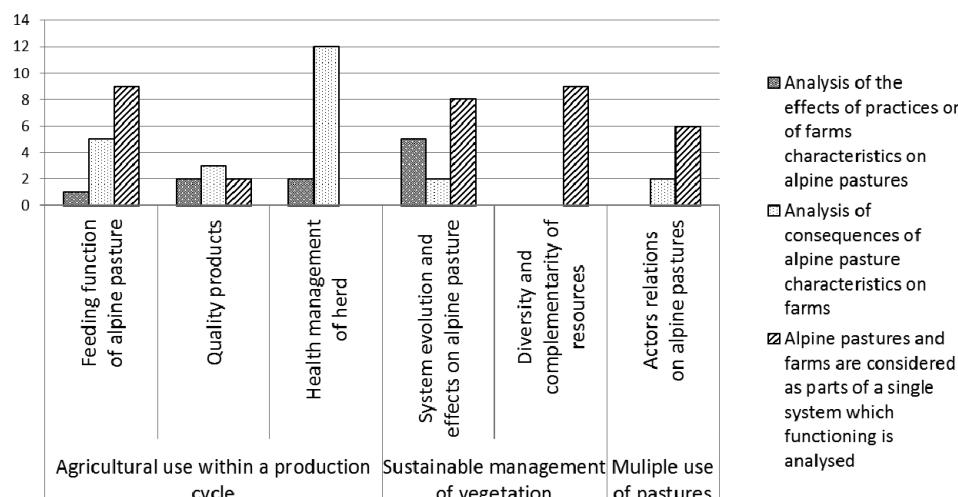
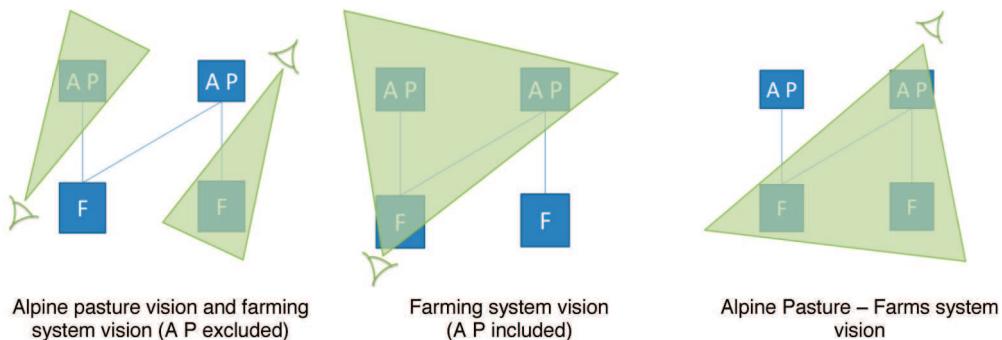


Fig. 1. Approaches chosen in selected articles: number of articles identified according to the themes covered. Six of the 62 articles appear in two thematics.

Farms use of alpine pastures is not reduced to the use during a period by an animal population that consumes a resource for animal production; it is also a way to combine this resource mobilization with other resources mobilization, with the objective of performing different functions (feeding, health, image support for products...) during an animal production cycle. These functions are determined by the characteristics of all the mobilized vegetation, they are also bound to the constraints of space organization, of socio-economic or political context and finally of expectations that may have farmers. These expectations can cover a strong symbolic dimension.

## 2. Proposal of a concept: the Alpine Pasture – Farms System

Most of the approaches at the farm level consider the alpine pasture as a spatial part of the farm and just take into account a part of its specificities (characteristics of the vegetation, or environmental issues, or multi-purpose...) and of interactions pastures-farms. Furthermore the interactions between farms using a same alpine pasture are very rarely considered. Towards a problematic requiring to take into account the different specificities of the alpine pastures, but which require also to consider different levels of interactions between alpine pastures and farms, one can be interested by a system consisting of an alpine pasture and the different farms that use it. So it corresponds to a system composed by a subsystem "alpine pasture" (seen as a management unit) and one or more subsystems "farm", in interaction (see Fig. 2). The analysis must strive to successfully integrate the specificities of the alpine pasture subsystem and to consider the functioning of farm(s) subsystem(s) as to understand the determinants of the use of the alpine pasture. We propose to call this system the "alpine-pasture-farms system". It can be applied to collective or individual alpine pastures.



**Fig. 2. Originality of the point of view proposed with the Alpine Pasture – Farms system**  
(AP: Alpine Pasture; F: Farm).

By focusing on the alpine pasture, this system can allow a perspective change on the various themes that we have identified in the literature review, and more generally for the analysis of the triptych "men-herd-resources" of the livestock farming systems approach (Gibon *et al.*, 1999).

Thus on "men", the objectives on the alpine pasture become central in pastoral management objectives (including non-agricultural objectives); we can try to understand how they deal with the other objectives of the farm(s). Relations between farmers and shepherds become central in the decision process. From the point of view of work organization, the alpine pasture is no more considered as an autonomous management unit (alpine pasture vision), or that obliged to delegate the work, or specialize a worker during a bounded period (farm vision). We can look at the way in which work on the alpine pasture, with its specificities (isolation, remoteness, collective tasks such as sorting the animals or maintenance chores), articulates with work organization in the farms.

With regard to the herds, the approaches at alpine pasture level consider it has to “cope with” the summered herd (often consisting of animals with different needs and behaviors) and objectives expected by farmers. Approaches across the farm are aimed at achieving a livestock goal by the articulation of resources variety over the year (including the alpine pasture) and a livestock management, so to use at best the alpine pasture in the system. The analysis of the functioning of the alpine-pasture-farms system enabled to wonder how to best manage herd(s) over the year and at long-term for using different resources from the alpine pasture during the season and sustainably manage them. It also allows focusing on the alpine pasture specificities for health management and reproduction management, which have consequences on the entire animal production cycle.

Finally if one is interested in resources, in contrast to the approaches to the farm level, the analysis of the functioning of the alpine-pasture-farms system allows to consider the diversity of internal resources of the alpine pasture and the way they are structured among themselves and with the various farms resources within the forage system; it also focuses the question of the management of the resource renewal on the long-term.

In the case of collective alpine pastures, the alpine pasture-farms system allows to look at the relationship between individual farms management and collective alpine pasture management: coordination between farmers and shepherds for work organization (chores...), herd management (sanitary, reproductive...), connection with a diversity of forage systems, sometimes geographically distant. It led to look at the collective farmers governance bodies (which take the form of pastoral groups in the majority of cases in France).

## IV – Discussion – Conclusion

The issue of adaptation to climate change of agro-pastoral systems could be considered through the prism of the alpine-pasture-farms system. This is an example of a problematic where the alpine pastures occupy a central place and where it is necessary to take into account their specificities and be interested in interactions with farms. Climate change, which has already resulted in an increase in frequency and intensity of extreme events, particularly droughts, is faster at high altitude, the vegetation degradation of alpine pastures are not easily reversible, and alpine pastures appear particularly vulnerable to climate change (Engler *et al.*, 2011). Adaptation of the alpine pastures to climate change requires also to look at farms that utilize alpine pasture, since flexibility can be found in the interaction between the alpine pastures and farms (Nettier *et al.*, 2011).

As conclusion, the thinking on the connection between alpine pastures and farms can be extended to other socio-economic contexts (Atlas, Rockies, Central Andes, etc.). A more general reflection on the relationship between common and individual resources could be transposed to other cases of agricultural systems combining the use of individual resources and common resources (that could be used individually or collectively). This may be the case for other pastoral resources, but also not pastoral resources (water, arable land, equipment...), since we want to focus on this resource while keeping a perspective on the coherence of the functioning of individual farms and their interactions with the common resource and between themselves.

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