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The Role of Pasture Management for Sustainable Livestock Production in Semi-arid Subtropical Mountain Regions

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Abstract

Grazing livestock is an important asset to livelihoods of people in most semi-arid environments, where natural resources cannot be used directly for human consumption. However, overgrazing commonly reduces pasture productivity, therefore threatening people's long-term food security.

To study the effect of goats' grazing on the natural vegetation and evaluate possibilities for a pasture management that maintains long-term fodder production, the ligneous and herbaceous vegetation was analysed at grazed and ungrazed sites in the Al Jabal al Akhdar mountains of Oman in August 2006–April 2008. Botanical composition, vegetation cover and biomass production were quantified along transects (n=1–4; length=700–1400 m) at i) a grazed plateau (GP), ii) an ungrazed plateau (UP), iii) a 15-year old enclosure (UE) and iv) a grazed valley (GV), where water availability was higher. Interviews with key informants (n=10) were conducted to determine the extent of village pasture areas and calculate stocking densities.

While foliar dry mass (DM) was 3–6 t ha⁻¹ at GP, UE and UP and reached 41 t DM ha⁻¹ at GV, herbaceous yields contributed ≤11 % to total biomass and decreased during the dry, cold seasons, highlighting the restricting effect of the low and variable rainfall. In September 2007, ground cover (%) and biomass yields (kg DM ha⁻¹) of the herbaceous vegetation were significantly higher at UP (82±10.5; 629±171) and UE (84±14.2; 505±181) than at GP (55±10.1; 20±8.2; *p* < 0.01). While the botanical composition was similar at UE and UP, unpalatable species were more dominant at grazed than at ungrazed sites. Stocking densities on village pastures were 0.03–0.28 goats ha⁻¹, but since construction of roads and housing decreased the available pasture area and pastures of different villages overlap, >0.8 goats ha⁻¹ graze the natural vegetation near settlements.

Despite the semi-arid climatic conditions, pastures on Al Jabal al Akhdar encompass characteristics of equilibrium systems, where vegetation is strongly influenced by livestock grazing but recovers in its absence. The sustainable use of the natural fodder resources by reserving sufficiently large areas for livestock grazing and by a rotational pasture use coordinated among villages is therefore a valuable alternative to intense supplement feeding or the introduction of zero-grazing management.

Keywords: Browse foliage, equilibrium concept, highlands, Oman, rangeland vegetation

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