

The Effects of China's Grassland Contract Policy on Pastoralists' Attitudes towards Cooperation in an Inner Mongolian Banner

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Abstract China's Inner Mongolia Autonomous Region is experiencing a marked decline in grassland quality partially as a result of government policies to sedentarize nomadic pastoralists and privatized collective grasslands. Previous research suggests that traditional forms of cooperation among Inner Mongolian pastoralists have deteriorated as a result of privatization and sedentarization. Herders in New Barag Right Banner ($n=50$) representing both sedentary and mobile livestock management strategies were asked to respond to a scaled survey regarding their attitudes towards cooperation with other pastoralists. Inter-rater reliability and Mann–Whitney U Tests were utilized to compare the attitudes towards cooperation across sedentary and mobile settlement categories and to assess whether or not sedentary and mobile herders share the same cultural model regarding cooperation. The authors show that there is both high intra- and inter-group agreement on the survey variables across settlement categories, indicating that sedentary and mobile herders share the same cultural model regardless of their settlement pattern.

Keywords Pastoralism · China · Inner Mongolia · Cooperation · Privatization · Cultural models

Introduction

China's Inner Mongolia Autonomous Region is currently experiencing unprecedented desertification and decline in grassland quality despite efforts by the regional and national governments of China to create policies aimed at improving grassland conditions (Nelson 2006). Previous studies suggest that some of the contributing factors of the decline in

grassland health include China's Household Responsibility System and Grassland Contracting Policy, which have led to the privatization of livestock production through the exposure of the Inner Mongolian pastoral economy to global markets for livestock products (Taylor 2012; Humphrey and Sneath 1996). This is due to the fact that these policies have eroded both the ecologically adaptive semi-nomadic grazing strategies and traditional Mongolian cultural norms of cooperation that allowed herders to collectively manage grassland in the past (Li and Huntsinger 2011; Williams 2002).

This study analyzes the effects of the privatization of grassland on a small population of Mongolian herders in the New Barag Right Banner (NBR) of Northeastern Inner Mongolia by comparing the attitudes towards cooperation of sedentary and mobile herders in three case-study villages.

Background: Grassland Ecology and Cooperation in Mongolian Pastoral Systems

The northern, western, and highland frontiers of China contain some of the most extensive grassland ecosystems in the world. Nearly half of Chinese territory consists of temperate, desert, and alpine grasslands which, traditionally, have been managed by pastoralists to convert grassland resources into consumables in the form of herds of sheep, goats, horses, camels, and cattle. The Inner Mongolia Autonomous Region (IMAR) accounts for nearly 20 % of China's total grasslands (Deng *et al.* 2009) and lies within the ecological and cultural transition zone between Han Chinese-dominated intensive agriculture and Mongolian-dominated pure pastoralism (Lattimore 1940).

Since the second half of the twentieth century, Inner Mongolia has experienced a marked decline of grassland productivity, decreased plant species biodiversity, and the expansion of desert into pastoral and agricultural areas (Williams 2002). It is estimated that currently over 90 % of

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Chinese grasslands are degraded and desert conditions expand over 10,000 km² annually in China (Nelson 2006). Previous research suggests that grassland deterioration is a result of both the expansion of agriculture into pastoral regions poorly suited to farming (Humphrey and Sneath 1996) and government policies that have led to the collapse of the nomadic grazing and common pool resource management strategies that were common in Inner Mongolia prior to the 1950s (Taylor 2006; Humphrey and Sneath 1999). In particular, past studies highlight the role that the Household Responsibility System and Grassland Contracting Policies initiated by the reform government of Deng Xiaoping have had in degrading both the nomadic grazing strategy of Mongolian herders and the cultural norms that supported its practice (Li and Huntsinger 2011; Ho 1996).

In a series of policy changes from the early 1980s to the mid-1990s, the Inner Mongolian government sought both to protect the fragile grassland environment and industrialize livestock production in response to growing domestic and international markets for animal products (Ma 2003). The policies privatized grassland and contracted pastures to individual herding families the same way that agricultural land was divided among farming families under the Household Responsibility System (Tilt 2008; Rozelle *et al.* 2005). Through this grassland contracting policy, and under the guidance of the World Bank and the UN Development Program, the government hoped to mitigate the tragedy of the commons that they felt could cause overgrazing on common grasslands and improve the productivity of herders by encouraging them to adopt Western models of sedentary, industrialized livestock production (Zukosky 2008; Fratkin 1997; Hardin 1968). Key to the implementation of these policies was the encouragement of pastoralists to cease seasonal migration, follow state-mandated livestock carrying capacities for grassland, and fence their family pastures to prevent other herders from misusing them (Banks and Doman 2001).

The privatization of grassland has been suggested as a key factor contributing to the continued mismanagement of Inner Mongolian grasslands because it has led to the collapse of the traditional mobile grazing practices that allowed Mongolian herders to flexibly manage the variable topographic and climatic conditions of their grasslands (Fernandez-Gimenez and Le Febre 2006). Prior to the privatization of grassland, pastoralists utilized a nomadic strategy centered on the use of seasonal pastoral migration that allowed grasslands long periods of regeneration after they had been grazed. Herders were also able to respond to seasonal variability in precipitation and plant growth as well as negative climatic events by conducting additional seasonal movements (known as *otor*) during unfavorable ecological and meteorological conditions (Humphrey and Sneath 1999). Following the division of pastures and their allocation to individual households from the 1980s to mid-1990s, herders encountered greater difficulty in conducting

seasonal movements and responding to climatic variability as the enclosure of formerly common grasslands with fencing became widespread (Li and Huntsinger 2011). Therefore, the privatization of grasslands and sedentarization of nomadic herders, although intended to mitigate grassland deterioration by preventing overexploitation, have actually been shown to contribute to the continued deterioration of Inner Mongolian grasslands for two reasons. First, by decreasing the mobility of pastoralists, the policies have contributed to overgrazing because constant grazing pressure is placed on small family pasture allocations rather than spread over multiple seasonal pastures. Second, to conduct seasonal movements or emergency movements, herders must now acquire the use of additional seasonal pastures by renting land from other families. Therefore, seasonal movements are now based on the availability of grassland for rent and monetary compensation rather than the traditional ecological knowledge that influenced movement decisions in the past. Herders not able to rent additional pastures must rely on securing external sources of supplementary livestock fodder (at their own expense) as well as depend on diminished resources on their family pastures during negative climatic events (Williams 1996). In addition, low investment in the pastoral sector of the Inner Mongolian economy renders the Western model of ranching ineffective because it is highly dependent on external sources of fodder and complex transportation infrastructure that are currently unavailable in many areas of Inner Mongolia (Sheehy 1993).

Furthermore, the privatization of grasslands has also negatively affected the socio-cultural norms that allowed herders to sustainably manage common-pool grassland resources in the past (Li and Huntsinger 2011). Traditionally, livestock and grassland were managed cooperatively by small groups of families known as *khot ail*. These groups could be composed of kin, neighbors, friends, or other members of the pastoral community, and could vary in composition each year. *Khot ail* cooperated to herd livestock, conduct seasonal migrations, and make decisions on how to manage the highly variable grassland environment. These cooperative units gave herders the ability to maximize their use of geographic features and plant species because they could divide labor and herd livestock species according to their topographic and plant species preferences (Bold 1996). Therefore, the *khot ail* system enabled pastoralists to utilize cooperation to spread grazing impacts more efficiently over available grasslands.

Williams (2002) found that the traditional socio-cultural norms of cooperation within Inner Mongolian pastoral communities have been eroded by the privatization of grassland and the decline in herder mobility to the extent that previously cooperative relationships among herding families have now become competitive. Li and Huntsinger (2011) employed the theory of community failure (McCay and Jentoft 1998) to show how the integration of the Inner Mongolian pastoral economy with domestic and international markets has

destroyed traditional social institutions by making herders dependent on government mandated regulations rather than collective action and cooperation to regulate grassland resource use. Thus, as a result of community failure among Inner Mongolian pastoralists, the community identity that previously allowed for the establishment of solidarity, trust, and norms regarding competition among community members have eroded to the extent that they no longer allow for effective grassland management. However, to date, few studies have systematically studied the relationship between settlement patterns and the attitudes towards cooperation of Inner Mongolian herders.

Based on the community failure theoretical framework and the findings of previous studies (Li and Huntsinger 2011; Williams 2002), we anticipated that there would be an observable difference in the attitudes towards cooperation between herders representing the current sedentary livestock production system and those who continue to move seasonally through renting additional pastures from other community members. This is due to the fact that mobile grazing traditionally required a high degree of cooperative labor exchange among pastoral families to effectively move livestock, household goods, and plan migrations (Cooper 1993). The New Barag Right Banner (NBR) of Northeastern Inner Mongolia provided an ideal setting to investigate pastoralists' attitudes towards cooperation because it did not adopt privatization policies until 1996, nearly two decades after most of the other regions of Inner Mongolia. Thus, many pastoralists in this area have had experience in both the traditional nomadic system of livestock production and the current sedentary system. The aim of this study was to understand the effects of changing pastoral policies on a small group of herders representing the transition from a nomadic past to a sedentary present. We addressed two main research questions. First, because they utilize different grassland management strategies in the same privatized grassland system, we assessed whether or not mobile and sedentary herders share the same cultural model (Quinn and Holland 1987) regarding cooperation. Second, we investigated whether or not NBR herders who are able to practice seasonal mobility through renting additional pastures would have a more positive attitude towards cooperation than those who are sedentary. The results can help illustrate the effects of current grassland management practices on Mongolian pastoralists' cultural attitudes and inform future grassland management policy in Inner Mongolia.

Changing Pastoral Policies and Practices in Inner Mongolia

The three case-study villages, Dashimo (pop=835), Hulun No'er (pop=255), and Ehe No'er (pop=458) lie within the New Barag Right Banner of Northeast Inner Mongolia's Hulunbuir League. The banner is approximately 23,000 km² in area and shares international borders with the Republic of

Mongolia to the west and south and the Russian Federation to the north (Fig. 1). The region lies on the eastern Mongolian Plateau and is dominated by short-grass steppe that receives 200–300 mm of precipitation annually (Daly and Hannaway 2005; Hu *et al.* 1992). NBR is a unique place to study changes in pastoral management and herder attitudes because, unlike other areas of Inner Mongolia, herders in NBR were not affected by the encroachment of agriculture into traditionally pastoral areas during the nineteenth and the twentieth century.

The main regional economic activities include livestock production as well as a burgeoning copper and coal mining industry. Service industries such as small restaurants, mechanic shops, and grocers can also be found in village centers. The average annual per capita pastoral income for the three villages in 2011 was 8,369 CNY (~\$1,300), which is roughly equivalent to the 2012 national mean rural income for the People's Republic of China (Holmes 2012). The pastoral population is dominated by ethnic Barga Mongols who have traditionally populated the area but also includes some Han Chinese pastoralists whose families migrated into the area from other regions of China during periods of political and economic turmoil in previous decades (Pasternak and Salaff 1993).

Prior to the 1990s, NBR was dominated by mobile pastoralism characterized by seasonal migration and the management of grassland through collective action. Herders typically conducted between 4 and 10 annual pastoral migrations, but could conduct as many as 30 movements and emergency *otor* during years with poor precipitation and climatic conditions.

During the Qing Dynasty (1644–1912), grasslands in NBR were administrated by local princes who represented the ruling emperor in Beijing or Buddhist monasteries that held economic authority over pastoral districts. These ruling institutions collected taxes and tribute from herders for the central dynastic government and consulted local herders to regulate the use of pastures among households and facilitate seasonal migrations and herd species compositions (Humphrey and Sneath 1999). Communities also regulated the establishment of winter grasslands and emergency pastures for times of adverse climatic conditions. Thus, overgrazing and unsystematic pasture use was prevented through collective action and community-based decision making during the pre-revolutionary period.

After the establishment of the People's Republic of China in 1949, nomadic herders in NBR were organized into collective herding units and livestock were redistributed from ruling elites to herding households. The herding collectives provided veterinary assistance to herders as well as constructing infrastructure and facilitating mechanized transportation for seasonal migrations. Collectives also continued to regulate the establishment of reserve pasture for emergency forage (Williams 2002). During the pre-revolutionary period and after collectivization, the *khot ail* system of cooperation

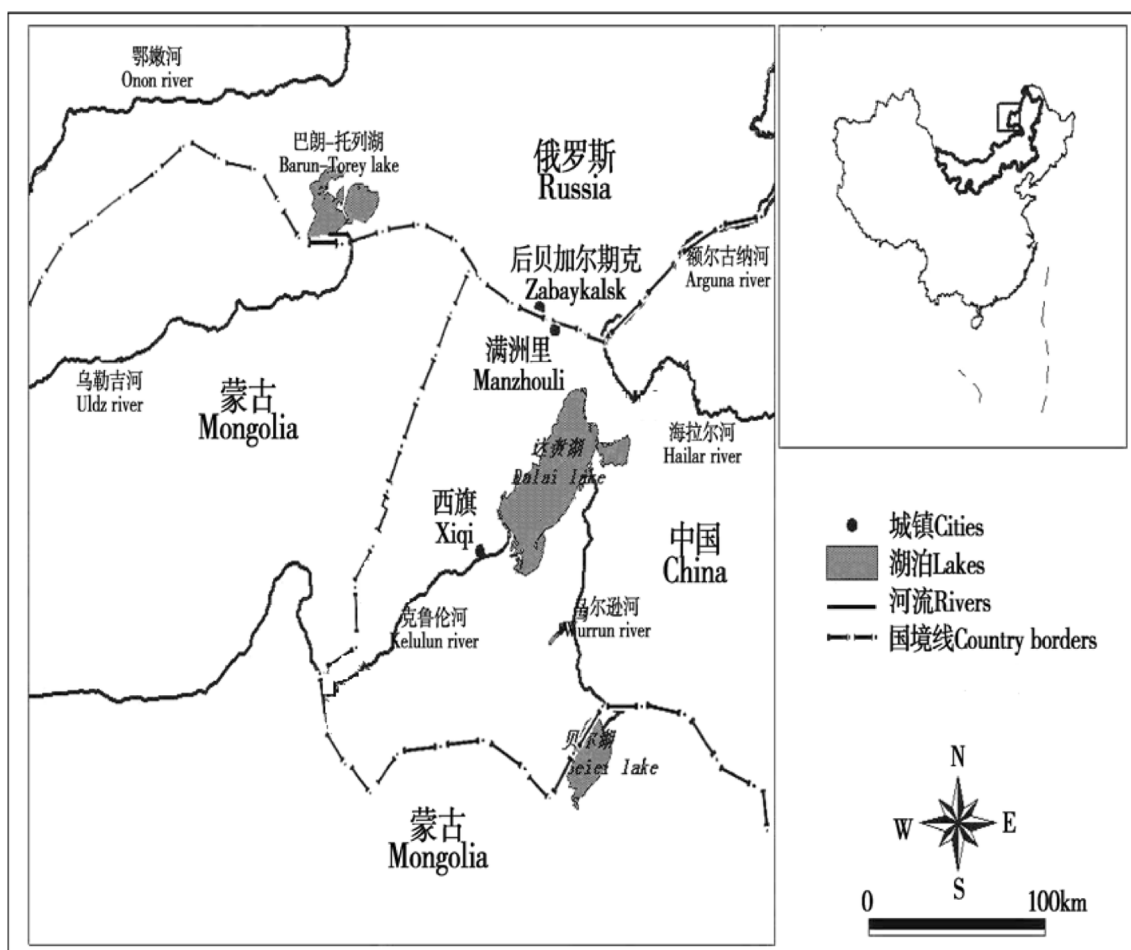


Fig. 1 Map of the study area (Liu n.d.)

between small groups of families remained largely intact through the formation of small cooperative groups of families by rural collectives (Bold 1996; Cooper 1993).

In 1996, collective management of grassland ended after the NBR government initiated the Grassland Contract Policy that had already taken effect in most of the other regions of Inner Mongolia. Government officials divided up available grassland among herding families based on their *hukou* (household registration) status and the number of livestock they had at the time of division. Families were assigned individual pastures that they could then subdivide for seasonal use and also had access to public grasslands close to the village center that were reserved for emergency use. The average land holdings in the study sample was 622.5 hectares (9,338 *mu*) (1 hectare=15 *mu*), although some study participants had access to as little as 213 hectares (3,200 *mu*) and others as much as 2,000 hectares (30,000 *mu*) through renting additional grassland. While local officials assert that the division of grassland was designed to be equitable for all resident families, some pastoralists assert that certain families were given preferential treatment and access to better quality land because of good relationships with local officials. For example, when

asked why he had been given so little land in relation to his neighbors, one 40 year-old herder commented angrily in Mandarin “They had good relationships with the officials, so of course they got the best land!”

After land privatization was initiated in 1996, the banner government then assigned local grassland monitoring stations to examine available grassland and assign a fixed livestock carrying capacity to each family pasture allocation that would be reassessed every 3 years. In 2012, the state-assigned carrying capacity for NBR grasslands was 1 sheep unit per 20 *mu* of grassland. However, because livestock products remain one of the only sources of income for NBR pastoralists, many herders far exceed their maximum allowance for livestock. At the time of this study, over 90 % of study participants reported herd sizes far in excess of the carrying capacity assigned to their land. In some cases, herders reported having more than three times the number of livestock they were legally allowed to keep.

Herders, grassland management officials, and grassland ecologists have reported the negative effects of the decline in mobility and growth in livestock numbers. For example, many NBR herders reported concern with a decline in desirable

plant species and a rise in the occurrence of unpalatable and less nutritious species over the last two decades. In particular, they mentioned an overall increase in *lang zhen* (“wolf needle”) (*Stipa baicalensis*) (Roshevitz 1929), a species of needle grass with hard, pointed seeds that can injure or kill livestock (Wang 1992). Community members agreed that *lang zhen* had always been present in local plant species associations, but has increased dramatically in proportion to other more desirable species in the last decade.

The initial distribution of land in 1996 has also contributed to social and economic inequality among NBR pastoralists. For example, some families are hampered by the size or quality of the land allocation they received in 1996. One 63 year-old herder commented that he felt economically disadvantaged by the quality of his land stating “my land is poor; it has a lot of rocks and it is only a very small plot.” Other families who received higher quality or larger grassland allocations in 1996 have benefitted economically by being able to raise more livestock and generate more income from their land.

The economic disparities spurred by the division of NBR grasslands in 1996 have led some herders to attain a large degree of success and wealth while other families have lost their ability to make a living from animal husbandry. These families have either left pastoralism entirely (often leasing their family’s grassland to other pastoralists) or have found employment as laborers managing the large herds of wealthy local families. One 58 year-old female herder commented ironically that “herding is a new ‘occupation’ around here” indicating that whereas pastoralism was a traditional livelihood for NBR herders for generations, it now also serves as a new form of wage labor.

While the traditional nomadic grazing strategies practiced by NBR herders prior to 1996 were disrupted by the institution of the Grassland Contract Policy, some herders are able to retain seasonal mobility by renting additional pastures from other families who have either left pastoralism (but still retain use rights to their pasture allocations), moved out of the region, or have lost their livestock to negative climatic events or poor management. Many herders will attempt to make at least one migration to an additional rented pasture each year, and it is not uncommon for many mobile families to move between 2 and 4 times during the year. There are several reasons why some herders choose to retain mobility in the current system while others remain completely sedentary. First, some herders choose to move seasonally so that they can legally pasture more livestock without violating carrying capacity restrictions on their family’s pasture allocation. This also enables them to mitigate the risk of raising more livestock than the forage available on their own family pastures can support. Second, some wealthy herders choose to rent enough pasture from other families to be able to conduct several annual pastoral movements. For example, one community

member was able to gain access to over 2000 hectares of land, and thus, reported being able to conduct ten short migrations each year. Third, some of the new class of hired pastoral laborers who manage the livestock of local elites are able to practice mobile grazing by moving to pastures rented by the families whose livestock they manage. Finally, some families choose to retain mobility regardless of the size of their land holdings or herds. For example, one elderly couple chooses to move their residence twice per year even though they have less than 300 hectares of pasture at their disposal. When asked why they continue to move within their land, they replied “we think it’s healthy for both our land and livestock, so even though our pastures are small, we still move.” Other families indicated that they felt mobility not only contributed to healthy grasslands but also helped identify them as ethnic Mongols. One 56 year-old female herder asserted “when you move, the land can rest and be healthy. My family moves three times a year. We are *real* Mongolian nomads” (emphasis added). Therefore, for many NBR pastoralists, mobility is not only recognized as ecologically beneficial for the grasslands and livestock, but also as part of the cultural heritage of the region.

While it may be easy to view the type of mobility currently practiced in NBR as a direct continuation of the nomadic strategy practiced prior to 1996, many herders have expressed dissatisfaction with the usefulness of renting additional pastures from other families. One 29 year-old herder asserted: “I think that we need to move to keep our animals and land healthy, but it’s useless to move now. My family has only one pasture and it has good grass for summer but not for winter. If we rent another pasture in the winter that also only has good plants for summer, the move is useless.” This comment is indicative of the fact that while previous forms of pastoral mobility took into account the plant species associations and topographic conditions ideal for different seasons and livestock species (Fernandez-Gimenez 2000), current mobility decisions depend heavily on the availability of pasture for rent rather than the pasture conditions suitable for seasonal livestock nutritional requirements.

Although the system of mobility currently practiced in NBR is far removed from the traditional form of pastoral migration practiced prior to 1996, mobility served as the unit of analysis in this study for the following reasons. First, the form of mobility practiced in NBR today represents the closest link with traditional nomadic herding that is generally observable in Inner Mongolia. Second, previous studies (Fernandez-Gimenez *et al.* 2012; Li and Hunsinger 2011; Bold 1996; Cooper 1993) have shown that seasonal mobility among Mongolian pastoralists is often accompanied by high degrees of cooperation among pastoral families to effectively carry out seasonal migrations. Therefore, we explore whether or not the

current form of mobility practiced by some NBR pastoralists leads them to differ in their attitudes towards cooperation relative to their sedentary counterparts.

Methods

The lead author conducted field research in the three case-study villages in the summer of 2012 using a mixed methods approach. A central component of this approach was semi-structured field interviews ($n=12$) with herders and key community leaders to investigate changes in cooperative structures and herders' perceptions of changes in grassland management and grassland health since privatization. We also developed a scaled survey instrument (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) that addressed attitudes towards cooperation, and the lead author administered the survey to a sample of 50 pastoral households. The survey variables addressed herders' perceptions about the willingness of their kin, friends, and neighbors to cooperate in livestock herding; herders' perceived obligation to help neighbors and kin manage their livestock; and herders' beliefs about whether the frequency of cooperation has changed in the community over the past 20 years (Table 1). Because we lacked access to local population censuses, convenience sampling was used to recruit the sample population (Bernard 2006: 191–192).

We chose a quantitative survey approach to measure pastoralists' attitudes towards cooperation because of both time constraints and difficulties in conducting ethnographic research in NBR due to the political climate of frontier regions of China. NBR's position on two of China's international borders makes many areas of the banner restricted to foreign researchers, and the movement of foreign nationals within the region is heavily regulated by both police and the People's Liberation Army. Therefore, the survey approach enabled the research team to both quickly collect data within the study population and utilize a deductive approach to determine if there is a difference in attitudes towards cooperation between herders that conduct movements to rented pastures and those that do not. In addition, the survey variables utilized in this study also allow for the possibility of future comparisons across sites.

The sample population was then divided into two categories based on pastoral mobility. Herders that reported no pastoral movements in the previous 12 months were classified as "sedentary," and those that reported at least one pastoral migration in that time were classified as "mobile." We used the cultural models approach and inter-rater reliability to test for both within and between-group agreement on the survey variables (Atran *et al.* 2005; Bang *et al.* 2007). Quinn and Holland (1987:4) describe cultural models as "presupposed, taken-for-granted models of the world that are widely shared and play an enormous role in people's understanding of the world and their behavior in it." Through the use of inter-rater reliability, we aimed to analyze whether herders with different settlement patterns share the same cultural model regarding their attitudes towards cooperation or if sedentarization and the privatization of grassland have led them to represent distinct populations within the same herding community.

To assess whether or not herders who retain mobility would have a more positive attitude toward cooperation than those that are fully sedentary, Mann–Whitney U Tests (a commonly used non-parametric procedure) were used to test whether or not there was a statistically significant difference between the responses of each settlement type to the survey variables. Mann–Whitney U Tests were used in place of Independent Samples T-Tests because survey data were not normally distributed.

Analysis

To assess whether or not the 15 survey variables pertaining to herder attitudes measure a single unidimensional construct, reliability analysis was conducted using Cronbach's Alpha (Table 2). Reliability analysis indicated that there is high inter-rater agreement on the 15 survey variables ($\alpha=0.78$). Analysis of alphas if survey items are deleted shows that the overall reliability of the survey variables would be improved if the variables "I am angry if neighbors' livestock cross into my land" and "I want to fence my family's pasture to keep other herders' livestock out" were omitted from the construct. However, they were both retained in the analysis because previous research suggests that fencing and conflict between herders over pasture boundaries have had an effect on cooperation among Inner Mongolian pastoralists (Williams 2002).

Table 1 Description of sample population¹

Ethnicity		Sex		Age			Settlement Pattern	
Han	Mongol	Male	Female	Mean	Median	Range	Sedentary	Mobile
9	41	33	17	39.46	38	18–67	25	25

¹ $n=50$

Table 2 Reliability analysis for survey items measuring attitudes towards cooperation¹

	Item Total Correlation	Alpha if Item Deleted	Cronbach's Alpha (α)
Attitudes towards cooperation			0.78
1. I often quarrel with my neighbors over pasture boundaries.	0.22	0.78	
2. I am angry if neighbors' livestock cross into my land.	-0.06	0.80	
3. My neighbors can help me herd my livestock.	0.64	0.74	
4. My kin can help me herd my livestock.	0.44	0.76	
5. My friends can help me herd my livestock.	0.51	0.76	
6. I want to fence my family's land to keep other herders' livestock out.	-0.25	0.82	
7. I can rely on my neighbors to help me in bad weather.	0.60	0.75	
8. People work together more now than 20 years ago.	0.17	0.78	
9. I have an easy time arranging seasonal movements with other herders.	0.38	0.77	
10. I feel my neighbors are interested in helping me herd my livestock.	0.51	0.75	
11. I feel my kin are interested in helping me herd my livestock.	0.61	0.74	
12. I feel an obligation to help my neighbors herd their livestock.	0.55	0.75	
13. I feel an obligation to help my kin herd their livestock.	0.50	0.76	
14. My neighbors and I help each other cut hay.	0.55	0.75	
15. I can rely on my neighbors to help me make a seasonal movement	0.54	0.75	

¹ Survey variables coded on a 5 point scale (1=strongly disagree, 5=strongly agree)

We then conducted inter-rater reliability analysis to assess whether herders representing different settlement patterns share the same cultural model regarding their attitudes towards cooperation (Table 3). Inter-rater reliability analysis for attitudes towards cooperation and settlement patterns indicate a high level of intra-group agreement for both the sedentary ($\alpha=0.79$) and mobile ($\alpha=0.90$) segments of the sample. There was also a high level of agreement on these variables between the sedentary and mobile categories of the sample population ($\alpha=0.92$).

To assess if there is a significant difference in responses to survey variables regarding cooperation, Mann–Whitney U Tests were conducted for the 15 cooperation variables to compare each of the settlement categories (Table 4). The results of the Mann–Whitney U Tests indicate that there are few statistically significant differences at the 95 % confidence level between the sedentary and mobile segments of the sample population regarding the survey variables pertaining to attitudes towards cooperation. Notable exceptions are the

variables “I feel an obligation to help my neighbors herd their livestock” ($z=2.48, p=0.01$) and “I feel an obligation to help my kin manage their livestock” ($z=2.41, p=0.02$). For both of these variables, the mobile segment of the study population had a significantly more positive attitude towards a perceived obligation to help kin and neighbors manage their livestock than the sedentary herders.

Discussion

Overall mean responses for survey variables pertaining to cooperation with neighbors, kin, and friends indicate that herders of both settlement categories place a high value on cooperation regardless of changes in the NBR pastoral system, but also believe that cooperation has declined since the end of collective herding in 1996 (Table 5). These survey responses are also emphasized in study participants' responses to interview questions regarding cooperation and how it has changed since privatization. One 56 year-old mobile herder asserted that although she feels strongly that she should work together with her kin, friends, and neighbors to manage livestock:

“We do our own work now and people cooperate and work together less than in the past. I want to work with my relatives, but they don't live in this area, so it's hard for them to help me and for me to help them. We typically help each other only during specific times of

Table 3 Intra/Inter-group agreement for cooperation variables

Settlement Type	Sample Size	Cronbach's Alpha (α)
Sedentary ¹	25	0.79
Mobile ²	25	0.90
Between Groups	50	0.92

¹ Herders who reported 0 pastoral movements during the previous 12 months

² Herders who reported at least 1 pastoral movement during the previous 12 months

Table 4 Comparison of attitudes towards cooperation among sedentary and mobile pastoralists

Variable	<i>z</i> – value	<i>p</i> – value	Sedentary Mean Rank	Mobile Mean Rank
1. I often quarrel with my neighbors over pasture boundaries.	–0.79	0.43	26.8	24.2
2. I am angry if neighbors' livestock cross into my land.	–1.03	0.30	27.3	23.7
3. My neighbors can help me herd my livestock.	1.10	0.27	23.3	27.7
4. My kin can help me herd my livestock.	0.65	0.52	24.3	26.7
5. My friends can help me herd my livestock.	0.42	0.67	24.7	26.3
6. I want to fence my family's land to keep other herders' livestock out.	–0.30	0.77	26	25
7. I can rely on my neighbors to help me in bad weather.	1.50	0.13	22.6	28.4
8. People work together more now than 20 years ago.	–0.56	0.58	26.6	24.4
9. I have an easy time arranging movements with other herders.	1.74	0.08	22.3	28.7
10. I feel my neighbors are interested in helping me herd my livestock.	1.05	0.30	23.6	27.4
11. I feel my kin are interested in helping me herd my livestock.	1.17	0.24	23.2	27.8
12. I feel an obligation to help my neighbors herd their livestock.	2.48	0.01*	20.7	30.3
13. I feel an obligation to help my kin herd their livestock.	2.41	0.02*	20.9	30.1
14. My neighbors and I help each other cut hay.	1.76	0.08	22.1	28.9
15. I can rely on my neighbors to help me make a movement to new pastures	0.67	0.50	24.3	26.7

* Statistically significant comparison

the year: when we shear our sheep and in the winter when the weather is bad.”

When asked if cooperation among herding families had changed since privatization, the same study participant indicated that “in the past, families would form a team: friends and relatives would help each other herd animals and sometimes even share income. Now income is separate: you work on your land, and I work on mine.” Therefore, sedentarization and privatization policies may have destroyed both the flexibility to conduct seasonal migrations to ideal pastures and the ability of herding families to form flexible cooperative units in close proximity to friends and kin.

Another 26 year-old sedentary female herder stated that in the past “there was small-group cooperation when people were nomadic. It was a flexible system during the year and the group you cooperated with 1 year might be different during the next.” Furthermore, a 42 year-old sedentary male herder asserted that “cooperation with family and neighbors now is more about specific tasks rather than herding and

moving animals together throughout the year. Even though I think people work together less now than in the past, we do help each other shear sheep and give animals vaccinations.” Therefore, although the traditional nomadic system that was dependent on cooperation among families to move and manage livestock has ended, many NBR pastoralists of both the sedentary and mobile categories still value cooperation for its essential role in labor intensive tasks such as shearing, administering vaccinations, and cutting hay. These results are consistent with the findings of Elickson (1994), who suggests that sedentary pastoralists in the American West are able to resolve land disputes and cooperative livestock management tasks without governmental intervention.

In regard to the statistically significant comparisons observed for the survey variables pertaining to herders' perceived obligation to help neighbors and kin manage their livestock, mobile herders may have significantly more positive attitudes because they have greater need for cooperation with neighbors and kin during seasonal transfers of livestock to rented pastures (one of the most labor intensive pastoral

Table 5 Mean responses to cooperation variables¹

Variable	Sedentary (<i>M</i> , <i>SD</i>)	Mobile (<i>M</i> , <i>SD</i>)
1. My neighbors can help me herd my livestock.	3.08 (1.71)	3.56 (1.69)
2. My kin can help me herd my livestock.	3.80 (1.58)	3.92 (1.55)
3. My friends can help me herd my livestock.	3.64 (1.60)	3.84 (1.46)
4. I want to fence my family's land to keep other herders' livestock out.	3.72 (1.84)	3.64 (1.75)
5. People work together more now than 20 years ago.	2.68 (1.62)	2.40 (1.47)

¹ Variables coded on a 1 to 5 scale (1=strongly disagree, 5=strongly agree)

activities), and they may perceive a greater sense of obligation to help others manage their livestock. On the other hand, sedentary herders may only rely on kin, neighbors, and friends during the annual shearing, vaccination, and hay cutting activities rather than assisting other families with daily livestock management and seasonal movement.

We interpret the high degree of agreement yielded by the inter-rater reliability analysis as an indication that NBR herders of both the mobile and sedentary categories share the same cultural model regarding their attitudes towards cooperation. Nevertheless, they also agree that overall cooperation among herding families has declined in the two decades since privatization and sedentarization were initiated. Mean responses to the survey variable “People work together more today than 20 years ago” by both sedentary and mobile herders (2.68, 2.40, respectively) indicate that herders of both settlement categories generally disagree that cooperation among herders is greater today than during the previous herding strategy. “We do everything by ourselves now” was a common theme stated during interviews.

Furthermore, mean responses to the survey variables pertaining to cooperation with kin, friends, and neighbors indicate that herders of both settlement categories share in overall agreement that neighbors, kin, and friends can help them manage their livestock. However, when participants were asked to estimate how many times in the last 12 months they actually helped other herders manage their livestock and how many times others herders helped them in return, responses were less optimistic. Of the 39 valid responses (responses other than “I don’t know” or “It is difficult to say”), 25 herders stated that they had not cooperated with other herders at all or only infrequently during the previous year. Therefore, although there seems to be a high cultural value attached to cooperation with other herders, given the current state of grassland and livestock management in NBR, actual cooperation between herders is minimal compared to the levels of cooperation reported by informants to have occurred prior to 1996.

Mean responses to the survey variable “I want to fence my family’s pasture to keep other herders’ livestock out” indicate that herders of each settlement category value the use of fencing in the current herding strategy regardless of their utilization of the mobile grazing strategy. Mean responses of both sedentary and mobile herders (3.72, 3.64, respectively) indicate that there is general agreement with the use of fences in the current privatized grazing system for both categories of the study sample. Therefore, the privatization of pastoral production in NBR could be leading to changes in herders’ land management values as they adapt to new non-indigenous models of pastoral production. For instance, herders may conclude that if they no longer have the ability to make decisions on where to migrate within NBR grasslands, then fencing could offer them an alternative method for preventing

overgrazing by restricting other herders’ access to their pastures.

Conclusions

The results of this study suggest two possible conclusions regarding the effects of resource privatization on the economies and land management strategies of small-scale societies. First, it is possible that privatization is having an equally negative effect on the attitudes towards cooperation of NBR herders regardless of their settlement patterns and Mongolian cultural values attached to cooperation. This could be a result of the privatized herding system’s emphasis on individual family livestock production and sale rather than the collective production that was common in the past. However, it could be possible that there is an as yet unknown cultural buffering effect that is leading NBR herders to retain a similar cultural model regarding cooperation even as the commercialization of pastoral production has dramatically altered the indigenous herding system and has led them to adopt different herding and settlement strategies. For example, Quinlan and Quinlan (2007) suggest that modernization and globalization may have complex effects on indigenous knowledge and production systems that may lead to the deterioration of certain features of indigenous systems and the reinforcement of others. Therefore, the NBR community may retain the traditional Mongolian values of hospitality and cooperation even as the new system of livestock management has made them impractical except for certain infrequent and labor-intensive tasks such as shearing or hay cutting.

To investigate these issues further, we recommend additional studies to compare the attitudes towards cooperation of herders who are utilizing a truly mobile system of livestock production based on common-pool resource management and sedentary herders who manage their livestock on private grassland. This can be achieved by comparing the attitudes of sedentary Barga Mongols in NBR with nomadic Barga living in the Republic of Mongolia’s Dornod Aimag, which shares a common border with the study area. In this way, mobile pastoralism, rather than mobile grazing in a sedentary system can serve as a unit of analysis for comparing the attitudes of herders representing conflicting grassland management strategies.

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