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Yanting Yin

Chinese Academy of Agricultural Sciences, China

Ping Li

Chinese Academy of Agricultural Sciences, China

David R. Kemp

Charles Sturt University, Australia

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Implications of herder attitudes for stocking rates in China and Mongolia

Yin Yanting¹, Li Ping¹, David Kemp²

¹ Institute for Grassland Research, Chinese Academy of Agricultural Science, Hohhot, Inner Mongolia Autonomous Region, China; ² Graham Centre for Agricultural Innovation, Charles Sturt University, Orange NSW Australia

Key words: herder attitudes; herder styles; desired stocking rates; policy

Abstract

Over-grazing of the grasslands in China and Mongolia is a common problem. Herders typically aim to increase their animal numbers to then hopefully, improve their status and incomes. Various studies have shown that stocking rates often need to be halved to restore grasslands to a sustainable state. Governments have been enacting policies to achieve a reduction in stocking rates, especially in China. However, in both countries, herders have freedom to set their own stocking rates. A survey was done of ~900 herders in Inner Mongolia, on the five main grassland types, to define their styles, attitudes and intentions for stocking rates, their desired stocking rates and how that related to actual and recommended stocking rates and the implications for policies designed to rehabilitate degraded grasslands. Most herders only provide minimal inputs to livestock relying primarily on grasslands for fodder. Herders were grouped into four main types, those who intended to increase or decrease stocking rates *Vs* their actual stocking rates as a function of their desired stocking rates (+/-). They varied from those who had less than their desired stocking rates yet intended to reduce them further, to those who had more than their desired stocking rates and were intending to increase them. There was a general relationship within villages between the ratio of desired to actual stocking rates and actual number of animals held by the household. This general relationship indicated that within a village the herder's actual 'desire' was for a specified number of animals, rather than a specified stocking rate. Similar attitudes prevail in Mongolia where herders do not think about animals per hectare. The policy implications are discussed.

Introduction

China has approximately 400m ha of grasslands and Mongolia 128m ha. In China 90% of these lands are considered degraded to varying degrees (Kemp & Michalk 2011) while in Mongolia degraded grasslands are mainly in central regions around the capital and large towns (Densambuu *et al.* 2018). Historically, common grazing has been practised for millennia. Since 1949, China has implemented major changes in grassland management practices. In the 1980's there has been a progressive implementation of policies that allocate land to individual households where herders chose the stock numbers they consider the land will sustain within a limit set by local officials. In Mongolia, individual herders still graze lands in common and decide how many animals they wish to have. The problem now is that the number of animals grazing the grasslands has been shown to often be twice or more, that which would sustain the grasslands (Kemp 2020). Over-grazing has been a major problem since the 1980's in China and since 1990 in Mongolia.

The Governments of China and Mongolia have a priority to improve the grasslands as a prime national resource, while alleviating poverty among herder households. Various policies in both countries have been designed to achieve sustainable grazing practices. However, compliance with these policies has been variable. Herders can have different attitudes about how many animals the grassland could sustain, compared to the views of researchers and officials. This paper reports on a survey of herders in Inner Mongolia to evaluate their styles (Kemp & Michalk 2011) attitudes and intentions for stocking rates and the implications for policies designed to rehabilitate grasslands (see Hou *et al.* 2020 for more details). Many of the herders in Inner Mongolia are Mongolian with a similar background to those in Mongolia. The work done in Inner Mongolia provides some insight into the possible attitudes of Mongolian herders. Future work will resolve the similarities and differences.

Methods

The survey of herder attitudes was done in Inner Mongolia, across the five main grassland types, all of which also occur in Mongolia. Annual precipitation varies from 200-500mm, mostly falling during the growing season from May to September. The average annual temperature is close to 0°C, with minimums in winter well below -20°C. An initial survey was done in 2010 (180 households), followed by a large sample in 2012 (combined total of 909 households). The two surveys included structured questions in five topic areas: (1) the socioeconomic characteristics of the herders and their households; (2) opinions about overstocking, carrying

capacity, and the degradation of their rangelands; (3) information about the herders' present management practices (including their actual stocking rates and their desired stocking rate); (4) attitudes towards new agriculture practices; and (5) attitudes towards the "balancing animals and grass" policy. Most questions were semi-structured, rather than open-ended.

Results

Across the five grassland types in Inner Mongolia, the average family size (4) and household labour (2) were similar, but the number of animals managed varied considerably, as did the area of grassland per household. The households from the meadow steppe region had the largest number of livestock (661 sheep equivalents, SE) highest stocking rates (3.2 SE/ha) but lowest net livestock income/SE (118 yuan/SE). In contrast, the households in the desert steppe region had the largest areas of grasslands (963 ha) the lowest stocking rates (0.6 SE/ha) and a higher net income/SE (198 yuan/SE). The total livestock income was greatest (126,796 yuan) for households from the typical steppe region and they also had a high net livestock income/SE (245 yuan/SE). Households in the sandy steppe region had the least animals, the lowest total livestock income (57,745 yuan) but the lowest livestock cost/SE (33 yuan/SE), which resulted in a similar high net livestock income/SE (246 yuan/SE) as in the typical steppe. In the sandy steppe, herders had some irrigation to grow forage, more so than in other regions, which resulted in a higher stocking rate than in the desert steppe where precipitation is similar. The considerable variation in total livestock income/SE reflects the current state of markets across grassland areas and the variability in amount of animal product per SE.

A conceptual framework was used to help understand herder styles and from that their attitudes. Their styles can in part be characterised by how the animals are managed and fed through the year. The transitional framework for herders in East Africa, developed by Neidhardt *et al.* (1996) of *user / keeper / producer / breeder* is similar to what has been evident among herders in China. To test this framework the total income across farms was related to the total expenditure on fodder (Figure 1). We assumed that herders who spent little on fodder would be the more traditional *keeper*, while those who spent more money on fodder were behaving more as *producers*. It is evident that most herders were spending much less on fodder than their livestock income. The main exception was one group on the sandy steppe who had the highest income and about the same costs per SE. In Mongolia, most herders would be *keepers*.

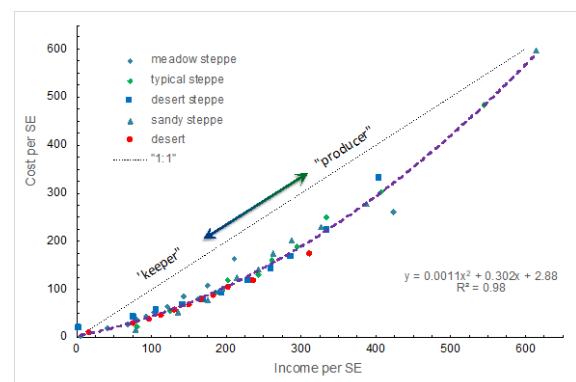


Figure 1. Relationship between income and costs per sheep equivalent, for five grassland regions, surveyed in 2010. Data are the limits for probability classes (Hou *et al.* 2020).

The actual stocking rate (ASR) used by herders would be influenced by several factors, such as seasons, markets, state of the grassland, finances, social factors and Government policies. All these components would feed into the herders desired stocking rate (DSR) (Hou *et al.* 2013). We then examined the relationship between a herders stocking rate intentions (to increase or decrease stocking rates) *Vs* the difference between the desired and actual stocking rates (Figure 2). This classified households into five groups from those who had more animals than desired yet were still going to increase them (18%), to those that had less than desired, but intended to decrease their stocking rates (26%). These apparent contradictions were evident in the survey results. It was not clear what factors were then driving these decisions.

The mean responses for the four main groups identified in Figure 2 within each County, where then examined in relation to total household animal number and the difference between desired and actual stocking rates ((DSR-ASR)/ASR (%), Figure 3). There was a consistent negative relationship between the difference in stocking rates and the total animal number per household across three groups in all counties. Group 2 herders (red symbols) wanted to increase animals, while group 3 herders (blue symbols) wanted to decrease them – it suggests that would align along a common relationship as the group 2 herders had less animals than group 3. These groups for Sunite and Xilinhote were not significantly different and the fitted regression was not significantly different for the group 1 herders who said their intent was to decrease animals, even though their DSR was greater than their ASR – the hypothesis presented here suggests they may in effect chose the county trend and increase their animal number. The fitted regression for Sunite and Xilinhote suggests that herders aim for a flock size of about 450 SE, at which their DSR and ASR would be the same. Similarly, for the

Xinbaerhu herder groups 1, 2 & 3, they aligned on a common relationship suggesting that they would settle on 600 SE where their DSR and ASR would align.

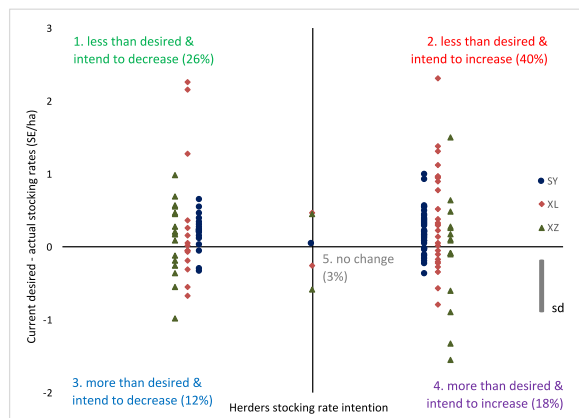


Figure 2. Classification of herders into five groups based on the relationship between the herder intention to increase or decrease stocking rates and the difference between their desired stocking rate and actual stocking rate – 2012 survey for Sunite (SY, circles), Xilinhot (XL, diamonds) and Xinbaerhu (XZ, triangles) Counties

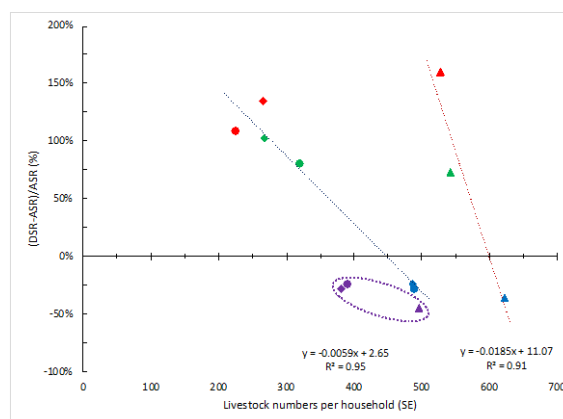


Figure 3. Herder desired stocking rate, as % of actual SR, in relation to number of livestock per farm in 2012.

Data are means for the four main groups in each county identified as in Figure 2. Data points in ellipse (group 4) excluded from fitted regressions – details in text.

The group 4 herders did not conform to the same pattern as other groups. In general, this group intended to increase their animal number, but were maybe constrained, because that would mean stocking rates more than what is considered desirable in those counties. Their actual animal numbers were only 14-17% less than the estimated ideal village animal number, which may mean a less-strong desire to increase them.

In Mongolia similar surveys have not yet been done, but anecdotally there is the opinion that herders would like to have at least 1000 SE. This reflects the poorer market prices in Mongolia, compared to Inner Mongolia and Government policies that have encouraged herders to increase their animal number.

Discussion

The grasslands of China and Mongolia are widely acknowledged as being overgrazed and the policy goal is to reduce stocking rates to a sustainable level (Kemp 2020). In Inner Mongolia, various studies have all shown that a 50% reduction in stocking rates is the required average change. In Mongolia, a similar level of reduction is required, though in this case that varies with region. However, herders often believe that more animals mean more income for them, even if the grassland condition would suggest otherwise. Defining what is sustainable does depend upon the general attitudes of herders.

The model for East African herders (Neidhardt *et al.* 1996) of *user – keeper – producer – breeder* as the development pathway, is similar to what applies among herders in both China and Mongolia. Most herders would fit within the *keeper* stage as their inputs to livestock are minimal and their animals depend almost exclusively on seasonal conditions. Their focus is generally upon how many animals can survive through the year, rather than the *producer* model where the focus is more on the output of saleable products (meat, milk, fibre). In addition, herders do consider they need a certain number of animals to be regarded as a genuine herder (Figure 3). The dilemma now is that more herders wish to sell more animal products in order to improve their livelihoods and obtain services from society (education, health, phones, TV, vehicles, goods). That means they are transitioning to a *producer* model. To be producers you need to allow more forage per animal, which requires lower stocking rates. In Inner Mongolia where herders are allocated individual areas of land and now also rent land from their neighbours, it is evident that once they achieve their desired number of animals, the effective average stocking rate declines (Li *et al.* 2020, Li & Bennett, 2019) though the rented land now tends to be over-grazed relative to the herders own land. In China, policies need to allow for this mechanism to operate more effectively *i.e.* increase the available land per herder to a level that would naturally allow lower stocking rates. In Mongolia, there is a trend for herders to move into towns and cities, but they often still retain their livestock and ask other herders to manage them. Policies are being discussed that could involve a livestock tax to then discourage animal numbers above some set value.

Acknowledgements

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