
EURAF2020
NUORO
EURAF
European Agroforestry Federation
UNINUORO
L'UNIVERSITÀ AL CENTRO
5TH EUROPEAN AGROFORESTRY CONFERENCE
17th - 19th MAY 2021 - ITALY
BOOK OF ABSTRACTS
Agroforestry for the transition towards sustainability and bioeconomy

Innovative beef cattle grazing systems for the restoration of abandoned lands in the Alpine and Mediterranean mountains (iGRAL)

EURAF 2020
Agroforestry for the transition towards sustainability and bioeconomy
Abstract
Corresponding Author:
giampiero.lombardi@unito.it

Giampiero Lombardi[1], Maria Sitzia[2], Marcello Verdinelli[3], Giovanna Seddaiu[4], Simonetta Bagella[4], Michele Lonati[1], Marco Acciaro[2], Margherita Addis[2], Luciano Gutierrez[4], Lorenzo Salis[2], Stefano Arrizza[3], Maria Leonarda Fadda[3], Stefania Bagella[5], Marco Pittarello[1], Ginevra Nota[1], Maria Carmela Caria[4], Giovanna Piga[4], Giovanni Rivieccio[4], Marco Cuboni[4], Alberto Tanda[4], Pier Paolo Roggero[4]

[1] University of Turin, Dept. Agricultural, Forest & Food Sciences, Italy, giampiero.lombardi@unito.it
[2]AGRIS Sardegna, Italy, msitzia@agrisricerca.it
[3] National Research Council, Institute of BioEconomy, Italy, marcello.verdinelli@cnr.it
[4] University of Sassari, Desertification Research Centre, Italy, pproggero@uniss.it
[5] University of Sassari, MUNISS, Italy, bagella@uniss.it

Theme: Agroforestry and the landscape

Keywords: ants, biodiversity, ecosystem services, grass-fed meat, hardy cattle breeds, vegetation

Abstract

Throughout the last decades, socio-economic changes have determined a dramatic agropastoral abandonment of Italian mountains, with a marked decrease in the number of livestock farms and animals reared. The reduction of anthropogenic pressure has changed the traditional landscapes, either in the temperate agropastoral systems, where permanent grasslands have reduced because of natural vegetation dynamics, and in the Mediterranean sylvo-pastoral systems, where weeds and invasive shrubs have replaced the pastures representing understorey layer. These modifications have negatively affected plant and animal diversity, as well as the ecosystem services delivered by open habitats, such as food production, touristic attractiveness, reduction of wildfire and flooding risks. However, since recent years, a remarkable number of workers has been moving to the agricultural sector, but two major issues limit the development of efficient agropastoral enterprises: land degradation, due to the abovementioned dynamics, and land fragmentation, due to Italian inheritance laws.

iGRAL - Innovative beef cattle Grazing systems for the Restoration of Abandoned Lands in the Alpine and Mediterranean mountains – is a three year project funded by Mountain Agriculture programme 2017 of AGER Foundations' network, which aims at finding solutions to both the issues, respectively by 1) testing innovative grazing systems, adapted to current socio-economic and environmental conditions, and 2) promoting land consolidation associations (Beltramo et al. 2018) to enlarge the territorial base for agropastoral holdings.

Grazing with two different hardy breeds, Highland and Sarda cattle breed, which seem well adapted to Alpine and Mediterranean mountains, respectively, may help prevent further encroachment of pastures by woody species, when not control invasion, and restore more palatable vegetation. Moreover, the production of grass-fed meat from the two breeds, with its peculiar characteristics, may increase farmer revenue, in case consumers will be available to recognise meat nutritional and nutraceutical values.

In Piedmont Alps (three areas managed by two commercial farms) and Sardinia mountains (Macomer, Agris experimental station), we compare two different grazing systems: an ordinary grazing, where the current grazing management is left unchanged and, in Sardinia, cattle fattening and finishing are carried out in a conventional specialized fattening centre to produce grain-fed meat; an improved grazing (*sensu* Pittarello et al 2016), where the current grazing management is improved by adjusting stocking

rates on the basis of forage availability, by strategic placement of mineral mix supplements to change cattle spatial distribution and increase the consumption of poor-quality forages, and by improving forage production and quality through weed control and overseeding.

Plant assemblage composition and diversity are assessed in sub-areas homogeneous from the point of view of vegetation physiognomy and composition. Surveys of herbaceous and shrub layers in each sub-area were carried out using the vertical point-quadrat method (Daget and Poissonet 1971), modified to have a complete species list, during spring-summer 2019, before exploitation. Measures of shrub and herbaceous layers height were recorded using 'sward stick method' (Stewart et al. 2001). To assess the sustainability of grazing systems, ants are often used as environmental indicators for their high diversity and functional importance. Ants can establish competitive and/or mutualistic relationships with plants. As plant regeneration heavily depends on seed bank, seed-collecting species play a relevant role in shaping local plant community composition, above all in Mediterranean ecosystems. At each sampling unit, ground foraging ant assemblages were characterized using pitfall traps buried into the soil and partially filled with a solution of water and monopropylene glycol. To analyse the grazing behaviour of cattle and, specifically, assess the selection for plant species and communities, and the impacts produced by trampling on plant and ant community composition and functional diversity, about 20% of cattle heads in the herds were and will be GPS-tracked throughout the three-year period of the experiment. Moreover, the behaviour of some cattle will be surveyed by visual observation. To assess the effect of year-round grazing in Sardinia or grazing and feeding without concentrates in Piemonte, we analyse the nutritional and nutraceutical characteristics (total cholesterol, fatty acid profile, antioxidants) of the grass-fed meat produced and compare them with grain-fed meat from conventionally reared animals. The project aims also to evaluate the potential economic value of grass-fed meat from both the two hardy breeds. In particular, to obtain information about meat economic value and set an appropriate pricing on the market, economic analyses focus on the consumers' availability to spend for the grass-fed meat.

To face land fragmentation issue, land consolidation associations are promoted starting from Piedmont, where local government recently implemented a new regulation system to encourage landowners pooling their land properties together. A new territorial base will generate from consolidation, which can be managed by entrusting the sylvo-agro-pastoral management to one or more farms, whose income would also be improved, as well as the provision of the ecosystem services resulting from the implementation of sustainable grazing systems.

By the end of the project (2021), we expect: to gather new scientific and technical information for the restoration of the lands degraded by different encroaching species, in different temperate and Mediterranean environments; to improve the land "quality" of the areas concerned (more ecosystem services, lower management costs), also through land consolidation associations; to define a strategy to reduce fattening costs of calves; to set the bases for the implementation of new regulation schemes for pasture-based productions in mountain areas; to increase consumer's awareness with use of narrative labels and through the communication and dissemination actions of the project; to inform stakeholders (agriculture and environment institutions, farmers' representatives, policy makers, organizations dealing with beef cattle systems), involved with a participatory approach, about the strategies for grassland conservation and restoration in mountain areas and to identify the priority of actions.

Beltramo R., Rostagno A, Bonadonna A (2018) Land Consolidation Associations and the Management of Territories in Harsh Italian Environments: A Review. Resources 7 (19): 1-13. DOI:10.3390/resources7010019

Daget P, Poissonet J (1971). A method of plant analysis of pastures. Annales agronomiques 22: 5-41

Stewart KEJ, Bourn NAD, Thomas JA. (2001). An evaluation of three quick methods commonly used to assess sward height in ecology. Journal of Applied Ecology 38: 1148–1154. DOI: 10.1046/j.1365-2664.2001.00658.x

Pittarello M, Probo M, Lonati M, Lombardi G. (2016). Restoration of sub-alpine shrub-encroached grasslands through pastoral practices: effects on vegetation structure and botanical composition. Applied Vegetation Science 19(3): 381-390. DOI: 10.1111/avsc.12222