

Effect of grazing intensity on photosynthesis and soil respiration of alpine grassland in Tibet

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Introduction Naqu locates at the northern Tibet , and also the higher part of Tibet . Alpine grassland is one of the dominant grassland systems at Tibet Plateau . But how the effect of grazing on its photosynthesis and soil respiration is still not very clear . To understand the relationship between them will help to evaluate the sustainable development of grazing capacity and CO₂ emission from this system .

Materials and methods The site was on a typical Alpine grassland . The experimental plots were separated by net wall . There are four grazing intensity treatments that is no sheep as check (T₀) , 2 sheep (T₂) , 3 sheep (T₃) and 5sheep (T₅) , which represented no grazing , less grazing , current grazing and over grazing level , respectively . The plots were divided into 3 parts inside for shifting grazing every 10 days . There are 3 replications in this grazing intensity experiment . The canopy photosynthesis rate was measured by Li-6400 portable photosynthesis system by using transparent chamber . And the soil respiration rate also measured by Li-6400 portable photosynthesis system by using soil respiration chamber . The measurement was taken at sunny day of middle August , which is the most dominate weather type and the most thriving season of the year . The measurement was taken every 2 hours from 10am to 5pm in a continuous 3 days period and the average results were given .

Results The photosynthesis rate under difference grazing intensity has obvious difference as shown in Fig1 . The descend order is T₂ , T₃ , T₅ and T₀ . It seems that less grazing will stimulate the photosynthesis rate and overgrazing will slow down this trend . As to the diurnal photosynthesis rate , T₂ and T₃ has almost have same tendency , that is , from morning to noon it ascend quickly , then it keeps almost stable , until 4pm , after that it drops quickly . As to T₀ and T₅ , the tendency is similar and about 2 hours delay . Fig2 showed that the soil respiration also different from each other . The soil respiration rate of all treatments dropped rapidly from morning to noon , and then keep flat . T₀ and T₂ were much higher than T₃ and T₅ . It may result from the balance of sheep trample and the respiration of grass root . More sheep , and lower soil respiration .

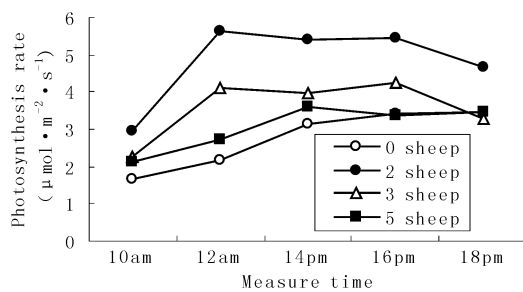


Figure 1 Photosynthesis rate of different grazing intensity .

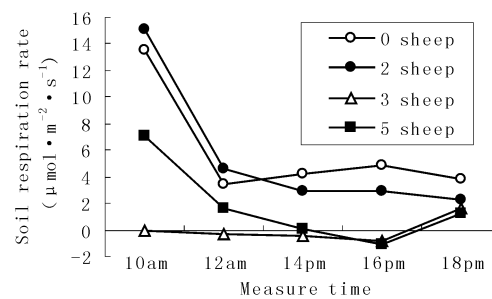


Figure 2 Soil respiration rate of different grazing intensity .

Conclusions Based on different grazing intensity experiments , the results showed that proper grazing intensity can stimulate the photosynthesis rate , overgrazing will slow down this trend ; Soil respiration rate will decrease with higher grazing intensity .