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МАЛ АЖ АХУЙН ХЭЛБЭР, АРГА АЖИЛЛАГАА: АМЬЖИРГАА, НҮҮДЭЛ ШИЛЖИЛТ, ЯЛГАА, ТӨВ АЗИЙН ТАЛ ХЭЭР ДАХЬ БАЙГАЛЬ ОРЧНЫ ҮЙЛ АЖИЛЛАГАА

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Хураангуй: Төв азийн нүүдэлчдийн аливаа зүйлд зохицож чаддаг амьдралын хэв маяг нь түүхийн бүхий л хугацаанд өөрийн оршин тогтнох чадварыг батлан харуулсаар иржээ. Өнөөдрийн эдийн засаг, байгаль орчны өөрчлөлт, малчдын мал маллах сонирхол зэрэг нь монголын уламжлалт мал аж ахуйг сорьж байгаа хүчин зүйлс юм.

Малчдын амьдралын хэв маяг, зан төрхийг ойлгоход хөдөөгийн тухай мэдлэг, сүүлийн үеийн арга ажиллагаа чухал юм. Бид өргөн хүрээний асуулгын аргаар явуулсан энэхүү судалгаагаар малчдын амьжиргааны хэлбэр, байгалийн харилцан хамааралыг олохыг зорилт болгосон áèёýý. Судалгааны үр дүнгээс харахад малчдын амьдралд нүүдлёýõ тоо болон хоорондын зай аль аль нь чухал ач холбогдолтой байгаа нь харагдаж байна. Нэгдэлжих үеэс ялгаатай нь малчид одоо бие даан малаа хариулж, амьжиргааны олон янзын хэлбэрийг ашиглаж байгаа бөгөөд эдийн засгийн хүчин зүйл малчдын мал маллахад нөлөөлж, малчид мал маллах нь хүүхдүүийн хувьд ажил мэргэжил биш гэдгийг ойлгодог болсон. Одоо ч гэсэн бýлчээрийн газрыг дундаа ашигладаг уламжлалт арга, бие даан шийдэр гаргах, нүүдэл хийх зэрэг асуудлууд малчдын дунд байсаар байна. Хөдөөгийн ялгарал нас, боловсрол, малын тоо, төрөл, байрлал зэргээр илэрч байна. Усны нөөцийн хомсдол, бэлчээрийн талхлалт, хур тунадас багасах зэрэг байгалийн хүчин зүйлс, амьжиргааны зардал, малчдын мал маллах сонирхол өөрчлөгдөх, засгийн газрын дэмжлэг дутагдах зэрэг нийгэм эдийн засгийн хүчин зүйлс ч оршсоор байна. Малчдын оролцоог дэмжих, орчин үеийн нийгмийн хөгжилтэй хөл нийлүүлэх, боловсрол, технологи, тээврийн хэрэгслийг ашигласнаар 21-р зуунд хөдөөд амьдралд тогтвортой байх болно. Мал маллах бодѐт шаардлагыг хүлээн зөвшөөрөх, шийдэхэд өнөөгийн болон цаашдын бодлого, менежмент, хөгжил дэвшил үр дүнтэй гэж тодорхойлсон áàéíà.

Түлхүүр үг: мал аж ахуй, нүүдэл, амьжиргаа, ялгарал, байгаль орчин, монгол, хээр тал

Introduction

Pastoralism has thrived on the Mongolian plateau for millennia with recent luminescent dating techniques indicating gazing effects for 6,500 years (Mandzy 2008). Throughout this long history traditional subsistence patterns have evolved through major political and economic shifts. In the last century customary herding dynamics moved from a feudal to Soviet collective system. The collapse of communism in 1990 gave way to a gradual transition to a market economy (Fernandez 2006). In the years since the end of Soviet collectivization Mongolian herding has seen dramatic change and flux in herders, livestock, motivation, and economics as modern pastoralism functions within socio-economic necessities and ecological parameters that impact human-nature interactions. Recent research documents either social or ecological aspects of the ongoing pastoral transition without clarification of human-physical interactions (Ferndandez and Batbuyan 2004; Sneath 1998; Mearns 2004; Okayasu et al. 2007; Bohannon 2008; Sternberg 2008). As tradition meets modernity this paper examines pastoralists in their environment, herder interaction with the physical landscape, livelihood practices, and the future direction of pastoralism on the steppe.

To examine today's pastoral practices requires recognition of contemporary forces shaping the Mongolian countryside. Animals, water, and migration are inseparable from personal motivations and decisions, income sources, expenses, and concepts of the future. Changing determinants – government role, need for cash, land tenure, children's future – make previous frameworks instructive but outdated. Real-time perception and information is essential for any assessment or programme aimed at a livelihood serving 50% of Mongolians (Johnson et al. 2006). Initial research efforts after transition to a market-oriented economy concentrated on rural subsistence and addressed basic pastoral conditions (Swift and Mearns 1993; PALD 1993). Since that time focus has shifted to ecological and social parameters, economics, and development. Lacking countryside crises, pastoralism has lost its place at the high table of domestic development and social concern.

The benign assumption, implied by government neglect, that "all-is-well" or at least that "all-is-OK" in the countryside (Suttie 2005) is a sign of relative maturity, signifying that the transition from collectivization to private ownership has occurred without notable societal disruption. Since 1990 the number of herding households has increased 225%, from 75,000 to 168,000, showing pastoralism's continuing viability on the steppe despite, or because of, limited government attention and support (Mongolian Statistical Yearbook 2002; *ibid*. 2005). Issues that dominated domestic and international concern post-1990 – privatization of livestock, adequate food and fodder, establishing product markets, addressing a collapsing rural government infrastructure, and providing local services - have given way to concerns about civil society, alternate income sources, gender, and the effect of mining - issues removed from daily herding exigencies (UNDP 2007). The conundrum is that though rural livelihood crises has been avoided, the challenges extant in 1990 remain a critical part of the pastoral landscape – adequate water, pasture quality, and

livelihood issues remain. New variables – economics, markets for cashmere and wool, transport costs, sedentarization, and out-migration join with climate change, degradation, and mining in a sparse environment to impinge on pastoralism (ADB 2004; Johnson et al. 2006). For herding livelihoods to remain productive potential economic and government policy relevant, and future planning viable, an understanding of today's pastoral realities is essential.

From the outside, pastoralists have been widely regarded as a relatively homogenous group, but herders are now drawn from a broad cross-section of society. The key elements of pastoralism – livestock, mobility, low ecological impact, sheep as the preferred animal, and a self-sufficient subsistence approach – while integral, have evolved. Into the system of open pasture, private responsibility, and declining government involvement come new elements such as changing motivations, land tenure, increasing livestock numbers, ecosystem change, and differentiation based on age, education, location, and wealth/number of livestock. Knowledge of today's pastoral dynamics is fundamental critical to understanding trends, determining relevant policy and management approaches, and addressing disparities. This study examines herders today, their livelihood practices, and the future implications of current processes.

As current research, often in concert with western academics, focuses on social factors – migration, mining impact, economics, education – or physical traits – ecological knowledge, degradation, water and soil characteristics, remote sensing, drought, and livestock - the cohesive whole is subsumed into specificities (Fernandez-Gimenez 2000; Steiner-Khamsi and Stolpe 2004; Farrington 2005; Lise et al 2006; Sasaki et al 2007; Tsolmon et al. 2008; Sternberg 2008). This provides greater distilled knowledge yet neglects the core issue – pastoralism itself, and with it the pastoralists' thoughts and action that define their physical and social environments (Fernandez-Gimenez 2000). Collectivization is now history on the steppe and memory of the 1990's fades in comparison with the immediacy of today's issues and work. We hypothesize that today people are not an homogenous group but represent varied approaches and motivations that comprise the nomad of the present. This paper examines pastoral dimensions in their natural setting – the herder's ger (tent abode) – to ascertain what comprises herding today. Through interviews a narrative emerges about herders, their environment, mobility patterns, socio-economic factors, and future direction.

2. Area & Methods

2.1 *Study Area*

This study investigates pastoralism in Ovorhangai and Omnogovi Provinces in central and southern Mongolia (Figure 1). Framed by the Hangai Mountains to the north the Ovorhangai research area (46° N, 103° E) in central Mongolia encompasses semi-arid steppe and desert-steppe terrain. Bordering it to the southeast the second research area Omnogovi (44˚ N, 104˚ E) is dominated by a desert-steppe environment with the Gurvan Saixan Mountains transecting the area. The surface morphology of the study region is typically that of a rolling gravel plateau ranging

from 1000 to 2000m above sea level (Hilbig 1995). Similarly defined landscape covers over 50% of the country's land surface (Geographical Atlas of Mongolia 2004). Climate in these semi-arid and arid environments is characterized by short hot summers and long cold winters with unimodally distributed rainfall concentrated in summer (Yu et al. 1999). Province capitals have mean average precipitation of 234mm and 121mm respectively. In Mongolia highly variable precipitation and low soil fertility of the steppe grassland exhibits non-equilibrium characteristics, with edaphic and abiotic factors limiting plant growth (Fernandez-Gimenez and Allen-Diaz 2002; Begzsuren et al. 2004; Retzer and Reudenbach 2005; Munktstsetseg et al. 2007). Differences in timing and amount of rainfall and inter-annual variability strongly influences livestock and plant communities and can lead to considerable fluctuation in vegetation cover (von Wehrden et al. 2006). Pastoralism is the traditional livelihood in these provinces with livestock composition dominated by sheep and goats (Table 1).

Figure 1. Map of Mongolia with study region.

Table 1. Physical and social characteristics in Ovorhangai and Omnogovi Provinces.

Province		Ovorhangai	Omnogovi
Sites		56	56
Rangeland		Steppe - Desert Steppe	Desert Steppe
GPS		46° N, 103° E	44˚ N, 104˚ E
Elevation - meters	Average	1707	1484
Mean annual precipitation	mm	235	121
	min-max	119-378	51-235
Mean Temperature	January / July	-14.4°C / 16.3°C	-13.9°C / 21.9°C
Water point	# well / surface	40 - 16	50 - 6
Herders	% population	57%	49%
Livestock	type	Sheep, Goat, Horse , Cattle	Goat, Sheep, Camel, Horse
Livestock numbers	2002 / 2006	1,665,000 / 2,623,300	

2.2 Survey

From June to October 2006 and February to May 2007 field surveys were conducted with herders in the two study areas. These provinces were selected to represent a transitional gradient from desert-steppe conditions in the south to steppe grasslands in the north. Fieldwork commenced in the provincial capital from where dirt tracks were followed towards a selected district and along the way *gers* (felt tent homes) were visually located for field interviews. This led to a stepping-stone process where abodes were spotted and visited along a general trajectory towards the town. This procedure was continued to cover approximately a 1˚ latitude by 2˚ longitude area in each province. In this way herders from different districts were selected by physical location rather than social criteria. Assessments (n=112, 56 in each province) were made to determine herder concepts of pastoralism in their respective area. The survey assessed herder practices through field-site interviews and participant observation to ascertain how livelihood and environment interactions have evolved since 1990 (Lee and Zhang 2005). Surveys focused on: 1) herder composition and characteristics, 2) environmental interaction, particularly present and past water resources and pasture use, 3) mobility patterns, and 4) socio-economic factors. Additional issues included livelihood practices, the role of government, herder differentiation, and the future implication of present processes.

Pastoralists were asked standardized questions that were not conditional on prior answers. Interviews were conducted through a translator in the pastoralist's habitation after cultural formalities were observed with handwritten notes taken at the time of the interview. Analysis synthesized responses with results reflecting herder responses and estimates. When possible herder reports were verified by personal observation of water sources, pasture, and number of livestock. This process develops understanding of herding livelihoods, economic impacts, land use, and claims of degradation in published reports (Mearns 2004; Middleton and Thomas 1997; MNE 2002; ADB 2004). Answering a set of semi-structured questions about pastoral practices allowed respondents to express personal ideas and behavior, though not all answered all questions. Common themes relevant to daily pastoral life in the Mongolian countryside emerged from interview data.

To provide a secondary source of information Normalized Difference Vegetation Index (NDVI) data were derived using Spot-4 1 kilometre resolution satellite data available from 1998 to 2006. Regional NDVI data in a previous study were found to significantly correlate with ground vegetation coverage obtained through on-site investigation (Sternberg et al. *in review*). Thirty-day digital number values were calculated at all sites in each district for April through October 2006, matching the maximum potential vegetation growth period. Results were averaged to provide a yearly NDVI value. While NDVI has limitations (Richard and Poccard, 1998), it is used here to provide an estimate of vegetation density and land cover over time that relate to herder perceptions of vegetation and precipitation.

Pastoral dynamics were then grouped by subject, including herder characteristics, the environmental interaction, mobility, and socio-economic factors. Data were

analyzed using SPSS 14.0 (Chicago, Il) to determine significant correlations among 80 variables. Dominant factors were then re-examined to evaluate their impact on variance within categories. Linear regression was applied to identify key determinants for each variable. Principal Component Analysis (PCA) was used as a data reduction technique to reduce the volume of data to a more manageable size while retaining as much original information as possible (Field 2005). PCA identifies structure in relationships and accounts for most of the variance in the observed variables, in this way classifying them. Eigenvalues derived explain percentage of data variance accounted for by the major data components.

In the study livestock numbers and Sheep Equivalency Units (SEU) are used to account for type of animal. In this way large animals (camel = 7, horse = 6, cattle/yak = 5) are given more weight than small livestock (sheep = 1, goat = 0.9) to better reflect herd composition (Geographical Atlas of Mongolia 2004). Livestock, as a herder's main asset, can serve as a proxy for income/wealth, with increased livestock/SEU numbers symbolizing greater economic success (Johnson et al. 2006).

3. Results

Within the herding community there is great diversity in personal characteristics and herding practices. Age, experience, number of livestock, moves, distance moved, education, and outlook reflected a marked divergence among pastoralists. While practices may vary there is strong agreement on core issues affecting livelihoods. Thoughts on privatization, access to water, control of movement, and the role of government are united and unequivocal. The variability within respondents leads to differentiation in practice, wealth, and perception among herders. Findings indentify livestock, movement, migration distance, education, and vehicle ownership to be key inputs. Quality of life is independent of measures of wealth, being instead a function of age and years herding.

3.1 Herder Characteristics

The age profile of herders shows a bias towards the older end of the age range of the general Mongolian adult population (Figure 2). 14% of herders were ≥ 70 years old, whereas the age group comprises 2.5% of the total population. Table 2 shows nearly half (48%) of herders had 5-8 years of education levels. Herders now receive more schooling than during the socialist era, reflected in a significant negative correlation between age and education ($P = 0.01$). The number of years herding shows more than half (58%) of respondents became herders after the changeover from collectivization to capitalism in 1990 (Table 3). Length of time herding relates well with age and possessing a land contract for a winter camp, identifying long-time herders as more inclined to pursue tenure rights. However, years herding is negatively associated with education and vehicle ownership. *"Before there were no cars or motorcycles"* – now private vehicles are owned by 73% of herder households with motorcycles (44%) more common than cars and trucks (29%). Ownership has become more accessible with the introduction of low cost Chinese motorcycles and to some extent has replaced the camel's transport role in the desert steppe. Land

contracts, commonly available in the countryside as tenure for a 700m^2 winter camp (Fernandez-Gimenez and Batbuyan 2004), were possessed by 52% of herders (Table 5). Contracts increased with years herding (P = 0.05), but were negatively related to livestock, SEU, and education (P = 0.01).

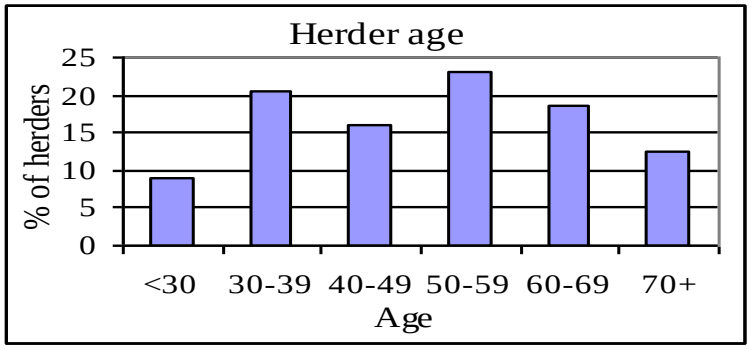


Figure 2. Herder age

Table 2. Herder education

Education (years)	%
None	7
1 to 4	17
5 to 8	48
9 to 10	13
Some college/ technical	9
University grad	5

Table 3. Years herding

Years herding	%
<10	16
10 - 19	42
20 - 29	14
30 - 39	8
40 - 49	12
>50	8

Livestock data identify 47% of surveyed herders have <200 animals, an amount considered to be a marginal livelihood (Johnson et al. 2006) (Figure 3). 33% of respondents, possessing 200-400 livestock, are successful whereas the 20% with >400 animals are highly successful (Janzen and Barzagur 2003). When examined by SEU, the number of marginal herders decreases to 24%. Species composition favored sheep in Ovorhangai, whereas goats were the dominant livestock in Omnogovi (Figure 4). Age is negatively correlated with number of animals (P = 0.01) and Sheep Equivalency Units (SEU) (P = 0.05), thus older herders own fewer livestock. The number of livestock, a perceived sign of wealth, suggests as age increases income decreases. Though wealth levels may be lower, older herders ascribe the highest quality of life to herding (P = 0.05), observing, "*herding life is beautiful. We have hard times, beautiful times. I can move anywhere."* (Anonymous 2007)

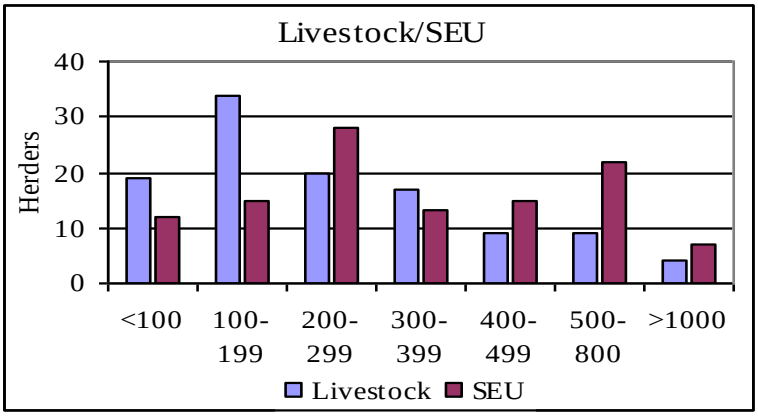
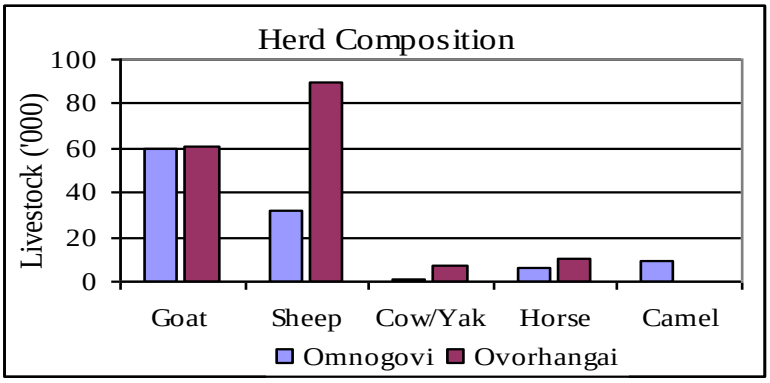


Figure 3. Livestock number and Sheep Equivalency Units.

Figure 4. Herd composition.



3.2 *Environmental Interaction*

The academic literature is united in characterizing the steppe environment as providing limited resources within a sparse landscape (Fernandez-Gimenez 2000; Suttie 2005). Herder perceptions of pasture quality varied with a third identifying good quality and half citing bad or very bad conditions; precipitation was viewed as overwhelmingly bad (Table 4). Grass composition/condition over the last decade was perceived as declining by 84% of herders whereas 7% described pasture trends as improving.

Table 4. Perceived pasture quality and precipitation (current year)

	Pasture - %	*Precipitation - %*
Very good	1	0
Good	31	6
OK	20	11
Bad	40	73
Very bad	8	10

"In Sant district I dreamed of water. Now here I dream about water in Sant district." Water is a key pastoral need and motivates migration. Distance to water shows the concentration of herders near water points. Almost half (47%) live less than a kilometre, and 70% are within 2 kilometres, of a water source (Table 5). The vast majority obtain water from wells (Table 6). This herder convergence reflects an intensification of families and livestock near water. Table 7 establishes the number of livestock at water points with an average of 1435 livestock using an individual water source. This clustering effect is at surface water sources (P = 0.01) where vegetation, determined by NDVI, is greater (P = 0.01), and altitude is higher (P = 0.01). Over 80% of herders identified water sources in the area as drying, with surface water – streams and springs – disappearing more often than wells (Figure 5), noted in the reflection, "*when I was a child there were many mountain streams with much water. Now these streams have little water and small streams have dried up."* Broken wells, lack of rain, disappearing streams and springs, global warming, and the impact of mining processes were cited as reasons for reduced water points. The drying of water sources and a decrease in the number of engineered (80%) and hand (40%) wells since 1990 (Tanaka et al. 2005) are possible causes for pasture and livestock intensification, increased grassland degradation, and the perceived decreased pasture capacity.

Table 5. Distance to water

Km	%
< 0.5	37
0.5-1	10
1 to 2	24
2 to 3	11
3 to 4	13
5+	6

Table 6. Water source

type	All %	Omnogovi %	Ovorhangai %
well	80	89	71
surface	20	11	29

Table 7. Families and number of livestock at water points

Families per water source	# Water points	Livestock per source	Livestock per family
1	16	285	277
2	18	462	228
3	16	880	294
4	7	1207	248
5	16	1715	334
6	10	2167	311
7	4	2500	405
8	3	1967	150
10+	8	2536	247
20+	7	6000	217

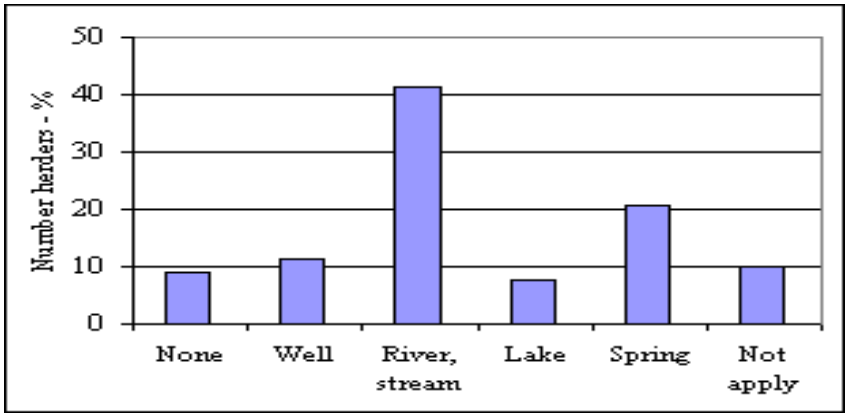


Figure 5. Herder identification of drying water sources

The government plays a limited role in rural water provision. As one herder said, "*I never heard of the government building a well anywhere!"* Only 2 herders identified the government as fixing or maintaining a well with the rest claiming herders assumed responsibility for maintenance and repairs of water points. Similarly, the government is viewed as having no water regulatory role. Control over pasture factors is currently exercised by herders themselves, such as over a privately build well, or to limit the number of herders moving into an area, and by tourist camps in grassland areas that have build engineered deep wells and restrict access. The only perceived price attached to water is not from the government but a charge for motor fuel at engineered wells.. This is a fee for delivery, the water is considered a free good.

Distance from a herder's home to a water point affected how a herder conceived the amount of territory available. Those further from water claimed greater areas as their personal herding sphere. A corollary of this was that these herders had significantly higher SEUs ($P = 0.05$), as opposed to livestock numbers, than those nearer water. This may reflect emphasis on large livestock, and thus the need for greater foraging range, by those further from water points.

The physical environment, as characterized by NDVI, and precipitation, recorded in the province centre, provides a comparison with herder perspectives (Figure 6). Land cover values are relatively consistent over the last 9 years, with the lowest cover in 2002. This implies a limited flux between years in vegetation levels. However, citing poor grass conditions may point to herders' discerning not only amount of grass but type, composition, grass height, and palatability that serves livestock needs. Though the two provinces had different rainfall patterns, with Ovorhangai notably wetter, perceptions of precipitation were identical. In both provinces 83% of herders identified precipitation as bad or very bad. This was at a time when average precipitation was somewhat elevated in Ovorhangai and below normal in Omnogovi.

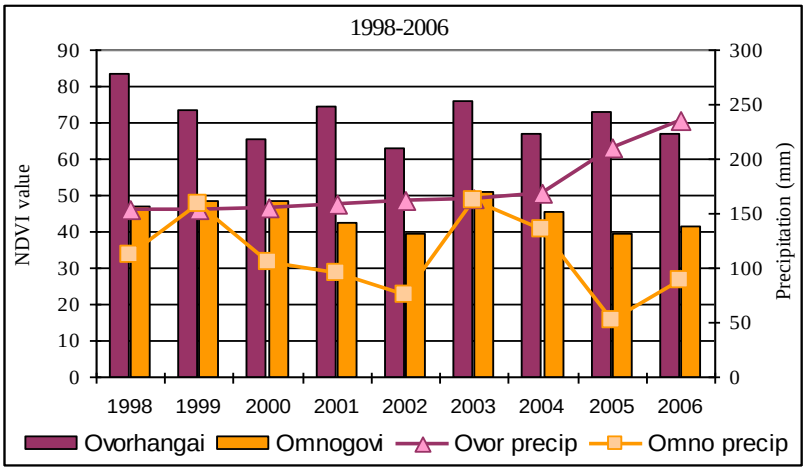


Figure 6. Precipitation and NDVI records, 1998-2006 (NDVI range 0-255).

An additional indicator of rangeland condition were perceptions of sand – herders' views on accumulation, impact on livestock, pasture, and working conditions, and as sandstorms, particularly during spring (Okayasu et al. 2007). When asked, 70% identified sand as a growing issue, citing increasing amount and distribution of sand, impact on livestock, its detrimental effect on grasslands, increasing and intensifying sandstorms, and the presence of sand where previously it had not been noted (Table 8). Four herders thought sand impact was the same over time, 26% said sand was not a problem whereas none cited sand effects as improving. The belief that sand was a worsening problem was dominant among herders with land contracts whereas 39% of herders with no land contract, three times the figure of those with contracts, cited no problem with sand. Those who perceived no problem with sand moved less often but further than other herders.

Table 8. Sand intensity - % respondents

	All	Omnogovi	Ovorhangai	land contract	no land contract	# moves	distance moved (km)
No problem	26	23	29	13	39	3	51
Better	0	0	0	0	0	~	~
Same	4	6	2	6	2	7	32
Worse	70	71	69	81	59	4	39

3.3 Mobility

"Mongolians are nomadic so where there is pasture and rain we have moved." Mobility is a key feature in maintaining a viable, low-imput pastoral system (Fernandez-Gimenez and Sayre 2003). We examined frequency and distance of migration, transport, past patterns, government control on migration, potential conflict, and the role of perceived land tenure on movement. Several factors were significant indicators of mobility. The most important correlation for herders was that increased mobility was reflected in greater livestock numbers and thus increased income (Table 9). Higher education levels, perhaps reflecting greater understanding of current livelihood conditions, and vehicle ownership contributed significantly to migration, and herders who moved more often moved farther. NDVI, water source, and altitude were also predictors of migration; herders in areas with lower NDVI vegetation cover as well herders dependent on wells were more likely to move. Reflecting positive altitudinal vegetation gradients on the steppe, herders at higher elevations moved less.

Table 9. Significance of number of moves and herding variables. Moves 10 years ag

Significance (P=)	Livestock/SEU	Distance	Vehicle	Education	Water source	NDVI	Altitude	
Number of Moves	0.01	0.01	0.01	0.01	0.05	0.05	0.05	~

"Moved so many times I can't count the number" Though many herders were uncertain about past movement patterns or were not previously herding, those who recalled migration patterns from a decade ago (62) showed a 58% increase in annual moves and less settlement now than previously (Table 10). While 4 was the median number of moves, 42% of herders migrated twice or less and one-sixth did not move, implying transhumanent pastoralism has shifted to settled livestock raising for this group (Table 11).

Table 11. Number of moves

Moves	today %	10 years ago %
0	16	19
1 - 2	26	21
3 -5	36	48
6 - 8	10	12
10 - 12	10	0
14 +	3	0

Table 10. Change in number of moves

today v. 10 years ago	%
Increase	58
Same	21
Decrease	21

Distance moved (Table 12) was an important predictor of both livestock numbers and vehicle ownership and related to education and distance from a water source. Herders residing farther from a water point and those with higher education levels were more likely to move. Half of the respondents moved less than 20 kilometres annually while almost a third migrated over 50 kilometres per year. The method of movement was not correlated (P = 0.05) with vehicle ownership - though three-quarters of herders have a vehicle the same percentage hire transport to migrate (Table 13). Most common is to hire a truck and driver to move the household in exchange for petrol and one or two small animals, depending on distance travelled.

Mongolians view grasslands as a communal property as enshrined in their constitution, thus available for grazing. Tenure rights for winter camps are spatially limited (700m^2), thus do not constrain pasture. There was a clearly expressed opinion that all rangeland was open to herders as needed, particularly during extenuating circumstances such as drought or extreme winters. The idea of control of movement was an anathema and seldom taken seriously, with most respondents perceiving no control on their movement (Table 17). 91% of herders stated there was no government control of migration. A small minority recognized the need to obtain permission from local authorities to move into another district, usually described as paying a tax, and 2% felt herders controlled area movement. There were some instances of herders attempting to limit new herders from coming to their area but this was the exception. A more common sentiment was, *"I don't have the courage to tell others to leave because it will be our turn when there is no grass."*

Table 12. Distance moved

km	%
0	16
1 - 5	16
6 - 9	4
10 - 19	14
20 - 49	19
50 - 99	17
100 +	14

Table 13. Migration transport - %

Own vehicle	12
Motorcycle	1
Animal cart	9
Hired transport	73
Tractor	4

3.4 Socio-economic factors

The social framework within which pastoralism occurs and the economic factors that drive decision-making are key livelihood determinants. This is a balance between income generated and costs of production. Across the spectrum of herders interviewed the major income source is goat cashmere (Figure 7). 95% of herders receive income from cashmere; for two-thirds it is their main income source. After cashmere revenue source and main income diverge. Wool – sheep and camel - is the second most common money earner but does not have high value so is seldom a main

income source. Pensions are a more important primary income, with 19% of herders dependent on them, and a third of households containing a pensioner. Livestock is the herder's most valuable resource but few (7%) use animals as the major income source. Meat and dairy, while a key factor for herder subsistence and self-sufficiency, are not dominant revenue generators. External work was only cited by 4% of households, suggesting herders have little outside support for livelihood needs. The majority of herders state income is "normal" whereas twice as many claim income is bad rather than good (Table 14). Different main income sources did not have notable correlations with other factors.

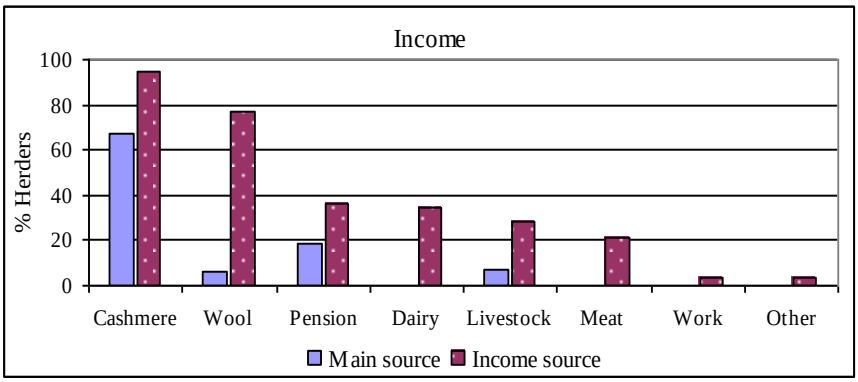


Figure 7. Herder income sources.

Table 14. Income perception - %

Very good	1
Good	13
OK, normal	55
Bad	27
Very bad	1

Herder expenses were lead by basic items – food and clothes, then children's education and petrol (Figure 8). Next came herding-related costs for fodder, migration, and livestock-related expenses such as vaccination and veterinary fees. While the five most common expenses were broadly shared the main expense identified was split between food (35%), education (26%), and petrol (23%). Food is the most cited expense; the prevalence of education and petrol as major costs suggest recent shifts in pastoral livelihoods. Educational expenditure may reflect increased primary and secondary enrolment in both provinces (>33%) over the last decade and increased university enrolment, which requires tuition fees, by rural students (Mongolian Statistical Yearbook 1989-2002: *ibid.* 2007). Education was also expressed as a way for children to qualify for future jobs in town that are regarded as better than herding. Increased educational levels were correlated with owning large livestock ($P = 0.01$).

The need for petrol, cited by 60% of the herders, shows the change in approaches to pastoralism where now a vehicle has become a standard input. As one man stated, "*before herders looked after livestock by horse, now we herd by motorcycle.*" The major expense of petrol results from the quick acceptance of vehicles - a three-fold increase over 6 years – and in part reflects operating costs, as at the time of fieldwork a litre of petrol was more expensive in Mongolia than in the US. Vehicle ownership was related (P = 0.05) with identifying a large herding territory. Secondary expenses reflected core livelihood needs – fodder for animals, migrating costs, care of livestock, and household expenditures.

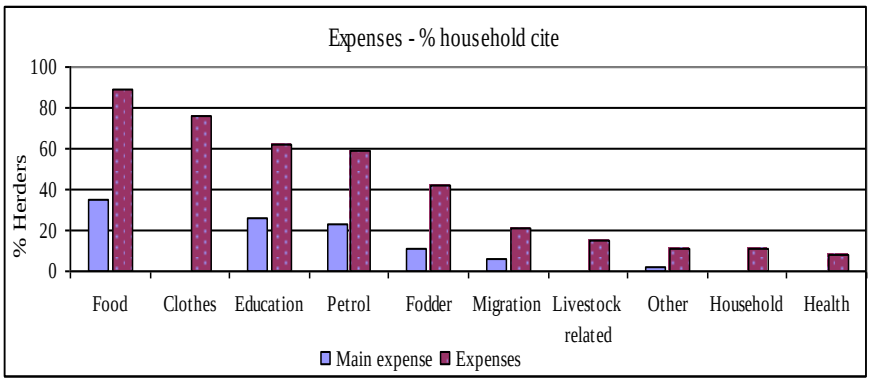


Figure 8. Herder expenses.

"*Who helps you? Does Enkhbayar (the President) help you? (laughs) There is nothing."* Questions about the role of government proved perplexing because respondents did not conceive of government as having a participatory role in herding. The memory of socialist times was of government "taking care of everything". In comparison to that conception, current government engagement is viewed as reduced to tax collecting with minimal services provided. Because of an absence of clear government programs or support for pastoral concerns the state was regarded as somewhat irrelevant to daily life. Thus a question on the role of government was interpreted as "what should the government do?" The standard answer was first that the government does nothing, followed by several suggestions for what it ought to do (Table 15). The overwhelming concern was with water sources, particularly building and fixing wells. This was seen by most herders as beyond their capability and thus it should be the major focus of government work (Sternberg 2008). A distant second concern was for winter fodder, then general assistance, and a hoped-for payment to herders to help cover living expenses. This was related as similar to a pension or the national payment to children (~ $3/month), with an amount of $20/month mentioned as a reasonable amount of support. Some viewed herding as best without any government involvement and did not want a state role in their livelihoods, saying, "we are countryside people and don't need much from the government." Pastoralists saw a need to protect environmental factors, such as pasture and springs, because, *"the environment changes by human hands*," and

wanted the government to "shoot the clouds" for rain, a practice reported in neighboring China. A small minority of respondents hoped for assistance with the cost of petrol.

Table 15. Role of government - %
(answered as it should provide…)

Does nothing	77
Water	69
Fodder	28
Aid	17
Want nothing	12
Protect environment	12
Shoot clouds (for rain)	9
Petrol	6

Changing mobility and land use practices, the retreat of the government from a regulatory role, and competition for pasture and water access previously noted is often viewed as increasing pastoral conflict (Oyuntseteg 2006). In contrast, our study did not find conflict to be an important herder concern. Of 112 interviewees 8 listed potential conflicts. These were disputes with herders about pasture usage (4), clashes with "ninja" small-scale miners over mining impact on water supply (2), and arguments with tourist camps that restricted access to deep wells (2). 93% of herders did not think conflicts were present in their livelihoods. However, herders felt strongly that land privatization would lead to conflict among themselves.

3.5 Statistical Analysis - Principal Component Analysis /Regression

Principal Component Analysis (PCA) was used to reduce the large data set to a more practical size. PCA organized the internal structure of data into main groupings in a number of independent axes that in decreasing order explain variance in the findings. In this survey the first component accounted for 31% of data variance while the three main components cumulatively explained 72% of survey variance (Table 16). Thus three quarters of survey variance is addressed by three main gradients. Dominant factor associations are in component one with relationships between moves, SEU, and vehicles as a positive grouping and NDVI, altitude, and province as a negative set. These explain nearly a third of data variance. The second component saw livestock and SEU as more positive and moves, vehicle, and education as a less positive cluster. In the third component education, followed distantly by moves and NDVI, were grouped while SEU and livestock formed a negative pair.

Table 16. Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.51	31.373	31.373	2.51	31.37	31.37
2	2.22	27.751	59.124	2.22	27.75	59.12
3	1.05	13.154	72.278	1.05	13.15	72.28
4	0.76	9.436	81.714			
5	0.59	7.405	89.119			
6	0.49	6.103	95.222			
7	0.26	3.279	98.501			
8	0.12	1.499	100			

Component Matrix

	Component		
	1	2	3
aimag	-0.63	0.57	0.08
SEU	0.38	0.81	-0.30
move	0.66	0.25	0.32
NDVI	-0.70	0.50	0.29
educucation	0.39	0.23	0.78
vehicle	0.59	0.24	0.14
altitude	-0.68	0.34	0.19
livestock	0.28	0.84	-0.35

Data were analyzed to determine how effectively the results explained the dominant factors that engage pastoralists. Taking the correlated factors for each variable we then ran a linear regression to see how well these variables explained key features (Table 17). The r^2 value represents how well the survey data explains individual factors. The number of livestock ($r^2 = 0.94$) and Sheep Equivalency Units ($r^2 = 0.80$) had high r^2 values, indicating that the components listed were responsible for most of the category variance. In addition to the correlation of the two as different measures of the same variable, the significant measures for livestock were drying water sources (0.00), livestock concentration at water point (0.00) and number of moves (0.05), were important. For SEUs, which accounts for size of animal, a vehicle (0.02), not having a land contract (0.02), and distance to water (0.07) were major explanatory factors. Differences between provinces ($r^2 = 0.83$) were also well described by the data though no single component was dominant. NDVI (0.07) was important but not at a significant level.

Major factors for altitude ($r^2 = 0.61$) were a lack of surface water (0.02), fewer moves (0.05), no sand-related problems (0.02), and higher NDVI values (0.00).

NDVI (r^2 = 0.51) had a dominant association was with altitude (0.02). Vehicle ownership (r^2 = 0.51) was negatively related to years herding (0.05), indicating older herders are less likely to own transport, and how people moved (0.01). Thus those with car and trucks were less likely to hire transport whereas herders with no vehicle or a motorcycle were more likely to rent transport. Education (r^2 = 0.43) was highly correlated with number of moves (0.00) and fewer years of herding (0.00). Number of moves (r^2 = 0.41) was significantly related to education and distance of moves.

High r^2 values in the linear regression tables show the research data does a strong job of explaining livestock numbers, SEUs, and province effect. The survey provides insight into major factors but other measurements are not as effectively defined by the collected data. Thus to better understand the characteristics that account for lower r^2 values, such as education or number of moves, more information beyond the survey content is needed.

Table 17.

Linear regression for major pastoral factors.

LIVESTOCK			**SHEEP EQUIVALENCY UNIT**		
r^2 = 0.94	Beta	ignificasnce	r^2 = 0.80	Beta	significance
age	-0.010	0.836	distance moved	0.063	0.824
distance moved	0.206	0.148	distance to water	0.151	0.072
drying sources	0.642	0.000	drying sources	-0.042	0.857
families at water pt	-0.054	0.260	km moved	-0.096	0.732
km moved	-0.153	0.275	land contract	-0.187	0.022
land contract	0.000	1.00	livestock	0.753	0.002
livestock at water pt	0.200	0.000	move	-0.049	0.612
move	0.085	0.051	private	-0.007	0.929
privatization	-0.029	0.423	vehicle	0.232	0.020
SEU	0.236	0.000			
vehicle	-0.047	0.248			
			ALTITUDE		
			r^2 = 0.61	Beta	significance
PROVINCE			water source	-0.229	0.018
r^2 = 0.83	Beta	significance	families at water pt	0.225	0.068
children's future	-0.056	0.860	livestock at water pt	0.199	0.076
drying sources	-0.615	0.386	move	-0.167	0.049
families at water pt	-0.297	0.579	NDVI	0.403	0.000
herder life	-0.067	0.803	sand	-0.180	0.024
km moved	-0.449	0.105	territory	-0.153	0.062
livestock	0.489	0.485	vehicle	0.001	0.986
livestock at water pt	0.285	0.565			
move	-0.061	0.837	**VEHICLE**		
NDVI	0.700	0.068	r^2 = 0.44	Beta	significance
sheep	0.808	0.266	altitude	-0.204	0.162
territory	-0.091	0.674	distance moved	-0.201	0.584

water source	-0.443	0.349
yak-cow	-0.197	0.605

NDVI

$r^2 = 0.51$	Beta	significance
altitude	0.289	0.016
children's future	0.156	0.139
families at water pt	0.199	0.219
livestock at water pt	0.171	0.263
move	-0.137	0.214
territory	-0.116	0.251
vehicle	-0.013	0.904
water source	0.089	0.443

EDUCATION

$r^2 = 0.43$	Beta	significance
age	0.107	0.294
distance moved	-0.102	0.343
land contract	-0.091	0.283
move	0.310	0.005
vehicle	-0.048	0.576
years herding	-0.586	0
drying sources	0.498	0.112
education	0.072	0.606
how move	-0.270	0.010
km moved	0.142	0.685
livestock	-0.379	0.250
move	0.196	0.141
NDVI	-0.143	0.391
NDVI 2006	-0.100	0.442
sand	-0.138	0.241
SEU	0.200	0.324
years herding	-0.257	0.049

MOVES

$r^2 = 0.41$	Beta	significance
altitude	-0.005	0.965
distance moved	0.604	0.037
education	0.254	0.005
km moved	-0.246	0.388
livestock	0.126	0.475
NDVI	-0.271	0.070
NDVI 2006	0.131	0.250
SEU	-0.063	0.711
vehicle	0.085	0.413
water source	-0.086	0.397

4.6 Differentiation

To this point the information presented provides a general picture of pastoralism on the steppe. The data can be further broken down to draw out differences within the group. What may appear homogeneous from the outside becomes differentiated by key livelihood factors. We examined four variables – Sheep Equivalent Units, age, education, and province to better understand herding dynamics that reflect economic, demographic, and geographic pastoral inputs. Variables for selected categories were broken down into three groups comprised of the top, middle, and bottom 20% of the interviewee population. As not all respondents answered each question the percentage of respondent replies is used.

Sheep Equivalency Units

"The rich can move, have transport, property, capital. The poor have many problems." The crucial livelihood variable of SEU reflects clear separation among the three groups. The bottom 20% has one-tenth the animal units of the top level and less than a third of the middle group (Table 18). Average age of this tier is 13 years greater than the other groups. Movement, education level, and vehicle ownership is lower yet they are more apt to have a contract for land and identify food as their main

expense. Despite this they are the most satisfied group, citing the herding life as "very good". The variables are ordered from high to low on several factors, such as number of moves, distance moved, education, vehicle ownership, and inversely for age, land contracts, pension, and dominance of food as the major expense. The top tier moved more often, migrated further, had higher education levels, and more vehicles yet were least positive on herding quality of life. This suggests that SEUs are a predictor of economic related factors (income, vehicles), mobility, and livelihood concerns (land contracts, satisfaction).

Age

"Cannot take more livestock. It is too hard at our age." Examing the effect of age on pastoralism found that young herders were most successful in livestock terms (Table 18). This group overwhelmingly depended on cashmere for income, were most likely to have a vehicle, and had food and petrol as major expenses. Middle-aged herders moved the most and the furthest per year, were similarly educated as younger herders, and three quarters owned a vehicle. Cashmere was the dominant income source with education and food major expenses. Herders in the oldest age bracket had fewer livestock, moved less often and less distance, and averaged 4 years of schooling. Yet they were most satisfied with herding and were more likely to encourage (grand)children in their household to be herders. Pensions were their major income and half owned a vehicle. Younger herders identified pastoralism as their main work option, often expressing that they were unqualified for other jobs. Breakdown by age separates pastoral tendencies. This identifies older herders, who began working during communism when few alternatives were available, as having more positive livelihood views (satisfaction, recommend for children), whereas younger herders were characterized by economic issues (number of livestock, vehicles) and middle-aged herders by mobility.

Education

"*Children should get educated.* ***The Gobi is turning into a desert."*** Pastoralists with higher education levels had greater livestock numbers, undertook more annual moves, migrated longer distances, and had high vehicle ownership (86%), and land possession (72%) rates (Table 19). This group had herded fewer years, was less positive than those with less schooling, and identified food and fodder as greater expenses than education. The least-educated group, of which a third had no schooling, was older, had herded much longer, and was most content with the pastoral lifestyle. This classification relates to educational opportunity and motivations as the older group grew up during communism when basic schooling was stressed, whereas higher education options have increased since the transition to democracy. Cashmere was the main income source across schooling levels with pensions important in the most- and least-educated groups. Education was the major expense of the middle group yet third amongst highly educated herders, after food and fodder.

Province

Herder characteristics differed in the two provinces, with Ovorhangai having on average 35% more livestock, particularly small stock, and 14% greater SEUs, perhaps due to greater precipitation and NDVI levels (Table 19). Expenses differed with petrol, then food, the most frequently cited main costs in Omnogovi whereas food and education were dominant in Ovorhangai. Omnogovi herders moved more often and migrated greater distances, potentially reflecting the province's drier climate and limited water availability, particularly surface sources. Land possession rates and herder satisfaction were higher in Omnogovi. Results highlight differences by degree of latitude within the Gobi desert region.

4.7 Future

Whither pastoralism? The findings illuminate current pastoral trends, their potential implications, and future challenges. Major issues are economic and environmental sustainability, age demographics, and perspectives on livelihood viability/satisfaction. How these topics are addressed by herders, the government, and society will determine the ongoing viability of Mongolian pastoralism.

Older herders, who are content with the traditional lifestyle though they have lower incomes, will gradually be replaced by younger herders who are market-oriented and want modern inputs for herding. With little experience of communism this group is motivated by economic factors, such as concentrating on cashmere production. If pastoralism can provide adequate income to meet essential (food, shelter) and perceived family needs (vehicle, education) it can remain viable. Otherwise income scarcity will compel herders to choose alternatives, such as settling in towns or small-scale mining (xx x). Development of income sources and market access for goods is key to pastoral future viability.

Declining water sources, pasture quality concerns, and livestock intensification point out how grassland sustainability will affect future livelihoods. Intensification can lead to range degradation as limited water points concentrate animals and can reduce mobility. Shifting herd composition, potential impacts of climate change, increasing temperatures (Batima et al. 2005), and decisions based on immediate needs over long-term sustainability combine to affect pasture resources and productivity, potentially impacting herders economically and reducing future income. Maintaining existing coping mechanisms, such as mobility patterns and seasonal grazing, incorporating new parameters, like forms of land tenure, and confronting ongoing problems – drying water sources, broken well infrastructure - will be essential to ensure adequate environmental conditions

Demographics will affect herding's future on the steppe. The average herder is 12 year above the national level (average adult herder age – 51 years; adult population – 39 years) with the number of >60 year olds herding 5.5 times greater than their percentage in the adult population. This suggests a new pastoral role as post-retirement work and indicates the drift away from herding by younger rural residents.

Settlements draw herders for perceived better income opportunities, with greater development, education, and health levels available in population centers. Particularly for youth there is a gravitation towards global lifestyle and cultural norms, such as electricity, mobile phones, internet usage, and vehicle ownership. Families play an important role in shaping the future of pastoralism as 91% of herders with school-aged children (62 families) stated they did not want their children to herd. "*My children will get an education – they will not be herders!"* Parents encourage high school education, noting improved job prospects with schooling. There is an idea that employment in a town is a more dependable income source than herding and requires less work and less risk. Some hoped their children would be pastoralists, feeling it was a good livelihood and wanted to pass the herd on to children when the parents become elderly. Yet today the parents are clear that such decisions are "up to them", a child's own choice.

Several herders expressed that herding was a beautiful or very good life, that they could not imagine a better way to live (Table 20). Such satisfaction was significantly related to age and years herding (P=0.05), but not related to immediate livelihood factors such as number of livestock, movement, pasture quality, or vehicle ownership. It identifies a difference in perception between older and younger herders. Without the perceived traditional lifestyle benefits younger herders are more likely to make practical decisions, regarding herding as a job.

Table 20. perception of quality of herding life

	%
Beautiful	25
Good	58
OK	8
Difficult	9

The combined factors of an aging herding population, the trend away from herding as a recommended livelihood, and lower satisfaction with herding's quality of life among younger herders (P = 0.05) questions the future direction of pastoralism. Several possibilities exist, including new approaches to herding, increased land tenure, or a reduction in pastoralism (see discussion). While herders value the openness of today – "*living now is better than in socialism – we can decide what we do*" and "*after democracy herding is getting better"*, some miss the state support of the communist era. The interview subtext was that if herders perceive they are included in the country's socio-economic development – improved livelihoods, access to education, services and technology – herding is a practical living. Development that reduces the remoteness of location, encourages exchange between herders and district and province towns, and enables travel, new income sources, and access to goods strengthens pastoralism. As herding becomes dominated by younger

herders it shifts from being the traditional Mongolian livelihood to a deliberate vocation choice based on potential income with awareness of other possibilities.

DISCUSSION

Pastoralism today is not the homogeneous model of the collectivized era. Since 1990 Mongolian herders have reoriented themselves and their interactions with their livelihood and land. They act independently of one another, are motivated by economic factors, and do not see herding as a career choice for their children. In many ways pastoralism is now a job based on income, replacing its former role of meeting basic needs. Livestock are the currency – to accomplish livelihood goals herders make practical, economically driven decisions about animal numbers and herd composition. Results from this study indicate that frequent moves and migration over extended distances are key factors in number of livestock and SEUs, both measurements of economic well-being. Secondly, findings document the differentiation among herders along several dimensions, including SEUs, age, education, number of moves, province, and altitude. Herding motivations vary from improving livelihood, wanting more material rewards, and supporting children's education, to viewing herding as one's only job choice and as a supplemental income source. Older herders want enough animals to make a financial impact but not so many that the work is too strenuous. Younger herders want the benefits of today – transport, modern technology, mobile phones. Such conveniences bring herding into today's world and narrows the divide between herders and town dwellers. Unspoken were the over-arching structural issues that affect herders - product markets, access to transport, water availability, and livelihood organization that affect well-being.

The decision-making of a small-scale herder can be imagined, such as considering if the expense of transport was worth the benefit of a move. This is then weighed against the cost of not migrating – less pasture resources, lower animal weight gain, and potential degradation in the vicinity (Hoffman et al. 2008). The other end of the spectrum finds herders with capital, transport, even hired workers, having greater mobility and the ability to make decisions based on pastoral factors rather than financial constraints. Patterns suggest potential virtuous (increasing prosperity) and vicious (increasing hardship) cycles exist in herding. Are the 16% of herders who do not move resigned to low income while those with hundreds of animals graze prime pastures? Without a strong government or international development pressure mechanisms to improve livelihood opportunities beyond customary family-based approaches are limited.

"*Government has no role. If I tell them what they should do they would not do anything. No need to tell – they might put the money in their pocket."* The role of government showed divergence between perception and reality on the ground. Though it was the clear that government played little role in pastoralism, herders still looked to it to solve larger problems, most notably water supply. The idea exists that most well construction is beyond a herder's ability and takes government input, particularly for engineered deep wells (Sternberg 2008), and that the government

should "shoot the sky" to make rain. The persistence of this model, despite the evidence to the contrary, implies the lingering impact socialist approaches and thought (Ynkhanbai et al. 2004). It also speaks to a lack of organization in the countryside now that collective groups have disappeared without other structures adequately taking their place, though some herders identify the need for better cooperation - *"if herders work together that is better, like in the Negdel (collective) time. It will be more profitable together."* The breakdown of collective pastoralism leaves individuals or small family groups responsible for creating livelihood opportunities. By definition this limits the means and scope to raise livestock quality, develop product markets, or improve infrastructure. The remark, *"government does not care for herders or wells"* raises the implicit question about the role of the state in rural areas - if citizens' needs are not being met is the government relevant?

Another part of the debate is future pastoral policy and management. Implementation and changes to land laws such as in 2002 granting possession of winter camps will affect the countryside (Fernandez-Gimenez and Batbuyan 2004). The increasing importance of mining as a revenue and tax source and foreign donor advice (ADB 2005; Bolormaa et al. 2006) could alter state perspective towards rural policies, particularly on land privatization. This is regarded as "impossible in Mongolian conditions" by 96% of herders because of the implication of potential restrictions on herder movement in a non-equilibrium environment and the resulting tension and conflict that would ensue. Herders, despite their numbers, lack political influence as issues are decided by an emerging political class in the capital with development and personal agendas that differ from rural livelihoods. Awareness among herders of potential outcomes is reflected in the remark that, "*rich people will take a lot of land but poor people cannot."*

An unstated theme that emerges from the interviews is that herding is a practical endeavor – herders want similar opportunities to other Mongolians, and if these are not available they are can leave the livelihood. Increased rural poverty rates reflect the impact the market economy has had on herding (Sneath 2003). If pastoralism can provide a standard of living perceived as comparable with other facets of society then herding will be evaluated on its own terms. With conveniences and improvements over time herders focus on benefits – meat supply, a vehicle, income to send children to school, and ability to freely migrate in open pasture. Then customary travails – climate, drought, and extreme winters can be moderated and the enduring strengths of herding - independence, an outdoor setting, following natural rhythms, and tradition may gain recognition. It is the more vulnerable herders that will struggle with physical threats. Human-induced changes, exemplified by livestock intensification, concentration at water points, and the shift to goats are potential sources of grassland degradation (Perkins and Thomas 1993; Thomas et al. 2000; Tumorjav 2003) are examples of how decisions in today's market economy can impact tomorrow's resources. Additional livestock will remain the only way to

increase income unless there is a paradigm shift from present trends. This could be done by improving livestock breeding (high quality cashmere, improved meat/milk standards), organizing marketing and distribution (infrastructure, delivery, promotion), making value-added products (cheese, leather goods), and developing new markets (China, Japan, Korea). Without leadership from government or international organizations organized pastoral change unlikely. Lacking advance planning, immediate herder needs and inclinations suggests herders will continue to react to changing economic and environmental conditions.

Pastoralism has changed greatly since the collective era ended in 1990. State support for infrastructure, transport, herder salaries, emergency assistance, and regulation of pasture use, livestock production, migration, and district of residence has stopped. Government education and health services continue as private ownership, herder responsibility, market forces, and withdrawal of the state from an active pastoral role have replaced the previous communal, socialist approach to herding. What will pastoralism of today look like in 5 or 10 years? Possible trends start with poor herders being subsumed and working for larger herders, or smaller herders may be limited to a more subsistence-based approach, migrating only short distances (XxX). Pastoralists will be increasingly dependent on income from cashmere, or perhaps a family member's work to make ends meet, and unable to expand their herds. More mobile herders may take advantage of less-used, extended pastures or build private wells to ensure personal water access. With increased forms of land tenure and possession (seasonal camps, wells, grazing areas) it is possible that more settled and even fenced livestock raising may occur, loosely modelled on the Chinese approach in Inner Mongolia, or that ranches with absentee capital and owners employing labor will bring large-scale efficiency to herding. Thirdly pastoralism could dwindle to a niche profession practiced by dedicated individuals or those with limited alternatives. This would have social impact, for where would the city dwellers get their meat and excess labor be absorbed? Economics dictates that reduced supply would lead to price rises, which should then increase herder income and make herding more attractive until a new balance is reached. Alternatively, herding could continue in the status quo or become a hybrid of the other scenarios, varying by region, ecosystem, and proximity to population centres. If this occurs today's concerns – economic and environmental - will continue to burden pastoralism. In whatever context herding takes place the ability to pursue a mobile, nomadic way of life will remain an essential condition for steppe sustainability (Wesche and Retzer 2005).

An example of future implications for pastoralism is the U.S. Government's $285 million Millennium Challenge Corporation assistance package to Mongolia that concentrates on rail transport, property rights, vocational education, and health care (U.S. State Department 2007). All are worthy aid targets yet that such a large sum chooses to not address pastoral livelihood issues, such as water, infrastructure, or economic development, affirms that the countryside is not viewed as a priority.

Herders will remain responsible for any concerns and challenges. Survey results suggest pastoralism will continue to evolve at a rapid pace. Issues such as degradation, water availability, pasture use patterns, herder differentiation, poverty, and mining impact will continue as pastoral challenges in the future and are unlikely to be addressed at the household level. Current uncertainty about herding as an economic and job creation endeavour and its social role will persist.

CONCLUSION

"If weather is bad herding life is hard, difficult. If weather is good, with rain and sun, then herding life is very good." Mongolian pastoralism remains an integral livelihood on the steppe after the political and socio-economic transitions in 1990. This is through the efforts of herders rather than institutions and is driven by income needs and a perceived lack of alternatives on the part of the herders. Previously weather and animals dominated herding concerns (XXX x). While these remain, now water resources (wells, the drying of streams and springs), pasture productivity and degradation, income generation, and livelihood expenses, (food, education, petrol) are major pastoral issues (XXX x). As pastoralism continues to become a work rather than lifestyle choice the fewer needs and higher satisfaction of older herders are being replaced in young herders by the desire to incorporate modern amenties into the herding mainstream. Where pastoralism heads depends on how herders are able to adapt to market structures and the role government policy and management may play in the future. The survey finds that the traditional approach of higher mobility over greater distances results in greater livestock numbers and wealth. Efforts that enable and encourage such customary practices will best serve the pastoral population.

Table 21. Differentiation between top, middle, and bottom 20% of herders for 4 variables

		SHEEP EQUIVALENCY UNITS			*AGE*		
Variable (average)	All herders	Bottom 20	Middle 20	Top 20	Youngest 20	Middle 20	Oldest 20
SEU	410	92	316	948	452	398	366
livestock	271	86	201	584	296	293	181
age	50.8	59	46	45	29.6	50.6	73
moves	4	2	4	6	4	4.9	2.4
km moved	42	10	27	66	34	45	23
education (grade)	6	3	5	6	6	6	4
year herd	22	26	22	22	11	21	42
vehicle (%)	70	50	68	90	86	73	50
land contract (%)	50	70	50	32	54	54	45

herding life	good	very good	good	good-OK	good	good+	good++
child herd - yes (%)	10	18	0	15	6	7	33
main income (%)	68 – cashmere	59 – cashmere	59 – cashmere	68 – cashmere	95 – cashmere	80 – cashmere	59 – pension
income	19 – pension	27 – pension	23 – pension	14 – livestock	5 – wool	10 – livestock	32 - cashmere
income	7 – livestock	9 – livestock	14 – wool	9 – wool	~	10 – other	9 – other
main expense (%)	34 – food	63 – food	41 – food	32 – petrol	47 – food	33 – education	45 – food
expense	26 – education	16 – fodder	14 – education	23 – education	42 – petrol	33 – food	25 – petrol
expense	23 – petrol	21 – education	14 – migrate	23 – food	11 – fodder	24 – petrol	10 – education
expense	11 – other	~	14 – petrol	23 – other	~	10 – fodder	10 – migration

Variable (average)	All herders	*EDUCATION*			*PROVINCE*	
		Bottom 20	Middle 20	Top 20	Omnogov	Ovorhangai
SEU	410	412	421	440	383	437
livestock	271	221	284	323	230	311
age	50.8	66	43.3	49	51.3	50.3
moves	4	3	2.8	5.8	5	3
km moved	42	38	29	60	51	33
education (grade)	6	2	6	some college	6	5
year herd	22	40	18	11	21	24
vehicle (%)	70	55	77	86	73	73
land contract (%)	50	41	32	72	60	43
herding life	good	good++	good+	good	good+	good-OK
child herd - yes (%)	10	22	6	6	9	13
main income (%)	68 – cashmere	45 – cashmere	86 – cashmere	55 – cashmere	68 – cashmere	67 – cashmere
income	19 – pension	45 – pension	14 – other	27 – pension	16 – pension	22 – pension
income	7 – livestock	9 – wool	~	19 – livestock	11 – wool	9 – livestock
main expense (%)	34 – food	41 – food	43 – education	35 – food	34 – petrol	45 – food
expense	26 – education	32 – petrol	43 – food	24 – fodder	28 – food	23 – education
expense	23 – petrol	14 – fodder	14 – petrol	18 – education	17 – education	13 – fodder
expense	11 – other	14 – other	~	18 – petrol	11 – fodder	13 – petrol

"*Now there is freedom! Life is easy", and "twenty years ago herding life was not good, it was a hard life. After democracy it is getting better."*

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MCC

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