WHY DO HERDERS INSIST ON *OTOR*? MAINTAINING MOBILITY IN INNER MONGOLIA

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Abstract

Otor is a traditional mobility strategy developed by Mongolian herders to cope with their highly variable and uncertain environment. The Livestock and Rangeland Double-Contract Responsibility System (LRDCRS) implemented in pastoral Inner Mongolia (People's Republic of China during the mid-1980s) has encouraged a settled mode of livestock husbandry within a delimited household rangeland area, depending primarily on fenced pastures. Practical results from the past 20 years indicate that this settled pattern can not completely replace the traditional herd mobility strategy that was anticipated by LRDCRS. A case study from a village in Xilingol Prefecture in Inner Mongolia explores the reasons why herders insist on *otor.* The paper evaluates the impact of changes in rangeland tenure and social relationships brought by LRDCRS on the herders' ability to access key resources in adverse weather. It is found that *otor* movement provides herders with the means to maintain livestock husbandry in highly variable and uncertain arid and semi-arid environments. Rangeland semi-privatization results in a loss of de facto guarantee of access to key resources. Faced with barriers to accessing resources, reciprocal bonds are weakened for conducting *otor*. As a result both sustainable pastoral livelihoods and sustainable use of rangelands are doomed to suffer.
Keywords: Pastoralism, livestock, rangeland, policy, mobility, Inner Mongolia

Introduction

The Livestock and Rangeland Double-Contract Responsibility System (LRDCRS) was implemented in pastoral Inner Mongolia in the early 1980s, and accordingly all collective rangelands and livestock were distributed to individual herder households. This privatization policy was initiated to create the so-called 'clear rangeland tenure' such that individual herder households would have exclusive rights to a certain rangeland area for their livestock production. The LRDCRS was expected to increase livestock productivity as well as to control rangeland degradation by establishing fixed and exclusive resource boundaries (Li 2007). However, recent research in the Mongolian steppe (Banks 2001, Ho 2001, Williams 2001, Li 2007) shows that the delimitation of small rangeland areas does not match the requirements of animal husbandry in a highly variable

doi:10.3167/np.2008.120203 ISSN 0822-7942 (Print), ISSN 1752-2366 (Online)

and uncertain arid and semi-arid rangeland environment. It is apparent that less herd mobility results from rangeland fragmentation and fencing, which are key factors in both rangeland degradation and herders' poverty (Humphrey and Sneath 1996). In reality, as adverse conditions have an impact on contracted rangeland herder households, they need temporarily to move their livestock out of the assigned boundaries so as to access better rangeland elsewhere. This is a traditional herding strategy called *otor* in Mongolian (Sneath 2000, Ge and Wu 2004) that represents herders' need for flexible physical and social boundaries. The need for *otor* is inconsistent with the requirement of LRDCRS, but a necessity in many rangeland environments.

The logic for the LRDCRS policy is mainly twofold. First, the policy implies that having exclusive use rights of an area of rangeland will encourage herders to use it sustainably, because rights-holders are provided with an expectation of security. In order to achieve this exclusive use right, a fixed and physically clear boundary of the contracted rangeland is needed to ensure both benefits and costs associated with the rights of rangeland are attached to the particular herding unit. The assumption is that the resources a herder conserves today will be available for him/her in the future.

The second implication of the LRDCRS policy is that, under the urge to modernize from the late 1970s, Chinese policy-makers (Liu 2004, Ni 2005) and experts (Wang and Chen 2003, Li 2005) considered traditionally mobile pastoral systems to be backward. In their opinion, nomadic pastoral economies depend wholly on nature, and these economies are not only prone to collapse by being limited to the patchy environment, but are also harmful to rangeland conservation by using resources in a simplistic way, without technological inputs.

So the LRDCRS policy was put forth to force herders to give up their traditional production practices and to adopt the so-called scientific and modern intensive system. The pastoral livestock production pattern was required to shift from seasonal grazing on extensive pastures to continuous exploitation of a delimited small area of contracted rangeland (Haisan 2000, Ao 2004). New technologies accordingly have been introduced to strengthen the intensive livestock husbandry, so as to consolidate the established household rangeland tenure system. Pen-raising is the primary technique that herders are required to adopt, which is expected to free livestock production from the natural rangeland and allow reliable and stable production output and herders' income by integrating controllable artificial energy (harvested forages and by-products) to even out the natural fluctuation of forage.

In these rangeland environments, however, pastoral reality does not completely conform to policy design, especially under the adverse climate conditions such as droughts and snow storms. Herders could not follow the policy requirements and many continue their traditional mobility strategy in order to cope with the climatic disturbances. According to statistical data (Bao 2001, Wang and Guo 2002, Li 2006), herders in western Xilingol Prefecture of Inner Mongolia

continued *otor* between 2001 to 2006 when adverse weather, primarily drought, occurred. For example, in 2006, in Sunite Left Banner 23 per cent of households with 47 per cent of livestock used *otor* to avoid drought disasters and maintain their livestock.[1]

Herder households tend to use rangelands in spatially and socially flexible ways so as to deal with climatic variability. This is similar to what is referred to as ill-defined or fuzzy property rights by scholars (Scoones 1994; Verdery 1999; Fernandez-Gimenez 1999, 2002; Mwangi 2008,). By maintaining flexibility, herders can move their livestock and access alternative resources, also called key resources, at times when their rangelands have little forage. It is argued that the term 'fuzzy' is used not to represent ambiguity, but instead, herders are able to identify who has rights to what, when and on what terms, based on how mobility is regulated (Mwangi 2008). Rights to any given unit of rangeland may be multiple and overlapping and the composition of rights-holders may vary over time. As a result, rights to a certain rangeland unit do not necessarily belong to an individual person or household but to a group of herders or herder households (Verdery 1999).

Many studies have revealed the importance of herd mobility strategies to risk aversion and rangeland conservation. In the context of pastoral Inner Mongolia, the way that *otor* is practiced gives us an opportunity to explore the reasons why herders insist on moving their herds over extensive pasture areas, rather than staying within the delimited household pastures and raising their livestock with artificial forage in the pens. Furthermore, we explore what has happened to herders' livelihoods when they need to be mobile in the new tenure context. Finally, we analyse the impacts of LRDCRS policy on *otor* from the aspects of access rights and social relationships.

Study Area

The study area is the grazing lands of Bayantala *Gacha* (Mongolian: village) located in the northeast part of Sunite Left Banner (SLB), Xilingol Prefecture (Figure 1). The total village area is 700 km^2, of which 670 km^2 is natural grassland. Approximately 90 per cent of the grassland is desert steppe while the remainder is meadow steppe (Inner Mongolian Grassland Survey Institute 1986). In 2006, there were 105 households registered with a total population of 372 persons. Approximately 75 households were staying in the village and their livelihoods were based on livestock husbandry. The remainder of the households, although registered in the village, have moved into urban areas since they have lost animals after continuous years of drought and the implementation of the policy 'Fencing Grassland and Forbidden Grazing', which is a newer policy to combat the degradation after LRDCRS (Bijoor et al. 2006).

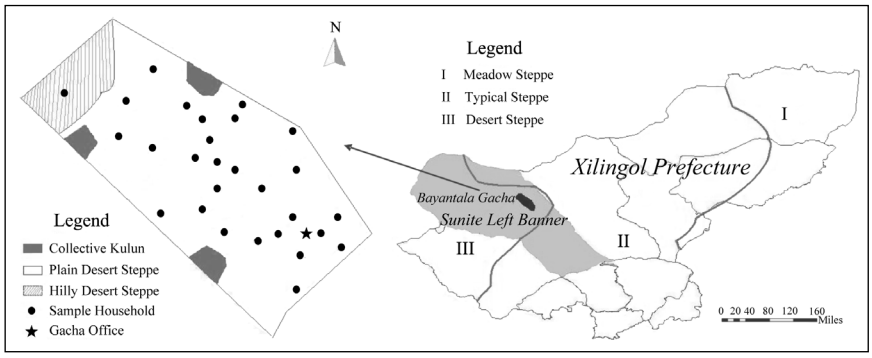

Figure 1: *Location of Bayantala Gacha in Sunite Left Banner of Xilingol Prefecture*

Source: Environmental and Ecological Science Data Center for West China, supported by National Natural Science Foundation of China (http://westdc.westgis.ac.cn).

By the end of the livestock husbandry census year in June 2006, there were a total of 26,951 livestock in Bayantala Gacha. They included 444 horses, 1,208 cattle, 99 camels, 17,423 sheep and 7,777 goats. In this village of Bayantala Gacha the policy of LRDCRS was initiated in 1983 when livestock were distributed to individual households according to the number of household members. Rangelands started to be contracted out to households after this livestock privatization, in two phases: in 1984 to *hot* groups (Mongolian: several households related by kinship) and ultimately to single households in 1996. The distribution of rangeland parcels was according to the size of herds that every household owned at that time.

Sunite Left Banner (SLB) is a place where bad weather such as droughts and blizzards happens frequently. Over fifty years from 1957 and 2006 the northern part of this region had 10 serious droughts and 12 snow disasters, with a frequency of once per four to five years. These unpredictable adverse climatic events cause shortages of natural forage, lower the rate of livestock growth and potentially cause livestock starvation if events are quite severe or last for any length of time (Qi 2002).

Methods

We conducted field surveys in Bayantala Gacha in April 2006 and July and August 2007. We used structured and open-ended interviews and participative observation at the local community level to collect data on livestock production and household income, as well as the benefit and cost associated with *otor*

compared to pen-raising. We interviewed 28 of the 75 herders' households whose livelihoods were based on livestock production. Of the sample of 28, there were two households which had lost all their livestock due to continuous bad weather, and were living on either rangeland rented to others or renting livestock from others to herd.

We sampled households at random locations, to exclude the impacts of natural diversity on livestock production (see Figure 1). In arid areas like Bayantala, there is significant resource spatial heterogeneity (both primary production and water sources) even on a small spatial scale, which significantly influences secondary (livestock) production.

The sample included herder households in different wealth categories. The Standard Sheep Unit (SSU) per capita among the 28 samples varied from zero to 533. Since the number of persons varies in each household, we divided the total livestock owned by a household by the number of people in each household, to use livestock per capita as an indicator for household wealth.

Thus, 18 per cent of the sample households own less than 50 SSU per capita, 25 per cent own 50–100, 36 per cent own 100–200 and the rest, 21 per cent, own more than 200 SSU. The average stocking rate among the 26 households who owned livestock is 2.1 ha/SSU in the wet season and 2.6 ha/SSU in the dry season.

We also interviewed local government officials in Sunite Left Banner in order to collect historical data on precipitation, climate and livestock production. Sources included individuals in the Bureau of Statistics, the Bureau of Livestock Husbandry, the Station for Grassland Management and Herders' Livelihood, and the Station for Grassland Survey.

Based on these data, we present information about *otor* movements recalled by herders, and then examine the economic and technical reasons for herders maintaining *otor* movements, although LRDCRS policy requires them and their livestock to settle down. Qualitative description is used, to discuss the impacts of LRDCRS on herders' ability to do *otor*, and the consequences.

Findings

Otor Movements in Bayantala Gacha

Herders in Bayantala Gacha have a long history of using herd mobility to cope with natural hazards. Basically there are two kinds of *otor* according to the distance of movements: a short-distance *otor* is moving within the village rangeland boundaries and a long-distance *otor* is when herders move livestock out of the village boundaries. Which kind of *otor* is practiced depends on the scale of adverse weather conditions. Before LRDCRS was implemented, for example, during the period of People's Commune (mid-1950s to 1982), the *otor* movement in Bayantala Gacha was organized by the village leaders. Herders moved

communal livestock to an area with better forage that had been previously selected by leaders as potential reserve or *otor* pasture areas prior to the inclement conditions. These pasture areas might be located both inside and outside the village rangeland boundaries. When rangeland was distributed to *hot*s in 1984, the village leaders continued to organize long-distance *otor*, but short-distance *otor* was initiated by individual *hot*s. When rangeland was eventually contracted out to individual households in 1996, the village leaders no longer took responsibility of organizing *otor* and households had to initiate *otor* individually.

An examination of the *otor* movements in Bayantala Gacha in Figure 2 shows the frequency and distance of these movements. Seven long-distance *otor*s occurred between 1964 and 2007, including moving livestock to neighbouring Abaga Banner during the autumn of 1964 and 1965, and to the most eastern part of Xilingol Prefecture during the summer of 1967 and 1968. From winter 1977 to spring 1978 movement was to the northern part of Sunite Left Banner. *Otor* initiated during the autumn of 1980 and 1981 had the same destination as the 1964–1965 movement. After rangelands were distributed to individual *hot*s, some of these groups voluntarily participated in *otor* movements initiated by the village leaders during autumn 1984 and 1985 and the summer of 1990 and 1991. Twenty per cent of *hot*s joined the *otor* to eastern Abaga Banner and 60 per cent joined the *otor* to the middle part of Xilingol Prefecture. In the summer of 2006, an *otor*

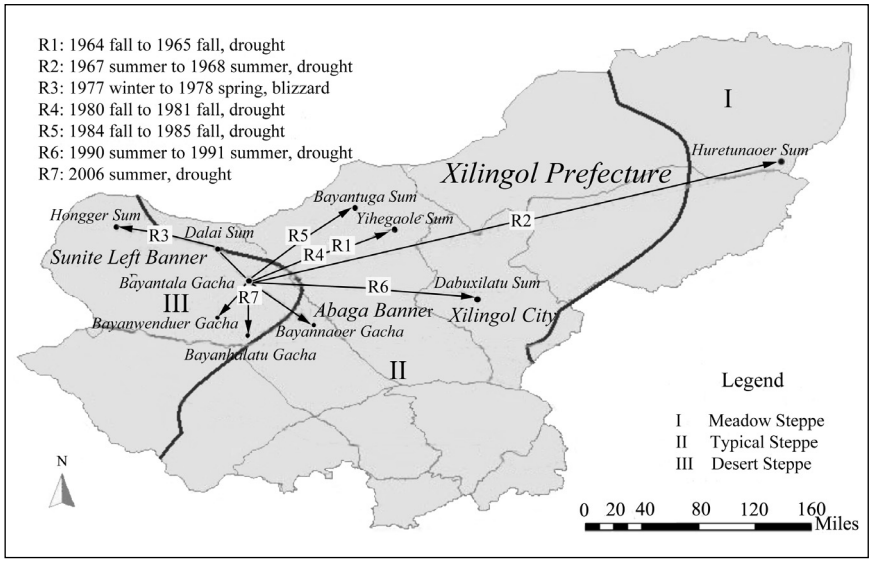

Figure 2: *The Routes of Otor from Bayantala Gacha, 1964-2006*
The map is drawn according to interviews and references from Station for Grassland Management and Herders' Livelihood and Station for Grassland Survey.

Table 1: *Information on Otor Movement of 28 Herder Households in Bayantala Gacha from 2001 to 2007*

Time (M/Y)	Home pasture	Destination	Households	Distance(km)
May 01–Jul. 01	Bayantala G.	Dalai Sum	1	>29
Jul. 04–Sep. 04	Aershanbaolage G.	Bayantala G.	4	>16
	Bayanhalatu G.	Bayantala G.	6	>38
	Sarulatuya G.	Bayantala G.	1	>13
Jul. 05–Oct. 05	Bayanhalatu G.	Bayantala G.	2	>38
	Aershanbaolage G.	Bayantala G.	1	>16
	Bayantala G.	Sarulatuya G.	1	>13
Jul. 06–Sep. 06	Bayantala G.	Bayanhalatu G.	11	>38
	Bayantala G.	Bayannaoer G.	7	>35
Oct. 06–Dec. 06	Aershanbaolage G.	Bayannaoer G.	1	>16
Jul. 07	Abaga Banner	Bayantala G.	1	>210

was the only long-distance movement initiated after rangelands were ultimately contracted to individual households. Approximately 80 per cent of households in Bayantala Gacha moved to the middle part of Sunite Left Banner. Besides these, a number of short-distance *otor*s have been initiated by individual households since 2001 when adverse climatic events reoccurred after nearly ten years of good weather conditions (Table 1).

Why a 'Settled' Livestock Production System is Not Suitable

After herders were 'settled' in specific pasture areas with the adoption of the LRDCRS policy, they had only two choices to deal with adverse climatic events. The first option is to reduce their livestock numbers and the second option is to supplement their livestock with feed obtained off-site; these options can also be combined. If herders choose the first option they are often confronted with high opportunity costs resulting from a loss of breeding animals, and also may have to sell their animals at a time when many others are selling livestock so the market price is depressed. For example, if a flock of 100 ewes was reduced to 50 due to adverse climate, it will generally take four years under normal climatic conditions to build the herd size back to 100 ewes (Zhang 2007). Of course, the situation will become worse if adverse climatic conditions occur over a series of years. This is not an unusual occurrence, and has led to many bankrupt operations in this area.

However, if herders can maintain a 'full' breeding flock even under adverse climatic conditions, they can seize the opportunity to take advantage of improved

rangeland conditions once the inclement climatic conditions are over. This explains why herders do not like to reduce their herd size even in a disaster year; a practice often criticized by government personnel and experts as short-sighted. If herders chose to reduce their livestock holdings by selling them ahead of schedule, for example in the spring or summer when livestock are immature instead of the more usual sale time in autumn, both the unit price and weight per head are less, because livestock are in poor nutrient condition. For example, prices for sheep, cattle and horses in the summer of 2006 were 125, 775 and 1000 RMB/capita, respectively, while they were 191, 1698 and 1989 in autumn – on average 50 per cent more than in summer.

As for the second option, there are several disadvantages of purchasing feed for livestock raised in enclosed pastures and winter sheds. First, there is an increase in production costs due to purchase of feeds, costs of buildings and related facilities, additional labour inputs and more veterinary costs associated with greater animal concentration. In order to minimize the costs, herders normally choose to raise livestock at the minimum feed level. In this case, the daily cost of cultivated feed associated with pen-raising, including expenditures of silage, hay and fodder, is at least 1.2–1.3 RMB/SSU. The revenue from a unit of livestock could only cover four months of feed cost, based on the livestock sales prices in 2006. In our cost comparison with *otor*, the costs are incomplete since costs of labour and infrastructure depreciation have not been considered. Further, pen-raising constricts livestock into a enclosed setting and all herders interviewed stated that livestock are not as prone to breed successfully under these situations as compared to natural breeding systems. Also, constricting livestock within the pen will result in weaker livestock due to lack of exercise. The process of conserving feed, after transportation and storage, results in a nearly 50 per cent loss of nutritional value (Li 2005) and thus at this time does not consistently provide for the livestock feed needs in Bayantala Gacha.

Why *Otor* is Suitable

In contrast to the settled pattern of dealing with adverse climates, Mongolian herders have a tradition of moving livestock to rangelands that can supply adequate or superior nutrition for their animals. As stated previously, the LRDCRS policy has a negative impact on this ability to move animals. 0f 26 households depending on livestock for their livelihoods, 25 households chose to do *otor*. The only household that did not was due to the individual owner failing to find available rangeland as he was late in seeking an area in which to move his livestock. Cost-benefit analysis was used to determine if there were economic reasons why herders chose *otor* rather than raising animals within pens. To compare the cost-benefits of the two strategies, the data of the household that

used pen raising (Household B) is compared with the average level of the 25 households that chose *otor*. Also, in case the averaged data might lose sight of the detailed information, we have selected one sample (Household A) from the *otor* group, which has a similar herd size and pasture area to manage, comparable social status (ordinary herders) and deals with drought over the same period of time, to compare with Household B, which chose not to move.

As shown in Table 2, the costs associated with the *otor* strategy include rangeland rent charged at the grazing destination, livestock transportation fees (includes renting vehicles, hiring drivers and purchasing gasoline), animal watering fee (includes fees paid on the way to and inside the destination), and livestock loss. The costs of pen raising livestock include purchasing cultivated feed and using veterinary inputs to prevent animal diseases due to pen-raising. The results in Table 2 show that the *otor* strategy is more cost-effective than the settled strategy in 2006. On the one hand, the costs of pen-raising are more than twice those of *otor* mobility. Although Household B adopts the lowest management standard, giving a daily ration of 0.75 kg hay, 0.25 kg cultivated feed and 0.2 kg corn per SSU, the costs are still significantly greater than moving the herd to fresh forage compared with Household A or the average of all households which moved. On the other hand, adopting an *otor* strategy allowed herders to maintain revenues by avoiding a loss associated with ahead-schedule selling to a large extent. Households in the *otor* group on average sold 83 per cent of the potentially saleable stock on schedule in autumn, and only a few of them sold some of their livestock prematurely. Household B, however, had little ability to raise a large herd in pens due to the high costs, so the owner therefore had to sell most of his immature lambs and unproductive ewes early in the summer and keep the most healthy ewes to feed after he failed to find an *otor*-recipient and decided to do pen-raising. If Household B could have done *otor* in time and sold livestock in autumn at the average price of the mobility group, he would have gotten more than 51 RMB per SSU.

Application of the two different strategies thus has distinct impacts on the benefits from selling livestock. Considering the selling prices for lambs, cattle and horses in the autumn of 2006 were, respectively 53, 120 and 99 per cent more than before autumn, and supposing no livestock were lost between summer and autumn, herders who were unable to keep livestock until autumn would receive fewer benefits, which would lower their revenues for the whole husbandry year. So the ratio of livestock sold before autumn to the stock of potential livestock on sale, which are usually lambs (always born in the previous winter) and either old or unproductive ewes, is indicative: the higher this ratio, the less the benefit a household obtained.

In short, it is more economically efficient for herders to let livestock track forage than to make cultivated feed track livestock.

Is this correct? '…than to use cultivated feed for livestock' seems to be what is meant rather.

Table 2: *Cost Comparison of Mobility and Settled Pen-raising*

	Household A: Moving Herds to Greener Rangeland		**Average of 25 mobile households**	**Household B: Settled Pen-raising**	
General	Herd Size Moved(SSU)	375	683	Herd Size Fed(SSU)	350
information	Pasture Area(ha.)	1053	949	Pasture Area(ha.)	1044
	Starting Time	Jun. 01	–	Starting Time	Early Jun.
	Days Out	50	41	Period of Pen-raising(days)	50
Cost	Pasture Rent(RMB)	3500	8370	Hay(RMB)	9375
Analysis	Transportation Fee(RMB)	2000	4139	Silage(RMB)	4000
	Animal Watering Fee(RMB)	500	596	Corn (RMB)	625
	Livestock Loss(RMB)	0	1498	Animal Disease Treatment(RMB)	1000
	Diurnal Cost(RMB/SSU)	0.32	0.62	Diurnal Cost(RMB/SSU)	1.20

Impact of LRDCRS on *Otor*

Although practising *otor* means herders have to pay less and benefit more when dealing with adverse climate events, herders' ability to conduct *otor* was obviously weakened after the LRDCRS policy was adopted. Firstly, they are less able to access key resources needed to improve livestock survival and productivity in this adverse climate. From the 1960s to the early 1990s, herders stated that when the height of grass decreased by 30 to 40 per cent from normal, they would undertake *otor*. However, since the LRDCRS policy was implemented herders do not move unless the height of grass is lessened to as short as 15 per cent of normal conditions. This suggests that herders allow their livestock to remain in undesirable forage conditions for a longer duration in the post-LRDCRS period. Secondly, during *otor* the length of time that pastoralists stay in a destination rangeland has been shortened. Before LRDCRS, herders were able to take full advantage of the forage produced in the *otor* pastures until their home rangeland recovered. Often they stayed in the destination ranges for a whole husbandry year, but after LRDCRS, herders stayed shorter times outside their home village ranges. Herders elected to return home immediately when the vegetation conditions of their home rangeland were just starting to improve. As herders stated in the interviews, once they heard that it had rained in their home rangeland, they decided to move their herds back home to save on the rent paid for using another's rangeland, even though the amount of rain was not sufficient to allow for rangeland recovery.

Impacts of LRDCRS on Social Dynamics

LRDCRS reformed rangeland tenure in Inner Mongolia, and land tenure is essentially a type of social relationship which defines the relationship between rights-holders and other people. In order to explore why herders' ability to practice *otor* declined after LRDCRS, we now examine the relationships between rangeland tenure and social relationships.

Property rights are considered as a bundle of rights, which can be categorized into two levels, the operational and the collective choice (Schlager and Ostrom 1992). The access rights and withdrawal rights owned by individuals belong to the operational level, while rights of management, exclusion and alienation collectively owned by a group belong to the collective choice level. Individuals who have access and withdrawal rights may or may not have more extensive rights authorizing their participation in collective choice actions (Schlager and Ostrom 1992).

In our case study, it is found that changes in rangeland tenure have brought uncertainty for herders seeking to obtain use rights to key resources. Before the LRDCRS policy, although *hot*s or herder households were assigned a certain area

to herd livestock, they also had rights at the collective choice level to access other areas of rangeland within the village. This ensured that they could obtain use rights at the operational level of key resources beyond their assigned area. Individual villages had de jure rights of exclusion, but this was rarely used. Previously, when herders in one village needed to access key resources located in another village area, they would not be excluded and were allowed to share the key resource with the herders from another village. Through this rangeland tenure system, herders had a de facto guarantee to use key resources when needed. After LRDCRS, however, as all rights to a particular rangeland area were allocated to individual households, herders were basically deprived of rights at the collective choice level to access areas beyond their contracted area. As such, when they need to access key resources located outside their contracted area they have to get the use right by paying (i.e. renting). Since herders have actually lost their guarantee and certainty of access right to key resources that they had before LRDCRS, this adds a new barrier to practicing *otor*.

In terms of social relationships, the two important aspects that need to be considered are social bonding and leadership (Weyerhaeuser et al. 2006) which may affect herders' ability to practice *otor* and gain access to key resources. Social bonding includes the bridging and linking among members of a community (Woolcock and Deepa 2000), based on communication and information sharing among them (Katz 2000). The goal of social bonding is to foster consensus about the rules and regulations, with which all community members will comply (Putnam 1993). Strong social bonding is the foundation of equal and effective social exchange (Platteau 1994). Reciprocity is a significant content of social bonding.

Traditionally, *otor* was accomplished through the reciprocal network among herders. *Otor* movements could not be rejected and excluded since the recipient would be given the same favour once conditions shifted (Fernandez-Gimenez 1999). As herders indicated in the interviews, traditionally, before they left the *otor* destination they would present some livestock as a gift to the recipient who received the temporary migrants. *Otor*-makers would also work together with the recipient, thus expressing and solidifying the friendship between them. Meanwhile, to receive *otor* is considered a kind of aid to other herders who suffer adverse climate events. In this highly variable environment, herders have tended to help each other because they understand that they may become the ones who need help one day. This social network of friendship strengthens herders' ability to do *otor*, thus minimizing the general risk that the whole pastoral society faces.

However, after LRDCRS was implemented, the trust-oriented friendship network became fragile and consensus on reciprocity began to be bankrupted as the extensive rangeland has been physically and socially fragmented. In this situation, interviewed herders stated that they started to be confronted with obstacles due to the large transaction costs in finding potential *otor* recipients. Herders may now face the risk of failing to move their herd since the potential

recipients may break promises that they initially made; then *otor*-makers lose time seeking other available rangelands for *otor*. This situation was reported by three out of the 25 sample households. Meanwhile, as social bonding weakens, *otor*-makers have less ability to negotiate with the potential recipients. As a result they have to take a loan or sell animals at low prices, so as to pay the rangeland rent to an *otor*-recipient before entering. This means that the previous low cost of facilitating *otor* is replaced by a higher cost. The worst situation is that these obstacles may leave *otor*-makers with a disagreeable memory of the social relationship, so when the climate conditions change, the tables are turned and they become the potential recipients, they may be not willing to invest in the reciprocal relationship, thus creating a vicious circle.

Leadership is also a key element for a community to function well. Strong leadership at village level can create well-organized *otor* movements. Before LRDCRS was implemented, village leadership was strong and whenever herders needed to access key resources within or outside their village area, they would be organized and directed effectively by the village leaders. With these standardized arrangements, individual herders did not need to spend time looking for other rangelands to move to, negotiating with the potential recipients and arranging for transportation to the other rangelands. After LRDCRS, however, as the leadership in the village became weak and the collective welfare system disappeared, when they need to do *otor*, each individual herder household has to complete every step of the process by him or herself. In this case, the total transaction cost related to *otor* has increased significantly. In the collective period, for example, when leaders sought potential *otor* destinations, they needed to spend less time in figuring out where to go, since they had acquired more information and social relationships than ordinary herders. Nowadays, though, each individual herder does the same thing, the total costs become greater, and some households may fail in the process due to differences in negotiation capability.

In short, herders tend to do less *otor* due to the obstacles that resulted from changes in rangeland tenure and social relationships after LRDCRS was established.

After-effects: Poverty and Undue Exploitation of Rangeland

As it is getting more and more difficult to conduct *otor* movement, herders are inclined to stay in their home rangeland rather than moving out when conditions are poor. This is one of the important reasons why many herders are getting poorer and even becoming bankrupt. In the short term, if herders fail to move their herds to greener rangelands when adverse climatic events occur, they have to resort to pen-raising, which loads a tremendous economic burden on livestock production and thus lowers herders' income, as we previously showed. Furthermore, herders may suffer large livestock losses by failing to obtain

sufficient grass or avoiding damage from bitter weather. When this happens, they may become bankrupt. In Bayantala Gacha, about 30 per cent of herder households have lost nearly all of their livestock due to not accessing key resources during the continuous drought conditions since 2001. These herders had to give up livestock production and move into urban areas. Their contracted rangeland may be occupied by other herders or outsiders. As a result, these herders may lose their production resources forever. In the long run, herders tend to move less frequently than before due to the potential obstacles for *otor*, as discussed above. Herds will remain for longer periods in poor quality rangeland and have less opportunity to use good quality rangeland than before. Not only will this increase the cost of livestock husbandry, but will also lead to intensive use of poor quality rangeland, thus exhausting the land.

After LRDCRS, as herder households undertake *otor* movements individually and with the end of standardized organization of herd movements at the collective level, the exploitation of key resources is upset. The first problem is that some bankrupted herders lease their rangeland to outsiders who are inclined to pursue short-term benefits in using the rangeland and have no incentives to protect it in the long term. As a result, the leasees may decide to overgraze in the rented area. The second problem is that to lower the costs, *otor*-makers tend to move only short distances and use closer key resources, which creates disequilibrium in the exploitation of key resources in general. The transaction cost of *otor* increases with the distance moved; herders have to spend more money on transportation and more time negotiating with strangers if they travel a long distance to the potential rangeland. As shown in Table 3, 20 of the 25 *otor*-makers selected to

Table 3: *Information on Otor Destinations in Bayantala Gacha in 2006*

Banner/City	**Sum/Town**	**Gacha/Village**	**Number of *Otor*-makers (household)**	**Distance to home rangeland (km)**
Sunite Left Banner	Mandulatu Town	Bayanhalatu	11	>38
	Beile Town	Bayannaoer	7	>35
	Mandulatu Town	Bayanwenduer	1	>50
	Mandulatu Town	sarulatala	1	>25
	Bayanwula Sum	aershanbaolage	1	>16
Xilingol City		dabuxilatu	3	>250
Sunite Right Banner	Wurigentala Sum	NA	2	>100
Abaga Banner	NA	NA	1	>200
Chayouhou Banner	NA	NA	1	>1000
Total			28	

Note: Three herder households moved to two places, so the total is 28 not 25.

move their livestock a distance of less than 38 km, and almost half of them moved within the village rangelands of Gacha Bayanhalatu. The livestock density in Bayanhalatu is less than 3 mu/SSU (0.2 ha per SSU) during the *otor* time,[2] while in Sunite Right Banner and Abaga Banner located more than 100 km away from the study village, the livestock density is half, at more than 6 mu/SSU (0.4 ha per SSU). This means that key resources near the village rangelands are risking being overloaded with livestock due to the absence of an overall management plan.

Conclusion

The major development policy in pastoral Inner Mongolia was LRDCRS, which sought to reform rangeland tenure and livestock production practices. As extensive rangeland areas were fragmented into small pieces, herders have had to constrain their herds within their contracted area. However, the environment in pastoral Inner Mongolia is characterized by high variability and uncertainty. When the contracted patch of rangeland suffers from a shortage of grass due to weather conditions, herders in reality still have to decide to move from the contracted rangeland to a greener area, although this strategy is not included in the LRDCRS framework. Based on our empirical study in Bayantala Gacha, this paper has tried to reveal the reasons why herders still carry out *otor* movements after LRDCRS. It is found that if herders choose to stay in their home rangeland, they will undergo a high opportunity cost of reducing their herd size as well as being constricted by the economic and technical barriers of pen-raising, required by LRDCRS. Instead, if herders choose to do *otor*, they will gain more profit than pen-raising by taking advantage of the temporal and spatial heterogeneity of pastoral resources.

We also found that herders' ability to do *otor* and to access key resources was weakened after LRDCRS. Herders have to spend more time in poor quality rangeland and gain fewer benefits from moving to *otor* destinations than before. Herders are facing a dilemma. Although it is a better option to do *otor* when confronted by adverse weather, since LRDCRS the transaction costs related to *otor* have become unaffordable. Failure to obtain access to key resources increases livestock production costs, creates risks of livestock loss and causes further degradation of the stricken rangeland. This has resulted in a crisis for herders' livelihoods. For the ecological environment, lack of standard collective arrangements for *otor* movement has meant a breakdown in the systematic exploitation of key resources. Some rangelands are leased to outsiders who have strong incentives to pursue short-term benefits, causing overgrazing. Meanwhile, *otor*-makers tend to move their herds only to close key resource areas to save transportation costs, thus leading to intensive exploitation of the rangelands. Both practices may cause rangeland degradation.

Acknowledgements

The research is supported by the Natural Science Foundation of China (40671070). We thank Da Lintai, Zhang Qian, Gaowa, Li Yanbo and Li Changling for their help in the field survey. A special thanks must go to all the hospitable Mongolian herders, who are always patient with our endless questions.

Notes

1. Website of Statistics Bureau of Xilingol Prefecture: http://tjj.xlgl.gov.cn, and website of agriculture and livestock husbandry Information of Sunite Left Banner: http://www.xlglagri.gov.cn/ds/dsq.asp
2. 1 hectare = 15 mu

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