Opinion: a new research approach is needed to secure viable mountain livestock (eco-)systems

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Mountain areas are diverse and multifunctional landscapes largely influenced by mountain livestock (ML). ML (eco-) systems provide numerous services, e.g. sustainably produced food, most biodiverse habitats, an attractive landscape for tourism, cultural heritage, soil stabilisation and avalanche protection. Today, ML (eco-)systems are threatened by abandonment of unfavourable locations leading to losses of biodiversity, cultural heritage and production potential as well as by intensification in favourable areas (e.g. high stocking density, concentrate feeds, fertilisation) leading to long-term degradation, eutrophication, soil instability and biodiversity loss. To answer the relevant questions and to secure ML (eco-)systems, a new research approach is urgently needed: (1) ML research must not longer mistakenly transfer solutions from the lowlands to mountains. Complex mountain (eco-)systems require mountain-specific solutions. (2) ML research must be site-specific, since mountains are extremely heterogeneous. (3) ML research must measure the most relevant parameters instead of the parameters most easy to quantify. Specific sustainability indicators must be developed. (4) ML research must overcome fragmentation administratively (among regions and countries), spatially (to avoid problems of upscaling and generalisation) and among disciplines (to establish a holistic and multidisciplinary approach). (5) ML research must be put into practice. Researchers first have to listen to practitioners, second communicate understandably and finally clearly advice policy makers. In this paper, we will provide justification for these claims by reviewing good-practices examples in the ML literature. We will demonstrate that if ML research becomes specific, precise, multidisciplinary and practical, it will give the answers in demand and initiate the political action needed to sustainably preserve ML (eco-)systems.