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Rating the Degradation of Natural Hay Pastures in Northern China

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Abstract: Natural hay pastures in semi-arid pastoral areas produce the highest yields of hay in northern China. However, long-term continuous hay harvesting with no rest interval has resulted in severe degradation across widespread areas of these natural hay pastures. In addition, no clear data exist on the spatial distribution or degree of degradation occurring in natural hay pastures primarily because a nationally unified and normative evaluation standard is lacking. In view of the above problems, we employed an analytic hierarchy process to carry out screening and accuracy validation of evaluation indicators for natural hay pastures in north China grasslands (temperate meadow steppes, temperate steppes, mountain meadows, and lowland meadows). Our study identified seven easily measured indicators that reflect the state of natural hay pastures (average height, aboveground biomass, coverage, proportion of medium grasses, litter biomass, proportion of degradation-indicative plants, and proportion of bare spots and saline-alkali spots). A five-level scoring method was employed to delineate the threshold range for these indicators, The results of this study show that this method effectively solved the technical bottleneck for graded evaluation of degradation in natural hay pastures. This provides a theoretical basis for the scientific assessment of natural hay pasture degradation as well as important technical support for sustainable use of natural hay pastures and livestock production.

Key words: natural hay pastures; degradation; grading; grassland classification

1 Introduction

Pastoral natural grasslands cover 236 million ha in China, of which 50.8% are located in semi-arid regions. Based on incomplete statistics, natural hay pastures in semi-arid pastoral areas cover approximately 13.33–20 million ha. These pastures are mainly distributed in eastern Inner Mongolia, the ago-pastoral ecotone of northern China, the Songnen Plain, northern Xinjiang, and other areas with appropriate humidity and temperature conditions (Fig. 1). These represent pastures with the highest yield in these areas of China (Tang et al., 2015). Natural pastures in semi-arid pastoral areas are traditionally cut and mown to complement grazing. Cutting and mowing ensures that an adequate supply of winter supplemental feed is available for livestock and hay serves as a basic feed supply in feedlots. Therefore, protecting natural hay pastures from urbanization and ensuring these areas are used rationally are important to the overall management of grasslands. Scientists have conducted a great amount of research that grades or classifies grassland degradation in China and other countries. Studies from the United States and Austria have proposed using grassland health as a scale to evaluate grassland conditions and

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