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The Impact of *Dzud* and Dynamic Changes of Nomads in Mongolia

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Summary

This paper focuses on the number of domestic livestock kept by nomads in Mongolia. The economic conditions of nomads in Mongolia changed during the transition of a centrally planned economy to a market economy, and as a result of harsh climatic conditions (referred to as *Dzud* in Mongolian). We have divided the nomads into two categories: Before and after the *Dzud*. First: From 1991 to 1999, the number of domestic livestock had been increasing along with the increase of family members. During this period, nomads increased the number of their sheep and goats. Second: After the *Dzud*, it appears that respective farmers had between 51 and 100 livestock and about 65% of the families had less than 100 livestock. A comparison of data in 1999 and 2003, illustrated that in most categories, the nomads reduced in number where the reduction ratio depended on conditions, such as resistive livestock, weak livestock and labor conditions in respective families.

1. Introduction

Mongolia's incorporation into the market economy in 1991 was unique, given that most capital goods, which had belonged to the state during the planned economy, were distributed to farmers after Mongolian's absorption into the market economy. Consequently farmers had an incentive to increase production and the number of farm livestock. However heavy snowfall referred to as Dzud in Mongolian has resulted in crop damage, and a concomitant decrease in farm livestock. It can be seen that it is necessary to reconsider the conventional way of nomads.

Mongolia was affected more than Russia as her GDP declined between 1991 and 1993. The decline in GDP can be attributed to the withdrawal of subsidies from former East European countries to Mongolia's industrial sector, which resulted in the shutdown of factories and a decrease in exports. Agricultural productivity also decreased because agricultural organizations such as *'kolkhoz'* or *'sovkhoz'*, centers for grain production also collapsed. Individual farmers were unable to maintain the big agricultural machines, which had been transferred to them after the collapse of the state. However, traditional domestic livestock farms remained viable, remaining amongst a small number of industries that did not disappear during the transition of economic systems.

According to Suzuki (2003), Mongolian livestock farming was mostly privatized in 1991 when state controlled collectives (*NEGDEL*) and government-managed farms were integrated into the market economy due to the collapse of the Council for Mutual Economic Assistance (COMECON) structure and the directives IMF / World Bank [15]. As in the case of livestock farming, both grassland and well management remained viable after *NEGDEL* dissolution, although the number of the machine-operated wells decreased to one third in a decade. The harmful effects of the sudden introduction of market mechanisms were realized as, as Oniki (1998) pointed out, production prices were liberalized in 1992 and government's purchasing system abolished in 1993-94 resulting in the establishment of free market. Economic

restructuring and privatization process led to severe retrenchment in the public sector employment, and to the closure of many enterprises [8]. Although much of the shed labor force was absorbed in livestock farming. The number of livestock increased rapidly, despite of inadequate public property such as wells, and other associated problems [8]. As Oniki・Sohki (2003) and Oniki・Konagaya (2004) described, since real estate was not privatized, no ground rent was the key to stock-farmers gathering in the outskirts of the cities which provided them with convenient access to the markets [9, 10].

Although Yasunari (2003), Morita / Shinoda (2003) and Sugita (2003) studied Mongolian schemes for grassland management and ecological climate from ecological, climatic and hydrological views, the major factor accounting for the sharp drop in the farm livestock population has not been fully analyzed yet [18, 6, 14] They also pointed to that the fact that farmers moved their livestock near wells and thus overgrazing and the loss of pasture productivity became an additional problem. Studies on glass land management or ecological climate showed that Dzud was influential in the sharp decline of livestock as studied by Yasunari (2003), Morinaga・Shinoda (2003) and Sugita (2003) from ecological, climatic and hydrology studies [18, 6, 14] however, these studies are still new to describe how the number of the livestock reduced. Ozaki (2003) studies the livestock farming management based on the actual conditions involving production / marketing / selling [11].

This paper describes the characteristics of self sufficient nomads who emerged after the creation of the market economy and how they have been influenced by *Dzud*. We mainly use statistics in this study. Mongolia's transition to a market economy was surveyed based on statistical data. In our extensive investigation of a sample village, we compared the number of farm livestock amongst respective farmers in 1999 and 2003, before and after the *Dzud*. The comparison of these two different numbers of the same farmers depicted the substantial nomadic management figures.

2. Trends in economic activities and the number of livestock in Mongolia

Before examining nomadic management, we analyzed these factors in two categorical terms, one from 1986 to 1990 when Mongolia was under socialism, while the other terms is from 1991 to 2000 when Mongolia was under transition from socialism to capitalism. The latter term was divided into three categories ; i) 1991-93, ii) 1994-99 and iii) 2000-03.

In the i) term, she was changing her economic system from socialism to capitalism owing to the application of IMF's structural adjustment program. In the ii) term, her economic condition was improving until 1999's *Dzud*, the snow damage. In the iii) term started from the most recent worst Dzud in 2000 up to present.

2.1 Mongolia's Economic Conditions

Table 1 shows Mongolian GDP trend, where GDP decreased dramatically from 1992 to 93, after that it improved as it grew both in 1994-1999 and in 2000-03. Mongolian GDP real growth rate was 3.9% in 1986-1990, while it became minus 7.2% in 1991-93. Since GDP real growth rate recovered to 3.3% in 1994-1999 and 2.9% in 2000-03, her economic condition was at the bottom in the ii) term.

Principal economic activities were found in Agriculture, Industry and Services ; therefore, as indicated in the table, until 1990 Services shared 46% while Agriculture shared only 15.2% of her GDP in spite of the fact that Mongolia was considered an agricultural country. As time passed as shown in the table, Agricultural share in GDP increased, although agricultural share has decreased since 1986-1990. This is

due to the difficulties in importing raw materials for factory production after the COMECON was disbanded and resulted in poor processing of the raw materials such as wool and cashmere. The Services sector, however, decreased her GDP share from 1986 to 1999, but increased its share in 2000-03.

The table also indicates the GDP growth ratio such as all three sectors showed negative rates, especially in Industry and Services sectors showed not small minus values, while Agriculture showed comparatively smaller depression in GDP growth rate in 1991-93 than the other two sectors. *Dzud* had badly affected agriculture in the past, and it continues to do so today. Table 2 shows that in the Agricultural sector, since 1985 crop production has been continuously decreasing. Especially after 1990, the decrease is more obvious. As Mongolia increased in population, crop production decreased. Self sufficiency in crop production is at a serious low.

2.1.1 Trends in the number of livestock

The number of livestock is shown in Table 3 where camels, horses, cattle, sheep and goats are chosen. The years are the same as that of Table 2. Camels carry the tents (*Gels*) and furniture of the nomads when they migrate, and the owner or his family when managing other farm livestock such as sheep or run in horse racing, Cattle provide milk, sheep produce wool and lamb, and goats produce milk and cashmere which are particularly important on the market economy. In the recent market economy, lamb, wool and cashmere are in common circulation.

The major Mongolian producer of livestock changed from *NEGDEL*, an agricultural production organization to individual nomads. For example the trend after 1991 indicates that the number of livestock increased steadily until 1999, but the number of livestock declined after the 2000's *Dzud*. In 1986-1999 the order of livestock in terms of largest numbers were sheep,

Table1 Mongolian Economy in GDP

year	GDP		Structure of Output in GDP			Growth of Output in GDP		
	Million of GDP[a] (Tugriks)	Real growth rate (%)	Agriculture (%)	Industry (%)	Services (%)	Agriculture (%)	Industry (%)	Services (%)
1986-90	202,500	3.9	15.2	38.7	46.1	3.1	4.3	4.6
1991-93	175,645	-7.2	26.5	33.5	40.0	-3.1	-10.9	-7.3
1994-99	516,923	3.3	38.2	24.8	37.0	4.8	-0.4	4.4
2000-03	659,540	2.9	23.7	22.0	54.3	-9.9	6.1	11.9

Source : Asian Development Bank (ADB) -*Key Indicators 2004* (www.adb.org/statistics) National Accounts For 1986-1987, 1995-2003, NSO, Official Communication, 26 April 2004 and past communication. For 1988-1994, NSO, *Statistical Yearbook 1996*. FAO, FAOSTAT Database, Internet Website.
Note : "a" refers to the Constant 1993 / 1995 Price.

Table 2 Cereal Production and Population

	Cereals[a] (per capita, kg)					Mid-Year Population (million)		
Year	1985	1990	1995	2002	2003	1990	2000	2003
	470	339	116	63	75	2.1	2.4	2.5

Sources : Asian Development Bank (ADB) -*Key Indicators 2004* (www.adb.org/statistics) FAO, *FAOSTAT Database*, Internet Website. UN, *World Population Prospects, The 2002 Revision.*
Note : "a" refers to total cereal production.

Table 3　Number of Major Livestocks

Item / Year	Number of livestock (ten thousand)			
	1986-90	1991-93	1994-99	2000-03
Camels	55	48	36	31
Horses	207	224	266	255
Cattle	253	283	331	276
Sheep	1,348	1,482	1,395	1,320
Goats	450	533	872	994

Sources : FAO, *FAOSTAT Database,* Internet Website.

goats, cattle, horses, and camels. The number of camels decreased because trucks became the mode of transportation. The number of horses as well as cattle increased up to 1999.

Sheep increased in number until 1993, but after that they slowly decreased. Goats have been increasing since 1993. Prior to that date, domestic livestock farmers depended mainly on sheep, but the number of goats surpassed the number of sheep in 1994 due to their high selling price on the international market. In any case 2000's *Dzud* had a big impact on the number of livestock, excluding goats.

In Table 4, we divided the scale of the nomads by the number of the livestock in 1 -10, 11 -30, 31-50, 51-100, 101-200, and more than 201. The total number of the nomads decreased since 1995, the mode on that year appeared in 51-100. The mode appeared 101-200 in 1999, but returned to 51-100 in 2000 and the after. The number of the nomads having more than 201 livestock decreased in its ratio in 2000 and in 2001, its ratio decreased to that of 1995. The ratio of the nomads who have less than 50 livestock had decreased from 1995 to 1999, but it began to increase from 2000. It is because until 1999, the nomads increased livestock number, resulted in reducing the ratio of the level less than 50 livestock.

3. Case study

This chapter describes a case study based on recent statistical data of several sample counties. Mongolian nomads reformed as increasing the number of livestock after market economy spread. The number of goats continued increasing even when in 2000 other livestock reduced in number due to *Dzud*. This phenomenon is important to understand market oriented modern nomads.

Economically active nomads are found on the outskirts of *Ulan Bator*, the capital of Mongolia because of easy access to big markets; thus, we focused on *Tov* prefecture for a case study. More precisely speaking, we focus on the *First Bag*, Bayan county in *Tov* prefecture. Data of statistics are based on "*Livestock assessment personal questionnaire*" which is investigating the *First Bag* thoroughly from December 7 to 17.

Table 4　Grouping of Households by Number of Private Livestock

Year	Number of livestock						
	-10	11-30	31-50	51-100	101-200	201-	Total
	Households						
1995	43,694	50,580	40,200	61,082	53,564	34,793	283,913
1999	28,669	35,970	31,874	61,347	67,840	44,250	269,950
2000	31,361	40,436	35,041	63,096	59,821	38,977	268,732
2001	33,797	43,082	36,030	60,195	51,383	32,063	256,550
	Share of Households (%)						
1995	15.4	17.8	14.2	21.5	18.9	12.3	100
1999	10.6	13.3	11.8	22.7	25.1	16.4	100
2000	11.7	15.0	13.0	23.5	22.3	14.5	100
2001	13.2	16.8	14.0	23.5	20.0	12.5	100

Sourse : Mongolian Statistical Office, *Mongolian Statistical year book,* 2001.

3. 1 Outline of Study area

Table 5, we categorized nomads according to the scale, shows the trend of the number of livestock in Tov prefecture, where the total number gradually decreased as that of total Mongolian did. The statistical data on the scale of the nomads by the number of the livestock realizes that the total number of the nomads having more than 201 livestock increased up to 1999 while the nomads having 101-200 livestock also increased in the number up to 1999. On the contrary the nomads having less than 50 livestock decreased till 1993-99, however, their number of the farm livestock increased. Mode was found 11-30 livestock in 1993-1996 while mode shifted to 51-100 after 1997 and 101-200 livestock. In 2000 due to *Dzud* mode shifted from 101-200 to 51-100 livestock, however, the increase in the livestock number has been bringing the mode to upper class.

Table 6 shows the trend of the number of the livestock in *Bayontsagaan* county, *Tov* prefecture, where mode has been shifting to upper class more than 200 livestock but the number of the nomads has been decreasing. *Bayontsagaan* county shows higher mode than average mode of the *Bayontsagaan* counties. The mode shifted down to the level of less than 200 livestock in 2000 at *Bayontsagaan* county as well as that of *Tov* prefecture shifted in the same way.

Thus we observed both in *Tov* prefecture and *Bayontsagaan* county, nomads have been managing nomads with increasing the number of livestock but in 2000, the number of livestock decreased, resulting in mode shift to lesser level of the livestock number.

3. 2 Lives of the nomads

This section describes the nomad lives in the *First Bag*, *Bayontsagaan* county in *Tov* prefecture from our observation. Table 7 shows the number of the member of the families and their age bracket. The number of the livestock in-

Table 5 Number of Households in *Tov*

Year	Number of livestock						
	-10	11-30	31-50	51-100	101-200	201-	Total
	Households						
1993	3,935	5,462	3,613	3,795	2,620	1,095	20,520
1994	3,832	5,114	3,107	3,671	2,690	1,392	19,806
1995	3,535	4,621	3,009	3,676	2,753	1,582	19,176
1996	3,098	4,082	2,718	3,660	2,914	1,983	18,455
1997	2,650	3,513	2,472	3,970	3,662	2,185	18,452
1998	2,549	2,872	2,246	3,801	3,976	2,579	18,023
1999	2,373	2,778	2,031	3,525	3,746	2,811	17,264
2000	2,281	2,779	2,150	3,655	3,450	2,477	16,792
	Share of Households (%)						
1993	19.2	26.6	17.6	18.5	12.8	5.3	100
1994	19.3	25.8	15.7	18.5	13.6	7.0	100
1995	18.4	24.1	15.7	19.2	14.4	8.2	100
1996	16.8	22.1	14.7	19.8	15.8	10.7	100
1997	14.4	19.0	13.4	21.5	19.8	11.8	100
1998	14.1	15.9	12.5	21.1	22.1	14.3	100
1999	13.7	16.1	11.8	20.4	21.7	16.3	100
2000	13.6	16.5	12.8	21.8	20.5	14.8	100

Sourse : Tov Prefectural office, *Tov Social and Statistics year book,* 2001

Table 6　Number of Households *Bayontsagaan*

Year	Number of livestock						
	-10	11-30	31-50	51-100	101-200	201-	Total
	Households						
1993	20	38	61	200	241	118	678
1994	24	72	67	159	190	143	655
1995	25	55	120	146	148	161	655
1996	24	50	51	115	190	196	626
1997	13	53	50	120	195	216	647
1998	15	51	51	131	180	236	664
1999	18	47	36	135	151	268	655
2000	21	59	61	133	192	169	635
	Share of Households (%)						
1993	2.9	5.6	9.0	29.5	35.5	17.4	100
1994	3.7	11.0	10.2	24.3	29.0	21.8	100
1995	3.8	8.4	18.3	22.3	22.6	24.6	100
1996	3.8	8.0	8.1	18.4	30.4	31.3	100
1997	2.0	8.2	7.7	18.5	30.1	33.4	100
1998	2.3	7.7	7.7	19.7	27.1	35.5	100
1999	2.7	7.2	5.5	20.6	23.1	40.9	100
2000	3.3	9.3	9.6	20.9	30.2	26.6	100

Sourse : Tov Prefectural office, *Tov Social and Statistics year book*, 2001

creases as the number of the member increases. Thus labor becomes bigger as the livestock number increases. Table 8 introduces discussion on the livestock keeping management of the nomads as it shows the species of the livestock against the levels of the nomad family scale given by livestock numbers. Nomad's family having less than 50 livestock would not keep camels, while the number of Horses increases as the number of the total livestock increases. On the other hand, sheep and goats show unique distribution to the family level, being different from those of camels, horses and cattle. Comparatively larger scale families, keeping 100 to 200 total livestock tend to keep breeding livestock such as sheep and goats.

We depict these characteristics in Table 9, where we find concrete difference between the families having more than 200 livestock and the families having less than 200 in the number of the growth number of the livestock, especially livestock birthrate. The decreasing number of livestock in the self-consumption and the number of the total livestock are not different from each other, where the number of the livestock increased minus decreased appears minus in the small families having less than 50 livestock. Thus the numbers of the increasing livestock become differentiated at the number of the total livestock 200 as watershed.

4. Livestock number change due to *Dzud* and its possible causes

4. 1 Livestock number change due to *Dzud*

4. 1. 1 Changes in the number of Livestock before and after *Dzud*

Table 10 shows the total number of livestock amongst nomads in the *First Bag, Tov* prefecture. The data shown is for 1999 just before *Dzud* and 2003, the date of the most recent *Dzud*. All nomads are classified into three different categories ; traditional nomads who have been nomads since 1999, nomads who abandoned herding after 1999 and new nomads who

Table 7 Number of Family Labour in *First Bag* (2003) (person / houeholds)

Item	Number of livestock					
	-10	11-30	31-50	51-100	101-200	201-
Family member	3.7	3.5	3.1	3.6	4.4	5.4
Family labour	1.7	1.7	1.8	2.0	2.3	2.8
Age (family labour)						
16-34	0.7	0.7	1.0	0.6	1.2	1.2
35-59 (F35-54-)[a]	0.7	0.9	0.7	1.0	0.8	1.2
60- (F55-)	0.3	0.1	0.2	0.4	0.4	0.4
Female	0.0	0.2	0.7	0.8	0.9	1.2

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : "a" refers to male 35-59, female 35-54.
Data of Family Labor are based on *"Livestock assessment personal questionnaire"* which is investigating *First Bag* thoroughly from December 7 to 17 in 2003, which Household number is 141.

Table 8 Number of Livestock in the *First Bag* (2003) (heads)

Item	Number of livestock					
	-10	11-30	31-50	51-100	101-200	201-
Total	7.3	21.0	42.3	71.1	146.1	359.0
Camels	0.0	0.0	0.0	0.2	0.2	0.5
Horses	0.7	3.3	9.1	8.9	17.7	32.7
Cattle	1.0	0.9	0.4	2.8	6.7	11.4
Sheep	0.0	3.0	15.0	20.6	63.0	198.4
Goats	0.0	13.8	17.8	38.6	58.5	115.9
Breeding animal						
Total	0.7	8.8	17.6	49.9	89.1	160.5
Camels	0.0	0.0	0.0	18.9	19.5	0.1
Horses	0.3	1.4	3.1	3.3	6.3	11.0
Cattle	0.0	0.4	0.2	1.3	3.4	4.9
Sheep	0.0	1.5	6.0	9.7	31.6	94.1
Goats	0.0	5.5	8.2	16.7	28.4	50.4

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.

Table 9 Changes in Livestock in the *First Bag* (2002-2003) (heads)

Item	Number of livestock					
	-10	11-30	31-50	51-100	101-200	201-
Increase	3	12	16	35	51	137
Purchase	1	5	4	9	4	26
Birth	2	7	12	25	47	111
Decrease	19	7	18	21	33	56
Sale, transfer	7	4	15	10	26	47
(Selling for meat)	0	0	1	1	0	0
Self-consumption	13	3	3	10	8	9
Total (increase-decrease)	-17	5	-2	14	18	81

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.

became nomads in 2003.

After the transition from a planned central economy to a market economy, the maximum number of livestock appeared in 1999 ; where in 1999 among the traditional nomads 76 families out of 141 had less than 200 livestock. Here, 200 livestock per family is the least sustainable number of livestock to which respective family depends for consumption or selling for income, thus any families with less than 200 livestock find it hard to feed themselves.

Mode among the levels of the livestock number per one family in 1999 appears in the category of family with more than 301 livestock, corresponding to 38 families. Only 11 families kept their livestock number more than 301 in 1999 to 2003, thus only one third of the families exceeded this number. There were five families who lost the number of livestock mentioned above, thus we can understand that *Dzud* was a primary factor to have broken up large scale nomads. This kind of reduction in livestock number is common in all categories, thus families keeping more than 301 livestock are also included in this trend. Among the former nomads who left herding in 2003, more than half of the total number, 36 families, of which had less than 200 livestock and the mode appears in 51-100 livestock number.

In the statistical data for 2003, after *Dzud,* mode appears in the level that the respective farmer has 51-100 livestock. Among all of the levels, the number of the families having less than 100 livestock shares 65%, the most of which are hard to keep their nomad's since 1999.

To compare the data for 2003 to that for 1999, in most of the levels, nomads reduced the number of livestock. It is confirmed from the Table where there are only two families above the framed ones.

Nomads with zero livestock in 2003 existed, while 36 families abandoned nomadic life style, resulting in 49 families remaining. This number of families abandoning nomadic life styles is almost equal to one third of the total number of the families, 141 ; therefore, *Dzud* had a serious impact on nomads. New nomads with less than 300 livestock are under the conditions as traditional nomads ; however, as most of the 36 new nomads have less than 200 livestock, they

Table10 Dynamic Statistics of Households in *First Bag, Tov prefecture* (1999→2003)

		Ongoing Nomads (2003)									Abandon Nomads	Total 1999
		0	1-50	51-100	101-150	151-200	201-250	251-300	301-	Total		
Ongoing Nomads (1999)	0											
	1-50	7	1							8	6	14
	51-100	3	14	4						21	10	31
	101-150	1	7	1	1	1				11	6	17
	151-200	1	3	5		1				10	4	14
	201-250		1	7	2	1		1		12	4	16
	251-300	1	1	2	3	3	1			11		11
	301-			5	4	3	5	4	11	32	6	38
	Total	13	27	24	10	9	6	5	11	105	36	141
New Nomads		13	7	7	3	3	2	1		36		
Total 2003		26	34	31	13	12	8	6	11	141		

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : Abandon Nomads who have abandaned nomadic lifestyle.
Ongoing Nomads who have continued nomadic lifestyle.
New Nomads who have entered nomadic lifestyle.

should face difficulties continuing to be a nomad. In 1999, about 50% of the nomads had less than 200 livestock, but in 2003 about 20% of them have less than 200 livestock.

4.1.2 Characteristic of Increase and Decrease of Livestock

Table11shows the characteristics of the nomads that increased the number of the livestock in 1999. The numbers of the nomads are the same to the former table, however, this table points out that the farmers involved in the levels with 51-100, 101-150 and 301-livestock increased the livestock number, but the increased ratio was not high. The average number of the livestock per one family decreased from 1999 to 2003 and its average decreased ratio was 38.6%, while this ratio became 32.7% in the nomads with less than 200 livestock. On the contrary, in the nomads with more than 200 livestock, this ratio was more than 40%, thus we find that the *Dzud* effects were worse amongst larger scale nomads. This is because the number of respective family members is almost the same amongst both smaller scale nomads and large scale nomads, where the scale depends on only the livestock number not on the number of the family member. We suppose when the number of the livestock per one labor in the family is small, this family could cope with *Dzud* comparatively easily.

In the *First Bag* in *Tov* prefecture indicates that about one half of the nomads were below the 200 livestock line in 1999, when the total number of the livestock was at the maximum. Thus in spite of the increase in the total livestock number, the number of poor families increased, most of them lived under the 200 line. The ratio of the nomads with more than 300 livestock decreased down to 44% due to *Dzud,* where the reduction ratio depended on the conditions such as resistive livestock or weak livestock, labor conditions in respective family.

The number of the livestock belonged to the families left from nomads were mostly less than 200. The difference of the number of the nomads was not in proportion to the livestock number, therefore, one of the major causes to leave from nomads is the number of the livestock they had.

Table11 Characteristic of Increase and Decrease of Livestock (Ongoing Nomads, 2003)

Number of livestock	House holds	Based on 1999		Decre ase average per households		Family labour per Nomad	
		Increase of Livestock (family)	Decrease of Livestock (households)	(heads)	(%)	1999 (person)	2003 (person)
1-50	8		8	29	4.9	2.9	4.6
51-100	21	1	20	49	36.6	2.2	3.4
101-150	11	2	9	72	44.3	1.9	3.5
151-200	10		10	116	42.7	2.6	4.1
201-250	12	1	11	126	44.7	2.3	3.6
251-300	11		11	157	42.9	1.3	5.0
301-	32	1	31	414	44.0	3.2	4.9
Average							
1-200				64	32.7	2.3	3.8
200-				300	43.9	2.8	4.6
Total	105	5	100	188	38.6	2.6	4.2

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : Abandon Nomads who have abandaned nomadic lifestyle.
Ongoing Nomads who have continued nomadic lifestyle.

4.2 Possible factors for change in domestic livestock numbers

4.2.1 Labor and family of nomads in the 1999 standard

Table 12 compares the characteristics of nomads continuing nomadic lifestyles and nomads who abandoned nomadic lifestyles during 1999 and 2003. Nomads are divided into three categories ; average, more than 200 and less than 200 in terms of the number of livestock. The average number of the family member in the abandon nomads was 3.8 while that in the ongoing nomads is was 4.5. In terms of the labor, the former was smaller by 0.6 person than the latter, therefore, this difference was not a major cause to let the former leave nomads.

Table 13 shows a comparison of the number of livestock belonging to nomads who abandoned nomadic lifestyles and nomads continuing nomadic lifestyles in 1999 and 2003. The latter, the ongoing nomads hold an extremely large number of livestock, more than 200 livestock, which we used as the 200 livestock line. This discrepancy comes from the number of sheep, being about 80. If discount this number from the total number of the reproductive livestock in the latter line of the table, there is no different trend between the abandon and ongoing nomads except camel. To compare the abandon nomads and the ongoing nomads, the abandon nomads holding less than 200 livestock had no camels. The number of sheep was larger in the left monads than in the ongoing nomads in the level of less than 200 livestock numbers. In any levels, the number of sheep was dominant, followed by goats and horses.

Table 14 shows the increase and decrease in the number of livestock. As shown in the previous tables, the increased numbers of the livestock were 77 amongst nomads who had abandoned nomadic lifestyles and 106 amongst nomads who continued nomadic lifestyles respectively, resulting in the difference. In both cases the number of birth exceeded those of purchased and of exchange presents, from this fact, we consider that is not easy to keep their livestock revel by own breeding.

4．2．2 Damage of *Dzud* for Livestock

Due to *Dzud*, decrease in the number of livestock seems to have reduced nomad conduct. Table 15 shows the number of livestock amongst nomads continuing nomadic lifestyles, in which the number in 1999 was chosen to be standard, compared to the changed ratio in 2003. The changed ratio 1 -50% indicates severe damages while the ratio above 51% indicates comparatively lesser damages. Thus, this Table depicts the decrease ratio to predict *Dzud's* influence in

Table12 Family Labour Characteristicss (person / households)

	Abandon Nomads			Ongoing Nomads		
	Number of livestock					
	Average	-200	201-	Average	-200	201-
Family member	3.8	3.4	4.9	4.5	3.7	5.3
Family labour	2.2	1.8	3.3	2.6	2.3	2.8
Age (family labour)						
16-34	1.2	0.9	1.8	1.5	1.6	1.5
35-59 (F35-54-)[a]	0.5	0.5	0.6	0.8	0.5	1.0
60- (F55-)	0.6	0.5	0.9	0.3	0.3	0.3
Female	1.0	0.9	1.2	1.3	1.5	1.2

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : Abandon Nomads who have abandaned nomadic lifestyle.
Ongoing Nomads who have continued nomadic lifestyle.
"a" refers to male35 - 59, female35 - 54.

Table13 Characteristic of Livestock (heads)

	Abandon Nomads			Ongoing Nomads		
	Number of livestock					
	Average	-200	201-	Average	-200	201-
Total	180	92	416	310	99	506
Camels	0	0	1	1	0	2
Horses	34	17	78	50	23	75
Cattle	17	12	33	26	12	38
Sheep	88	40	220	166	35	287
Goats	40	23	85	68	30	104
Breeding animal						
Total	61	37	127	114	41	181
Camels	0	0	0	0	0	0
Horses	7	4	15	11	5	17
Cattle	6	5	9	8	4	12
Sheep	31	16	72	65	17	110
Goats	17	12	31	29	15	43

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : Abandon Nomads who have abandaned nomadic lifestyle.
Ongoing Nomads who have continued nomadic lifestyle.

Table14 Trends in the Increase and Decrease of Livestock

	Abandon Nomads			Ongoing Nomads		
	Number of livestock					
	Average	-200	201-	Average	-200	201-
Increase	77	39	181	106	37	171
Purchase	22	7	63	10	6	15
Birth	55	32	117	96	31	156
Decrease	43	32	71	74	34	110
Sale, transfer	14	9	27	28	11	44
(Selling for meat)[a]	15	12	23	30	11	47
Self-consumption	12	10	18	13	11	16
Death	2	2	3	2	1	3
Total (increase-decrease)	34	6	110	33	3	60

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : "a" refers to sum of foodstuffs sold in the market by Normads.
Abandon Nomads who have abandaned nomadic lifestyle.
Ongoing Nomads who have continued nomadic lifestyle.

domestic livestock damages.

Among the conventional 105 nomads, 50 families have livestock less that 200, while other 55 families have more than 201 livestock. The average number of livestock amongst smaller scale farmers changed ratio 1 -50% was 119, while in the greater changed ratio 51% and more, 94. To use the average number of the livestock, the damage of *Dzud* was worse in the former, as the number of the livestock decreased from 119 to 31, reached one third. The average number of the livestock in the latter class, de-

creased from 94 to 64. Thus we understand that the *Dzud* effect was worse amongst larger scale nomads. Their average number of keeping livestock reduced from 506 to 206, about two thirds of the reduction is similar to that of the nomads with less than 200 livestock. Thus even in the large scale nomads, *Dzud* gave severe damages at almost the same extent.

Table 16 shows that the reduction of the livestock number in the nomads with less than 200 livestock was 87 which involve 38 sheep, 20 horses. The ratio of the reduction was dominant in horses and sheep.

When we put 1999 year data of the livestock number as a standard, cattle reduced in ratio at most. Thus *Dzud* damaged livestock horses and sheep at most in terms of the total number but cattle in terms of the ratio. This characteristic is the same to that of the class of more than 51% class in the changed ratio. Horse showed less reduction while goats increased by 13% in 2003.

This characteristic is also found in the levels of nomads keeping more than 200 livestock. The reduced number of livestock in the category of nomads with less than 200 livestock is reflected in the number in the order of sheep, horses, goats or cattle. When we depict this order in terms of reduction ratio, then we see cat-

Table15 Damage of *Dzud* for Livestock (Ongoing Nomads)

		1-200(heads)					201(heads)-				
1999=100 Livestock	(%)		0	1-50%	51-100%	(101%-)		0	1-50%	51-100%	(101%-)
Nomads household	(house)	50	4	38	9	3	55	1	34	18	2
1999 (average)	(heads)	99	60	119	94	107	506	267	534	489	296
2003 (average)	(heads)	35		31	64	129	206		152	306	328

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : Ongoing Nomads who have continued nomadic lifestyle.

Table16 Increase or Decrease of *Dzud* for Livestock (Ongoing Nomads, 1999→2003)

	Damage of Dzud for Livestock					
1999=100 Livestock	1-200 (heads)			201 (heads)-		
	1-50%	51-100%	(101%-)	1-50%	51-100%	(101%-)
Increase or Decrease ; 1999→2003						
Total (heads / household)	-87	-30	22	-382	-183	32
Camels	-	-	1	-1	-2	-
Horses	-20	-14	-8	-61	-43	-7
Cattle	13	-10	-3	-34	27	9
Sheep	-38	-9	11	-238	-111	-15
Goats	-16	4	22	-47	0	62
Index, 1999年=100						
Total (heads / household)						
Camels	-	-	-	17	17	-
Horses	22	26	38	22	42	72
Cattle	11	18	55	14	27	69
Sheep	16	55	140	23	59	92
Goats	51	113	131	55	100	188

Source : Field survey and *"Livestock assessment personal questionnaire"*, 2004.
Note : Ongoing Nomads who have continued nomadic lifestyle.

tle and sheep or horses. Thus the reduction rates of cattle were significant. In the class of the changed ratio above 51%, the reduction of the number of the livestock was comparatively small because the number of goats increased in 2003 than those in 1999. The reduction of the other livestock number was compensated by goat production.

5. Conclusion

This paper, focusing on the number of the domestic livestock, studied Mongolian nomadic economic conditions change through revolution from planned economy to market economy and damage of *Dzud*. So, we categorized between before and after *Dzud* when is the year of 2000.

First, since 1991 to 1999, the number of the domestic livestock had been increasing with increase of per family number of the livestock. Nomads per family domestic livestock in *Tov* prefecture was 101-200 in 1999, while in *Bayontsagaan* county it was above 200 and in the *First bag* it was above 300. From these data, we see even in 1999 when the number of the livestock was maximum, the average per family livestock number in *Tov* prefecture was under the 200 livestock levels, which is a minimum level for independent nomads as a full time farmer.

During this period, nomads increased the number of sheep and goats. Sheep increased in number until 1993, but after that they were slowly decreased. Goats have been increasing because till 1993the livestock farmers mostly had depended on sheep, but they were replaced by sheep to goats in 1994 for their high selling price on the international market.

Second, in the statistical data for 2003, after *Dzud,* mode appears in the level that the respective farmer has 51-100 livestock. Among all of the levels, the number of the families having less than 100 livestock shares 65%, the most of which are hard to keep their nomad's since 1999. To compare the data for 2003 to that for 1999, in most of the levels, nomads reduced the number of livestock.

Thus in spite of the increase in the total livestock number, the number of poor families increased, most of them lived under the 200 livestock line. The ratio of the nomads with more than 300 livestock decreased down to one third due to *Dzud,* where the reduction ratio depended on the conditions such as resistive livestock or weak livestock, labor conditions in respective family.

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