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Feeding preferences of Highland cattle reveal their attitude to exploit woody vegetation in mountain environments

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Agroforestry for the Green Deal transition.
Research and innovation towards the
sustainable development of agriculture and
forestry
Abstract

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Abstract

Since the 1950s, the area occupied by woody-encroached pastures, shrublands and forests in European mountains has dramatically increased due to agro-pastoral abandonment. The exploitation of these habitats by livestock is challenging due to low forage quality and difficult accessibility. However, if grazed by robust breeds, such as the Highland cattle, these habitats could represent a valuable resource for sustainable livestock productions. Indeed, Highland cattle are characterized by low maintenance energy requirements, low grazing selectivity and great agility on rough terrain (Pauler et al. 2020; Berry et al. 2002). However, the feeding behaviour of this breed has been poorly investigated in mountain environments. To fill this knowledge gap, the objective of this study was to analyse Highland cattle diet composition and feeding preferences in contrasting mountain sites encroached by woody vegetation.

The study was carried out at four sites in the Western Alps, representative of different mountain vegetation communities: Almese (480 m a.s.l., Italy), Casteldelfino 1 (1380 m a.s.l., Italy), Casteldelfino 2 (1280 m a.s.l., Italy), and Bovonne (1750 m a.s.l., Switzerland). Cattle behaviour was recorded at regular intervals through direct observations of 29 focal animals. For each observation, the plant species consumed and those available in a 1-m buffer area around the animal were identified and their relative consumption and abundance recorded in a percent scale. Herbaceous plants were included in a broad category, while woody plants were identified at the species level. From these data, (i) the diet composition, (ii) the Jacob's Selectivity Index (JSI) (Jacobs 1974) of woody plants, and (iii) the relation between species consumption and abundance were investigated.

Overall, 11'356 observations were made during 150 hours. Highland cattle diet included a large proportion (15-46%, Figure 1) and variety (45 different species) of woody plants. For instance, *Rubus*

idaeus and *Alnus viridis* accounted for 40% and 12% of the diet in Casteldelfino 2 and Bovonne, respectively. Interestingly, cattle were also able to forage on spiny shrubs such as *Prunus spinosa* and *Rosa* sp. According to JSI, cattle expressed a clear feeding selection towards woody plants: *Celtis australis*, *Frangula alnus*, *Fraxinus ornus* and *Rhamnus alpinus* were among the preferred species (JSI > 1), *Alnus viridis*, *Picea abies*, and *Populus tremula* were consumed proportionally to their availability (JSI = 1), while *Corylus avellana*, *Crataegus monogyna*, *P. spinosa* and *Sorbus aria* were among the avoided ones (JSI < 1). The relation between species consumption and their abundance differed depending on their preference index. For instance, cows consumed *F. alnus* (preferred species) even at low abundance, whereas *Rubus* sp. (avoided) was highly consumed only at high abundance.

The remarkable consumption of woody plants by Highland cattle could encourage the use of this breed to reduce woody encroachment, likely enhancing forage quality and other ecosystem services (e.g., plant diversity, landscape quality, and tourism attractiveness). Therefore, Highland grazing could be adopted for the sustainable use and restoration of marginal mountain areas (Svensk et al. 2021). Future studies should explore the forage quality of woody plants and Highland cows growing performances in these environments.

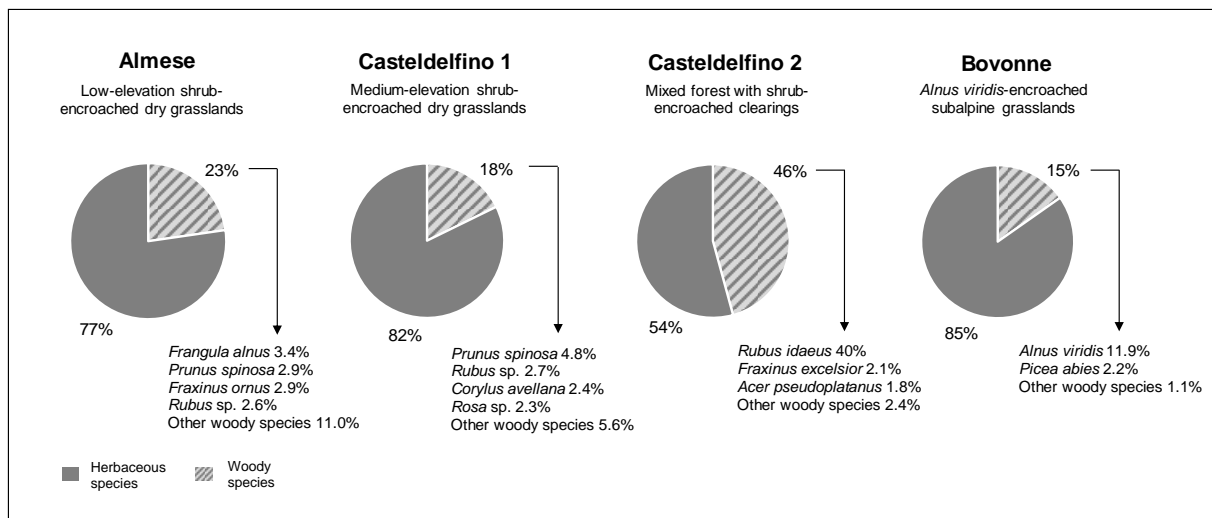


Figure 1. Proportion of herbaceous and woody plant species in Highland cattle diet in the four studied sites.

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