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Introduction Grasslands in western China are highly degraded in terms of the herbage mass available and species composition . Grassland degradation is largely due to excessive grazing pressure from high animal stocking rates . Many farmers believe that increasing flock or herd size results in higher income ,despite reductions in per unit animal productivity at high stocking rates . To achieve the goals of grassland rehabilitation ,improved animal productivity and increased farmer income will require a change in current management methods . This paper reports some results from a joint Australian and Chinese project which developed a farming systems model to evaluate alternative management strategies and policies for a typical Inner Mongolian grazing farm . The focus of this work was to identify strategies that are both more profitable and lead to a more sustainable use of the grassland resource in the long-term .

Materials and methods The case-study region for the analysis is Taipusi Banner (county) of Inner Mongolia (EL $114°51'$ ∼ $115°49'$; NL $41°35'$ ∼ $42°10'$) ,which is classified as a "typical steppe" grassland . 30 farms were surveyed within one village to identify a range of biophysical and financial factors based on data from 2005 to 2007 . This information was used to parameterise a "typical" farm for this region of Taipusi Banner ,for a farming systems model developed as part of the joint Australian/Chinese collaboration (ACIAR project : LPS/2001/094) . The model used a linear programming framework to identify optimal solutions for at least maintaining the current farm income for the grasslands management problem . Three individual stocking rates were tested : 0 .2 ,0 .9 and 1 .6 breeding ewes/ha . The model was solved to provide information on farm revenue ,feeding costs and net income as well as grassland condition factors .

Results With increases in stocking rate there is a corresponding increase in livestock revenue due to the greater livestock numbers carried on the typical farm (Table 1) . However ,due to limitations in the grassland resource and other sources of available fodder ,there is also a substantial increase in supplementary feeding costs to maintain livestock energy needs . This results in the highest net farm return from livestock production occurring at a stocking rate of 0 .9 breeding ewes/ha . At high stocking rates ,significant supplementary feeding costs occur which results in negative net farm income from livestock .

Table 1 *The effect on farmer income under different stocking rates .*

Stocking rate (breeding ewes/ha)	0 .2	0 .9	1 .6
Total farm net return from livestock (¥)	4560	15339	-4389
Total revenue from livestock production (¥)	4560	16327	22499
Cost of supplementary feeding (¥)	0	703	25378

Conclusions This preliminary analysis indicates that the income of the typical farm can be increased by improving livestock management ,in particular reducing stocking rates to around 1 breeding ewe/ha . This leads to an improvement in animal productivity and lower feed costs than often currently occurs in this region . Adoption of such a strategy will significantly reduce grazing pressure ,and over the longer term would allow for a recovery in the condition of the grassland .

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