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Non-destructive assessment of cattle forage selection: A test of skim grazing in fescue grassland

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Abstract

This study evaluated a non-destructive scientific method that is non-invasive to the animal, for quantifying foraging selectivity by cattle within heterogeneous pasture swards in order to test the utility of a new grazing system designed to aid conservation of native rough fescue (*Festuca campestris* Rydb.) rangeland in western Canada. Skim grazing is a recently developed strategy that involves a light, once-over-spring defoliation, followed by a late to dormant season grazing period. This practice is thought to conserve rough fescue as cattle are assumed to prefer invasive grass species during spring when fescue is sensitive to defoliation. We examined the preferences of cattle for each of four major grass species, two native and two introduced, within rough fescue rangeland, grazing during spring, fall, or spring and fall of 2000 and 2001. We developed height–biomass models for each grass species in each grazing period, determined biomass removal by species, and despite underestimating actual herbage removal, successfully evaluated cattle preferences. Though the interpretation of established preferences are limited to the conditions of this study, rough fescue together with the introduced species, Kentucky bluegrass (*Poa pratensis* L.), were preferred during spring, contrary to our hypothesis. Kentucky bluegrass was also preferred within both fall and fall regrowth pastures. Smooth brome (*Bromus inermis* Leyss.) and Parry oat grass (*Danthonia parryii* Scribn.) were generally avoided. The failure of cattle to avoid rough fescue during spring indicates skim grazing

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may negatively impact the conservation of rough fescue grassland. In contrast, fall grazing appears conducive to sustaining fescue grasslands while capitalizing on forage production from invasive species like Kentucky bluegrass.

Keywords: Biomass modelling; Cattle preference; Kentucky bluegrass; Rough fescue

1. Introduction

Previous studies indicate heavily grazed rough fescue is replaced in fescue grasslands of western Canada by invasive species, particularly Kentucky bluegrass (McLean and Tisdale, 1972; Willms et al., 1985, 1990, 1996). Compared to fescue, bluegrass is shallower rooted (Walton, 1983) and less productive, but more resistant to grazing (Willms et al., 1988, 1996; Dormaar et al., 1989; Dormaar and Willms, 1990, 1998). Rough fescue is considered important to maintain as it provides a low-cost source of fall and winter grazing in the region (Willms et al., 1993). Consequently, rangeland managers are continually seeking practical grazing methods to reduce the competitiveness of invasive, grazing tolerant plants, while maintaining native vegetation such as rough fescue.

Under the recently developed skim cattle grazing system used in southwestern Alberta, Canada, managers apply spring grazing at low stocking rates in an attempt to utilize rapidly growing invasive grasses, and return later in the season to graze remaining forage (Thomas, 2001). Successful use of skim grazing for fescue grassland conservation depends on the assumption that cattle prefer invasive grass species during spring green-up. This preference is assumed to change in favour of native species during the fall dormant season when introduced species have senesced and forage quality is more similar among species (Bezeau and Johnston, 1962; Johnston and Bezeau, 1962; Bailey et al., 1996). However, the critical assumption upon which skim grazing is based, that cattle preference varies seasonally to the advantage of rough fescue, remains untested. Unexpected cattle preference for native species like rough fescue during spring could threaten the conservation of this species and reduce forage production as well as the long-term sustainability of fescue grasslands, as this species is known to be particularly sensitive to spring defoliation (Willms, 1991). To date, no research has examined whether skim grazing systems influence plant selection by cattle. The seasonal dynamics of cattle preference for different forage plants within heterogeneous plant communities of the Fescue Prairie is also unknown.

Previous studies on plant selection by livestock have utilized several approaches, including controlled dry-lot feeding trials (e.g. Bisson et al., 2001) that do not approximate practical field conditions. Many field studies qualitatively compare livestock use of vegetation types in the landscape (Willms, 1988; Fehmi et al., 2002; Asamoah et al., 2003), with observational studies on animal location and associated evidence of foraging used to assess livestock affinity for habitats (Rutley and Hudson, 2001; Asamoah et al., 2003). Unfortunately, this approach provides no estimate of actual biomass removed among individual plant species. Other investigators have assumed livestock selection can be artificially mimiced through emulated ‘bite’ or grab samples to assess the quantity and quality of forage removed during grazing (e.g. Jiang and Hudson, 1994; Gedir and Hudson, 2000; Orr