Submitted Abstract

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Abstract

Since the 1950s, the surface 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 feeding source for sustainable livestock farming and have clear management advantages such as the provision of alternative forages during grass shortage periods and shade relief.

To ascertain how Highland cattle could adapt to mountain woody-encroached environments, we analyzed their feeding behavior in four contrasting sites in the Italian and Swiss Western Alps. The study sites ranged in elevation from 480 to 1750 m a.s.l., and were representative of different vegetation communities. Cattle behavior was recorded at regular intervals through direct observations of 29 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 on a percent scale. Herbaceous plants were pooled in a broad category, while woody plants were identified at the species level. From these data, we determined (i) the diet composition, (ii) the Jacob's Selectivity Index (JSI) of woody plants, and (iii) the relation between species consumption and abundance.

Overall, 11'356 observations were recorded during 150 hours. Highland cattle diet comprised a large proportion (15-46%) and variety (45 different species) of woody plants, including also 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 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, 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, with preferred species consumed even at low abundance and avoided ones consumed only at high abundance.

The remarkable consumption of woody plants by Highland cattle, together with their great agility on rough terrain, resistance to cold weather, and low demand of veterinary assistance, could encourage the use of this breed in marginal mountain areas, likely reducing woody encroachment and enhancing forage quality and other ecosystem services (e.g., plant diversity, landscape quality, and tourism attractiveness).