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Bodyweight gain of grazing sheep responses to stocking rate in *Stipa breviflora* steppe

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Key words: desert steppe, optimum stocking rate, daily bodyweight gain, ANPP, sheep production

Introduction The desert steppe is one of the important parts of Eurasian steppe, playing an important role in the terrestrial ecosystem. Grazing is the major way to use desert steppe in North China. The objectives were: a) to study the effect of stocking rate on animal performance; b) to determine the best indicator that affects the bodyweight gain. Currently, no optimum stocking rate has been recommended in desert steppe.

Materials and methods There were four treatments: control (CK), lightly grazed (LG), moderately grazed (MG) and heavily grazed (HG). Each treatment has three replicates. The stocking rates of LG, MG and HG were 1.10, 0.55 and 0.37 ha/sheep, respectively. All sheep were grazed from June 1st to November 30th from 2004 to 2006. All sheep were weighted at the beginning and end of the grazing period. Above-ground net primary production (ANPP) was also measured during the study period.

Results Figure 1 shows the mean weight gain against the stocking rate. Heavy stocking rate reduced daily gain by 42% and 39% compared to light and moderate stocking rate, respectively. The sheep production (gain/ha/day) however increased first, then decreased as stocking rate increased. Comparing bodyweight gain and sheep production, it was concluded that the optimum current stocking rate was 1.1 ha/sheep in desert steppe. ANPP was one of the best indicators for bodyweight gain and stocking rate in desert steppe. The Pearson correlation coefficients are -0.57 and 0.50 between bodyweight gain with ANPP and stocking rate. The bodyweight gain can be predicted by ANPP and stocking rate as follows: $Y = 0.074 - 0.001X_1 + 0.065X_2$ ($R^2 = 0.73$, $P < 0.05$). Y-bodyweight gain; X_1 -ANPP; X_2 -stocking rate.

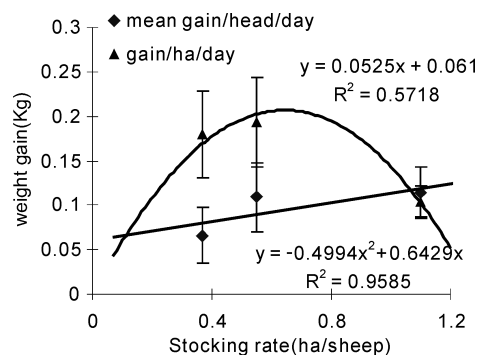


Figure 1 The bodyweight gain change in different stocking rate.

Conclusions Stocking rate plays a critical role in the rangeland management. Stocking rate had direct effects on bodyweight gain and sheep production. The bodyweight gain was closely related to ANPP and stocking rate in *Stipa breviflora* steppe. The current optimum stocking rate (1.1 ha/sheep) was much lower than that ten years ago (0.45 ha/sheep), indicating that the desert steppe of north of China is undergoing a great degradation due to overgrazing.

Reference

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