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Journal of Arid Environments 67 (2006) 641–660

Journal of Arid Environments

www.elsevier.com/locate/jnlabr/yjare

Seasonal changes in pasture biomass, production and offtake under the transhumance system in northern Pakistan

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Received 6 October 2005; received in revised form 7 February 2006; accepted 9 March 2006
Available online 15 May 2006

Abstract

An understanding of seasonal changes in pasture biomass, production and offtake of different range types is fundamentally important for the efficient management of livestock grazing. However, few studies have quantified these changes for transhumance systems, despite the fact that transhumance is still the main form of livestock management in several regions of the world and is often critical for the livelihoods of the people. One such area is the Northern Areas of Pakistan, where six villages and their pastures were selected for study. Pastures were categorized within foothill, dry temperate and alpine range types, and seasonal biomass, production and offtake of the vegetation was estimated by clipping paired caged and uncaged quadrats. The alpine range type had by far the highest biomass and offtake; the foothill and dry temperate range types were much more sparsely vegetated. Although alpine pastures were heavily used, particularly in spring, there was no evidence for consistent over-utilization of pasture resources. Within the dry temperate range type, production was highest during spring but significantly under-used. This indicates a potential for increased use of dry temperate pastures during spring, an important period both for early recovery of

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0140-1963/$ - see front matter
doi:10.1016/j.jaridenv.2006.03.008

livestock body condition after winter and to reduce the heavy pressure on the alpine pastures at this time.

Keywords: Range use; *Artemisia*; Semi-arid; Hindukush; Karakoram; Himalaya

1. Introduction

Transhumance grazing is associated with cyclical, annual movement of livestock between distinctive seasonal pastures, from settlements within the same area (Tucker, 1986; Vallentine, 2001). Transhumance grazing systems still operate in many parts of the world where vegetation growth is strongly seasonal (McArthur et al., 1979; Tucker, 1986; Gutiérrez et al., 1998; Tulachan et al., 2000; Vallentine, 2001). Movement of livestock between pastures through the year aims to follow the seasonal growth of forage (often at different altitudes) and maximize efficiency of their grazing use, without the need for additional inputs of fertilizers to produce additional vegetation growth, as is often required in sedentary grazing systems (Tucker, 1986; Rao and Casimir, 1990; Gutiérrez et al., 1998; Vallentine, 2001). In many areas practicing transhumance there is a strong dependence on these natural grazing systems (AKRSP, 2000; Tulachan et al., 2000). An understanding of the dynamics of the grazing system (in relation to both vegetation growth and livestock management) is thus of paramount importance to ensure best use of the resources available. However, few studies have quantified the seasonal dynamics of these systems and none have been carried out in northern Pakistan, where transhumance is the main form of livestock management and is critical for the livelihoods of the people (AKRSP, 1997, 2000; Parvez, 2000; Ehlers and Kreutzmann, 2000). Results from other parts of the world have shown that vegetation quantity and quality can change significantly between different seasons and play a key role in determining herbivore performance (Albon and Langvatn, 1992; Willms et al., 1996; Kanneganti et al., 1998; Shinde et al., 1998). In the Northern Areas of Pakistan, livestock experience on average 40% feed deficiency during the 7–8 months of winter (Khan, 1991; Rahman, 2002; Rahman et al., 2005). Winter forage limitation greatly reduces the potential livestock productivity in the area and results from the difficulty of producing sufficient winter fodder from cropping areas in the short growing season (Khan, 1991; Rahman, 2002). As a consequence of the critical condition of feed deficiency during winter, the role of the natural pastures to enable recovery of body condition of livestock during the spring and summer growing season is crucial (Rahman, 2002). In particular, the timing of plant growth and turn-out of livestock to pasture in spring are very important. In a study of seasonal changes in feed resources and livestock productivity in northern Pakistan, Rahman (2002) found that the livestock attained maximum live weight by the end of the summer grazing season on pastures, and they fell to their lowest weight by the end of the winter period when reliant upon stored feed resources (often scarce; Rahman, 2002).

The aim of the work presented here was to examine the seasonal cycle of biomass production and offtake of the different range types found within the transhumance system of this area and to consider the potential for more efficient patterns of seasonal grazing use, for example by identifying hot-spots of over- or under-utilization at key times of year and proposing modifications to the timing of movements to and from different areas, or