

Impact of grazing intensity and grazing system on herbage quality and performance of sheep in the Inner Mongolian steppe, China

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In Inner Mongolia, China, grassland degradation due to overgrazing reduces grassland and animal productivity as well as biodiversity, leads to desertification, and thereby accelerates the occurrence of dust storms with ecological and economical consequences to the whole country. The present dissertation was carried out within the framework of the Sino-German research group MAGIM (**M**atter fluxes of **G**rasslands in **I**nners **M**ongolia as influenced by **S**tocking **R**ate), supported by the German Research Foundation (DFG). The objectives of this dissertation were to evaluate the effect of different grazing intensities and different grazing management regimes on grassland and animal performance.

A grazing experiment with six different grazing intensities was conducted in the vegetation periods of 2005, 2006, and 2007 to analyse herbage mass and quality as well as quality of ingested herbage, feed intake and animal performance influenced by different grazing intensities. Sheep were transferred to the grazing plots in the middle of June each year and were continuously kept on the plots throughout the grazing season until the middle of September.

Grazing intensity strongly influences herbage mass and quality. Diet digestibility of organic matter, feed intake, metabolizable energy intake, and live weight gain were not different between grazing intensities. However, feed intake per ha as well as live weight gain per ha increased with increasing grazing intensity.

The results show that intensive grazing does not reduce performance of individual animals but increases productivity per area and therefore, income for farmers. However, in dry years a lack of herbage mass on offer on heavy grazed pastures requires the purchase of additional forage for animals at the end of the vegetation period or the untimely sale of animals. Long-term negative effects of high grazing intensities on grassland productivity are likely and therefore, this study is continued to obtain further information on long-term effects of intensive livestock grazing.

To determine the impact of a continuously 24h grazing system compared to the common daytime grazing system an experiment with these two systems were carried in 2005, 2006, and 2007 at a moderate grazing intensity. For the continuously grazed system sheep were kept on the plots all day and all night throughout the whole grazing season, whereas sheep of the daytime treatment were removed from the pasture in the evening and kept in pens over night according to the common practice of local sheep farmers in Inner Mongolia. The research question were (i) if sheep that have the possibility to graze at day and at night increase their daily feed intake due to longer available grazing time and thus, show a higher live weight gain than sheep that graze during the daytime only, and (ii) if closing the nutrient cycling on continuously grazed treatments where sheep faeces remained on the pasture has a remarkable influence on grassland productivity.

Grazing treatment of continuous and daytime grazing did not influence herbage mass and herbage quality parameters. Similarly, digestibility of organic matter, feed intake and animal performance did not differ between treatments.

The results show that additional grazing time offered to sheep during night does not lead to an increase in feed intake or animal productivity. Furthermore, no beneficial effects for continuous grazing of closing the nutrient cycling on pasture production could be determined in this study. Hence, considering the importance of sheep manure as fuel, our observations confirm the common practice of penning sheep over night to be an adequate management practice for the pastoralists and their families in the Inner Mongolian steppe.