Agricultural Systems 125 (2014) 50–53

Contents lists available at ScienceDirect

Agricultural Systems

journal homepage: www.elsevier.com/locate/agsy

Short communication

Commentary: A critical assessment of the policy endorsement for holistic management

David D. Briske[a,*], Andrew J. Ash[b], Justin D. Derner[c], Lynn Huntsinger[d]

[a] Ecosystem Science and Management, Texas A&M University, College Station, TX, USA
[b] CSIRO, Sustainable Ecosystems, St. Lucia, Queensland, Australia
[c] USDA-Agricultural Research Service, High Plains Grasslands Research Station, Cheyenne, WY, USA
[d] Society and Environment, University of California-Berkeley, Berkeley, CA, USA

ARTICLE INFO

Article history:
Received 18 August 2012
Received in revised form 18 November 2013
Accepted 2 December 2013
Available online 9 January 2014

ABSTRACT

This commentary summarizes the evidence supporting holistic management (HM) and intensive rotational grazing (IRG) to demonstrate the extent to which Sherren and coauthors (2012) have overstated their policy endorsement of HM for rangeland application. Five major points are presented – distinction between HM and IRG, insufficient evaluation of the contradictory evidence, limitations of the experimental approach, additional costs associated with IRG, and heterogeneous capabilities and goals of graziers' to manage intensive strategies – to justify why this policy endorsement is ill-advised. The vast majority of experimental evidence does not support claims of enhanced ecological benefits in IRG compared to other grazing strategies, including the capacity to increase storage of soil organic carbon.

Published by Elsevier Ltd.

1. Introduction

The objective of the paper by Sherren et al. (2012) was to evaluate graziers' perceptions of landscape features and the relative importance placed on specific features by contrasting perceptions of graziers that have adopted holistic management (HM) with those who have not. However, they move beyond this evaluation and conclude with the policy recommendation that HM should be broadly adopted to provide public benefits through either the removal of current barriers or the development of government interventions to accelerate adoption. We acknowledge that management strategies based upon adaptive capacity, sound financial planning and recognition of ecological constraints, as broadly espoused by HM, are important in achieving sustainable grazing strategies. However, we find the authors' endorsement of HM disconcerting given that only minimal qualitative data is presented in support of this policy recommendation. Further, their endorsement is based largely on the purported benefits of intensive rotational grazing (IRG), a grazing strategy that is widely advocated by HM, without either investigation or an assessment of the evidence associated with this grazing strategy.

We wish to comment on the evidence addressing HM, and especially IRG, in a more comprehensive and systematic manner to clearly identify the extent to which a policy endorsement of HM and the purported benefits of IRG have been overstated by Sherren et al. (2012). Intensive rotational grazing (syn. cell grazing and time controlled grazing) involves the subdivision of individual paddocks into multiple units – often eight or more – that are grazed successively with a single herd or flock of animals to produce short, intensive periods of grazing followed by longer periods of deferment (Heitschmidt and Taylor, 1991). Successive periods of grazing by livestock concentrated in a single pasture to produce a high grazing pressure (animal demand per forage availability) followed by rest periods – when supported by adaptive management as prescribed by HM – are assumed to provide the ecological benefits attributed by the authors to IRG. We acknowledge that IRG represents one of many viable grazing strategies (Briske et al., 2008; Tanaka et al., 2011), but insufficient evidence exists to support the occurrence of consistent ecological benefits relative to other less intensive grazing strategies.

The debate regarding the relative ecological benefits of IRG compared to other less intensive grazing strategies has been prolonged by misinterpretation of concepts and terminology, evaluation of different response variables, and bioclimatic variability among regions, in addition to inherent intra- and inter-annual variability of rangeland systems (Briske et al., 2008). Rotational grazing or deferment from grazing can be confused with IRG, and grazing management can be considered synonymous with grazing strategy, which obscures the importance of adaptive management (Fazey et al., 2007; Teague et al., 2013). In this regard, the benefits of strategic rest from grazing within a growing season and grazing at different seasons among years on grassland vegetation and soils can be implemented in the absence of IRG (Ash et al., 2011). The

* Corresponding author. Address: Department of Ecosystems Science and Management, TAMU 2138, Texas A&M University, College Station, TX 77843-2138, USA. Tel.: +1 979 845 5581.

E-mail address: dbriske@tamu.edu (D.D. Briske).

0308-521X/$ - see front matter Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.agsy.2013.12.001

benefits ascribed to IRG are often confounded with more effective animal distribution within paddocks, which can also be accomplished with paddock subdivision, herding, distribution of water points, and patch burning, in addition to rotation of concentrated herds or flocks of livestock (Briske et al., 2008; Teague et al., 2013).

Monocultures of forage grasses and grass-legume mixtures grown in high precipitation regions, in contrast to rangelands, do show consistently greater plant production (mean of 30%) and persistence of highly palatable species, but not improvements in forage quality or livestock production, in a majority (85%) of comparisons between IRG and continuous grazing (Sollenberger et al., 2012). The mechanism(s) contributing to the distinct responses of IRC in pasture and rangeland systems remains unclear, but these highly productive forage systems are comparable to those investigated by Voisin (1988) who initially developed the concepts supporting rotational grazing in France and Western Europe. Variables in addition to total annual precipitation may contribute to these distinct responses, because investigations in mesic rangelands (800 mm precipitation/yr) have shown both positive (Cassels et al., 1995; Teague et al., 2011) and negative (Gillen et al., 1998; McCollum et al., 1999) plant production and livestock responses to IRG compared to continuous grazing. The important distinction regarding the application of IRC in mesic compared to arid and semiarid systems has been previously identified and addressed (Briske et al., 2008; Teague et al., 2013). The study region investigated by Sherren et al. (2012) had a mean annual precipitation of 600–866 mm which represents a mesic rangeland by global standards, but the wheat-sheep belt region has a mean annual precipitation as low as 300 mm on the dry end. Paddocks in this region have been created through clearing of box gum (predominantly *Eucalyptus albens* and *Eucalyptus melliodora*) grassy woodlands and vary from unfertilized native grassland to fertilized grassland with exotic grasses and forbs. It is unclear how broadly Sherren et al. (2012) were directing their policy recommendations, so here we addresses the purported benefits of IRG as applied to global rangelands and native grasslands distributed along wide precipitation gradients.

2. Primary rebuttal points

This assessment highlights five major points—distinction between HM and IRG, insufficient evaluations of the contradictory evidence, limitations of the experimental approach, additional costs associated with IRG, and heterogeneous capabilities and goals of graziers' to manage intensive strategies—that challenge the policy endorsement of HM by Sherren et al. (2012), and we conclude with a more comprehensive, evidence-based interpretation of HM and IRG. First, it is essential to draw a clear distinction between HM and the closely associated grazing strategy of IRG. A clear contribution of HM is the emphasis on adaptive management – a form of structured decision making that uses measured outcomes of management actions to inform subsequent management objectives and strategies (Allen and Gunderson, 2011). We have previously hypothesized that strong testimonials in support of IRG from some HM managers may have originated from enhanced adaptive management – strategic planning and goal setting, financial rigor, and regular assessment of management outcomes - rather than from the promotion of beneficial ecological processes by IRG (Briske et al., 2011). This hypothesis reconciles, as least in part, the continued support of some managers for IRG, even though a large amount of experimental research has not found IRG to increase plant or livestock production compared to other grazing strategies. The hypothesis that IRG may promote more effective adaptive management requires rigorous evaluation following the comparative approaches of Jacobo et al. (2006) and Teague et al. (2011), but initial findings suggest that adaptive management may be an important component of these divergent interpretations. We are not aware of any reason why emphasis on adaptive management as espoused by HM is specific to only IRG. Adaptive management would appear to benefit all grazing management strategies and more broadly all activities associated with ecosystem management, although these benefits are poorly documented (Fazey et al., 2007; Briske et al., 2011; Teague et al., 2013).

Second, a policy endorsement of HM seems ill-advised when Sherren et al. (2012) explicitly acknowledge 'the lack of conclusive evidence on measurable benefits of HM grazing'. We agree that HM, and more broadly adaptive management, have not been experimentally evaluated in rangeland systems because the human dimensions of ecosystem management have only recently been emphasized (Fazey et al., 2007; Briske et al., 2011). The lack of information regarding the effectiveness of HM is sufficient reason to restrain a policy endorsement. Recent research does suggest that the effectiveness of adaptive management does provide a clear and perhaps overriding contribution to the success of grazing strategies (Jacobo et al., 2006; Pinchak et al., 2010; Teague et al., 2013).

In contrast to HM, IRG has been rigorously evaluated, primarily in the US, by numerous investigators at multiple locations and in a wide range of precipitation zones over a period of several decades. Collectively, these experimental results clearly indicate that IRG does not increase plant or animal production, or improve plant community composition, or benefit, soil surface hydrology compared to other grazing strategies (Briske et al., 2008, 2011). A recent assessment report commissioned by Meat and Livestock Australia (2011) to evaluate grazing strategies in northeastern Australia similarly concluded that no discernible differences in plant species composition or soil surface characteristics existed between IRG and continuous grazing. This assessment was undertaken in sub-tropical and tropical grasslands of north-eastern Australia, rather than in temperate grasslands of south-eastern Australia, but the findings of this assessment are entirely consistent with the conclusions of Briske et al. (2008).

However, recent research has provided evidence of improved plant species composition and, to a less extent, some indication of improved soil quality for IRG compared to continuous grazing in mesic rangelands (Jacobo et al., 2006; Teague et al., 2011). Investigation of a 4- and 8-paddock rotational system also demonstrated improvement in vegetation composition, but not livestock production, and the ability to accumulate fuel so that fire regimes could be incorporated within grazing strategies (Pinchak et al., 2010). Teague and coworkers provide a valuable interpretation of the potential limitations of the results generated by previous grazing experiments and suggest hypotheses that may support greater insight into the effectiveness of grazing strategies (Teague et al., 2013).

Sherren et al. (2012) incorrectly state "The perennial pastures that are encouraged through HM practices have been shown to hold more soil carbon (Sanjari et al., 2008; Teague et al., 2011), contributing to the carbon sequestration that is becoming increasingly important for averting severe climate change." The majority of experimental evidence indicates that grazing strategy has a minimal effect on carbon sequestration, especially in arid and semiarid rangelands where rainfall is a major driver of sequestration, and rangelands act as weak carbon sinks in wet years and weak carbon sources in dry years (Svejcar et al., 2008; Ingram et al., 2008; Zhang et al., 2010; Booker et al., 2013). Further, the authors failed to recognize that Sanjari et al. (2008) did not find more soil organic carbon (*P* value was 0.16, not statistically significant) with time-controlled grazing compared to continuous grazing at the same stocking rate. Similarly, Teague et al. (2011), working in a mesic rangeland with a mean annual precipitation of 820 mm, only observed an increase in soil organic carbon when soil depths from