



Impact of grazing intensity on performance of sheep in the Inner Mongolian steppe, China



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Introduction

In the Inner Mongolian steppe, China, the grassland steppe was traditionally used for nomadic sheep grazing. However, recent sedentarization of pastoralists has profoundly altered grassland use, which led to a severe degradation of the natural steppe vegetation. The objective of this study was therefore to evaluate the effect of different grazing intensities (GI) on the nutritional quality of ingested herbage, the organic matter intake (OMI), and the live weight gain (LWG) of grazing sheep.

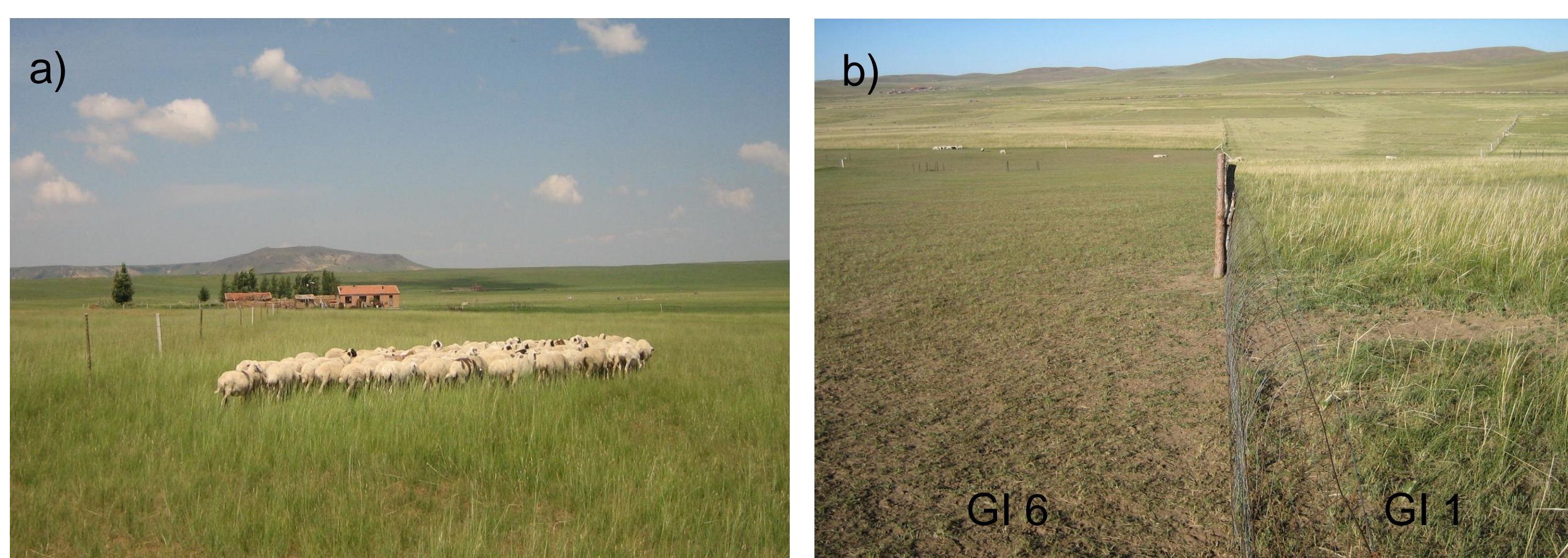


Fig. 1. Sheep grazing the natural steppe vegetation (a) and herbage on experimental plots grazed at very high (6) and very low (1) grazing intensity (GI) in the Inner Mongolian steppe, China.

Material and methods

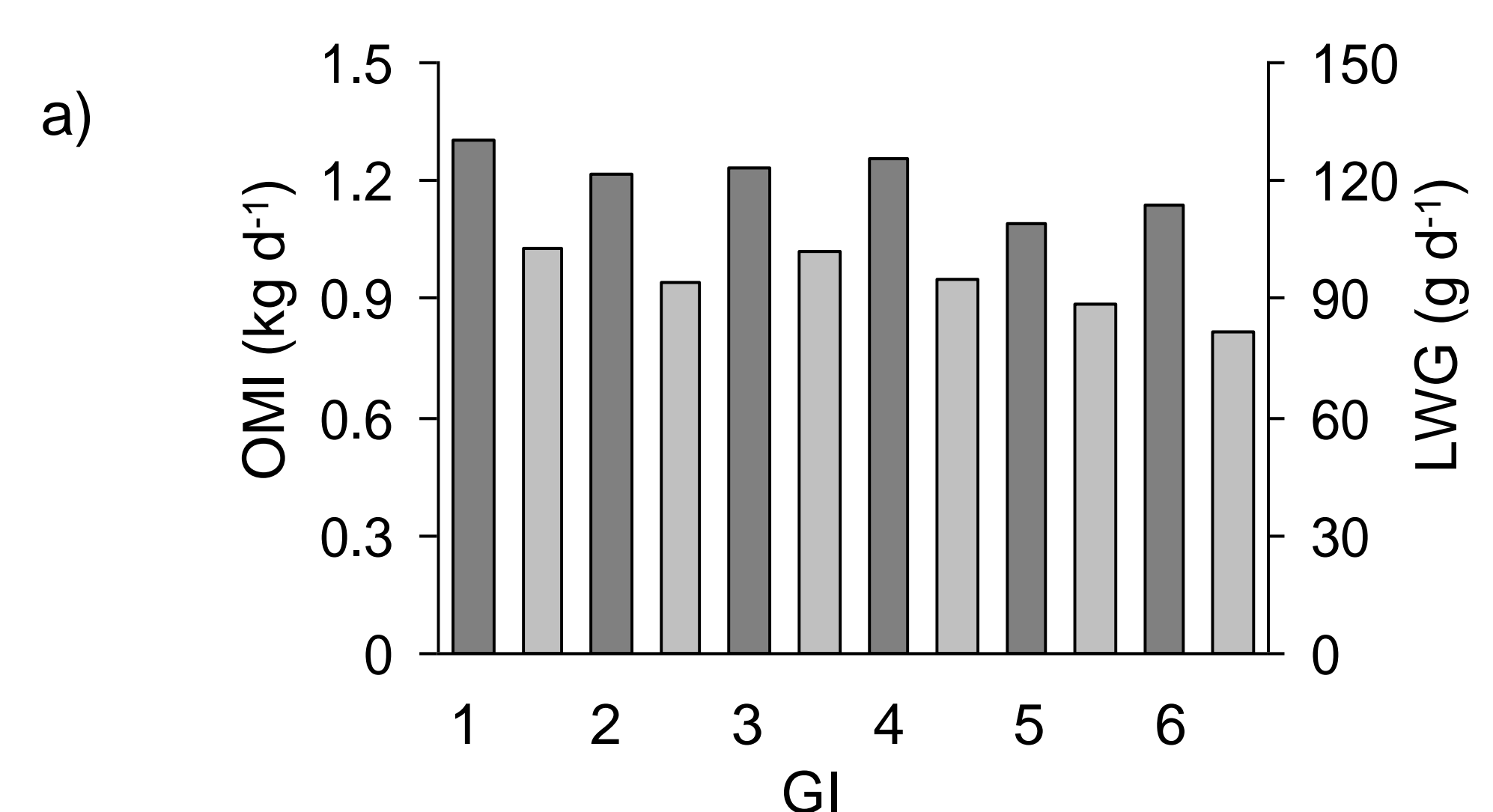
A grazing experiment was conducted in the Xilin River Basin (116°42'E, 43°38'N; 1200 m a.s.l.) in July - September in 2005, 2006, and 2007. Six different GIs were tested: >12 (GI1), 6-12 (GI2), 4.5-6 (GI3), 3-4.5 (GI4), 1.5-3 (GI5), and <1.5 kg (GI 6) herbage dry matter per kg live weight. On five consecutive days each month, faecal output of six sheep per plot was estimated using titanium dioxide. Digestibility of ingested organic matter (dOM) was derived from faecal crude protein content and sheep's daily OMI was calculated. All sheep per plot were weighed on two consecutive days per month to determine daily LWG. Measurements were repeated in two plots per GI treatment.

Conclusions

Intensive grazing does not reduce feed intake and performance of individual animals but increases output per area and therefore income for farmers. In dry years, the lack of herbage on heavily grazed pastures requires the purchase of additional forage or the untimely sale of animals. Recent changes in the steppe use towards intensive sheep grazing may limit future grassland productivity and animal performance.

Results and discussion

dOM ranged between 0.565 - 0.580 and was similar at all GIs ($P>0.05$). Daily OMI and LWG per sheep also did not differ between GIs, suggesting that sheep were able to compensate for a decreasing herbage allowance. Moreover, total LWG of all sheep per ha and hence, income for farmers increased with increasing GI. Nevertheless, studies in the same area have shown a reduction of vegetation cover and herbage mass with increasing GI, indicating that negative long-term effects are likely. Correspondingly, animals at the two highest GIs had to be removed before the end of the grazing season in 2007 due to a lack of herbage mass on offer.



OMI: SEM 0.06, $P>0.05$; LWG: SEM 7.3, $P>0.05$

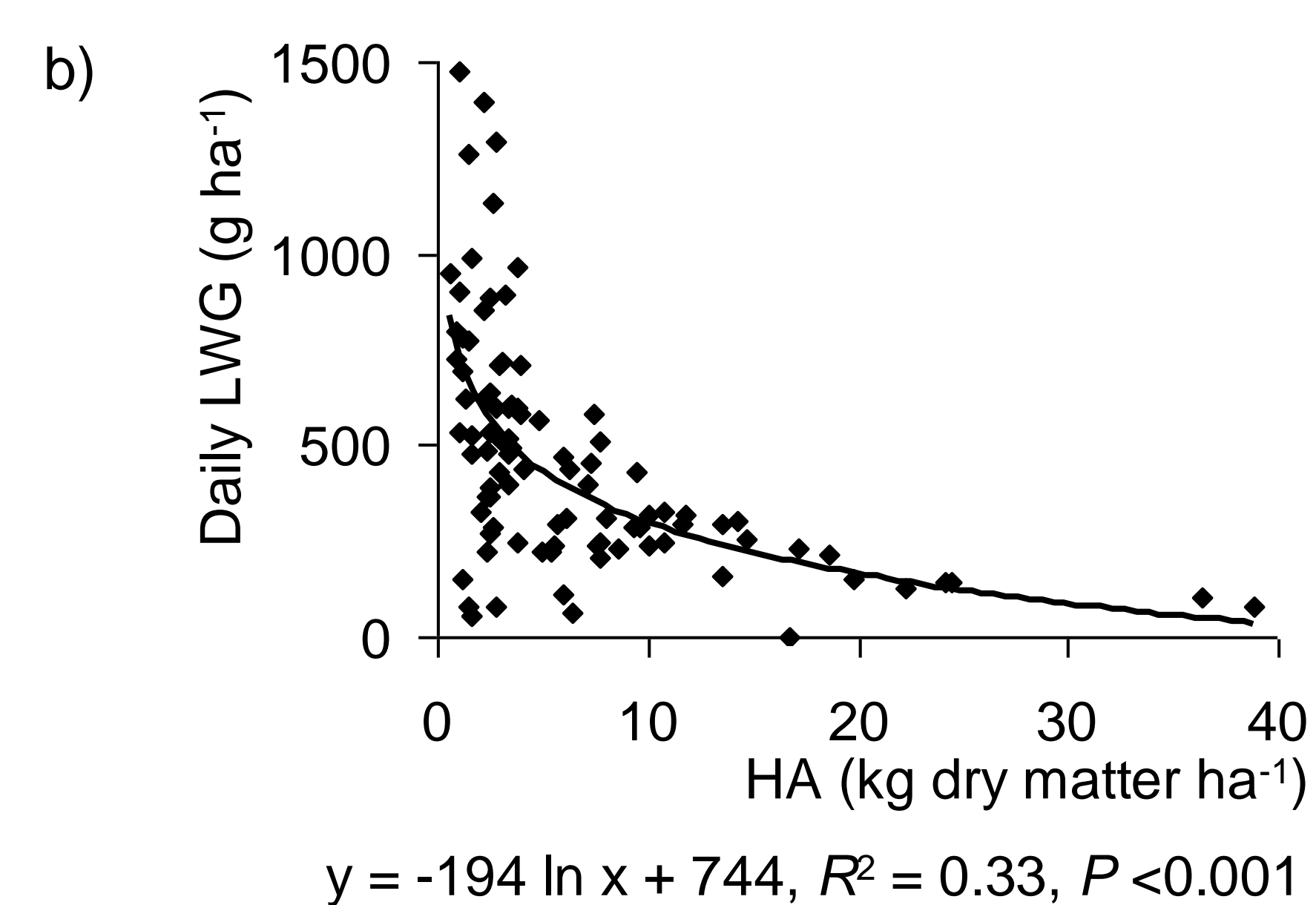


Fig. 2. Daily organic matter intake (OMI, dark grey, primary axis) and live weight gain (LWG, light grey, secondary axis) of sheep grazing at different grazing intensities (GI; a); and regressions between the herbage dry mass allowed (HA) and the total LWG of all sheep per hectare (b).

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