

# Patch-burn grazing (PBG) as a livestock management alternative for fire-prone ecosystems of North America

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## Abstract

Many rangelands of the world are fire dependent and display a strong interaction between fire and grazing on animal behavior, productivity and ecosystem processes. The application of this fire–grazing interaction as patch-burn grazing (PBG) has recently been promoted in North America to conserve biodiversity and as an alternative for livestock management in fire-prone ecosystems to enhance forage quality and other production benefits. PBG is functionally applied by burning spatially and temporally discrete patches to allow livestock to choose where and when to graze. However, considering that the primary intent of PBG in fire-dependent ecosystems has been for the conservation of biodiversity, we synthesized the peer-reviewed literature to assess PBG as an alternative strategy for livestock management in fire-prone ecosystems. We reviewed the literature to assess PBG as an alternative livestock management approach to optimize animal production and conserve biodiversity in fire-prone ecosystems. We reviewed the results of 83 studies that focused on two main areas: (1) livestock production and inputs and (2) maintaining or improving ecosystem functioning and biodiversity to support sustainable livestock production. PBG can optimize cattle production by offsetting input costs such as supplemental feed, insecticides, herbicides, mechanical brush control, veterinary costs and cross-fencing. PBG can also maintain native herbaceous plant communities that are the resource base for cattle grazing enterprises by reducing woody plant encroachment, stimulating above- and below-ground biomass of native perennial grasses, enhancing nutrient cycling and optimizing plant diversity. PBG creates a habitat mosaic critical for many trophic levels of wildlife, particularly grassland birds, which are currently in decline. Further research is needed to clarify the potential environmental gradients defining applicability of PBG, economic outcomes of PBG, potential gastro-intestinal parasite control with PBG and other metrics of animal production. Overall, PBG is a viable management approach to improve productivity and

biodiversity in fire-regulated grassland ecosystems in a manner supported by both fire and grazing disturbances. This is especially true when these communities have other organisms that depend on periodic disturbance and interaction with large animal grazing and is supported by ample empirical research.