The Productivity Consequences of Incomplete Reforms of the Extensive Livestock Industry in Mongolia

A paper presented to the SURF International Seminar
"Recovery with Incomplete Reforms"
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1. Introduction

1.1 Role of the livestock sector in the national economy

Mongolia is a Central Asian country with extensive livestock production as the dominant sector in agriculture. The population of Mongolia is 2.4 million, over half of which is urban, living in the capital Ulaanbaatar and other major towns. About 35% of the population are involved directly in extensive livestock production. In 1998, the livestock population of Mongolia was around 32.9 million, and was made up of horses (3.0 m), cattle including yaks (3.7 m), camel (0.4 m), sheep (14.7 in) and goats (11.1 m). Mongolian livestock produce mainly meat, although wool, milk, cashmere, skin and other products are also important. In 1998 the rural sector, overwhelmingly pastoral, accounted for 32.8 percent of GDP.

1.2 Major characteristics of the extensive livestock industry

The major characteristics of the Mongolian extensive livestock industry in the context of the current study are its absolute dependence on a extremely harsh and highly variable natural environment and the resulting low and basically constant yield per animal over time .

Mongolian livestock get over 95 percent of their annual fodder from natural pastures, utilizing them all year round. Pasture resources are highly dependent on erratic rainfall and their availability is subject to snowfall during cold seasons, 'faking the high >eason standing pasture as 100 percent, winter production is 50-60 percent and spring production is 30-40 percent. As the season progresses, quality of vegetation decreases 2-3 nines and its protein content by 3-4 times. Accordingly, Mongolian animals, well suited

for pastoral grazing, accumulate fat, grow and produce during summer and autumn, and they survive by using their fat reserves and by reducing their feed requirements during winter and spring.

The most extreme natural hazard is dzuud, (sudden winter snowfall burying pastures) which can appear out of nowhere and overwhelm the herders who are caught in the sudden dump of snow. They are immediately faced with the starvation of their stock, which being already in poor body condition, may die within days. The next danger is drought which usually happens due to the failure of principal rains in June-August. The consequence of drought is that peak summer pastures are poor, followed by insufficient growth in autumn/winter reserved pastures. As a result animals go into the winter with insufficient body condition and become steadily weak because of the poor status of the reserved pastures.

Mongolia is a land-locked country with severe continental climate. The average monthly temperature ranges -15 °C to -30 °C in winter and 1 5 °C to 30 °C in summer, annual rainfall is only 50mm to 350 nun .::id average pasture yield per hectare is around 150-600 k.g in dry mass.

The main and traditional strategy in response to the severe and highly variable natural environment is mobility of herding families in search of better pasture, water and favorable weather. Another reasonable strategy, which was one the main focuses of economic policy during the socialist period, is to invest in fixed capital such as winter and spring shelters and weils. and to provide veterinary services, labor and fodder supplements during especially difficult periods.

Because of ecological constraints the extensive livestock industry in Mongolia is characterized by low and basically constant yields of meat, milk and wool per animal over time.

Table 1: Per head production of meat, wool and milk in Mongolia

	1960	1980	1991
Average live weight sold to the state (kg)			
-Cattle	248	217	245
-Sheep	36	33	39
-Goat	28	26	33
Wool yield (gr.)			
-Sheep	1186	1390	1243
-Camel	4104	5034	4365
-Cow milk (liter)	344	292	323

Source: State Statistical Office of Mongolia. Mongolian Statistical Yearbook (1970, 1981 and 1992 editions)

1.3 Intensification in the socialist period

From the late 1950's up until 1990, when Mongolia began the process of economic liberalization, all members of the rural population were negdel (state cooperative) or state farm employees. The negdel was primarily an economic unit responsible for marketing livestock products, supplying inputs and consumer goods as well as fodder and transport services to its members. The average size of a negdel in 1985 was around 400 000 ha of pastures, with a total of 60 000 livestock, 43 tractors (in 15 horsepower units) and 15 motorcars. The smallest production unit within a negdel was a situri. or one to four households involved in the production of specialized species herds. The average size of siiuri was around 500-600 sheep equivalents.

For the last 30 years up to 1990, the centrally planned system of agriculture moved towards the intensification of production by providing shelter structures and veterinary services for livestock, making supplementary fodder and concentrates and irrigating natural pasture. The intensification process was implemented by a series of large campaigns at tremendous cost. The bulk of these investments was brought about in the late 1960's, peaking in the 1970's and early 1980's. The increasing trend in water and shelter-supply compared with the generally constant livestock numbers is shown in Figure 1 where the number shelters and wells is given in thousands. Likewise, for the same period, the total harvest of natural hay, the main fodder supplement in Mongolia, increased from 522.2 thousand tons in 1970 to 1275.6 thousand tons in 1985.

2. Transitional reforms and emerging challenges

With the beginning of the transition of the Mongolian economy to a market oriented system in 1990-1991, the extensive livestock production system developed over the past 30 years has collapsed. The government has privatized the ownership of the stock and, in reaction to long years

of central planning, has stood back leaving the industry to reorganize itself.

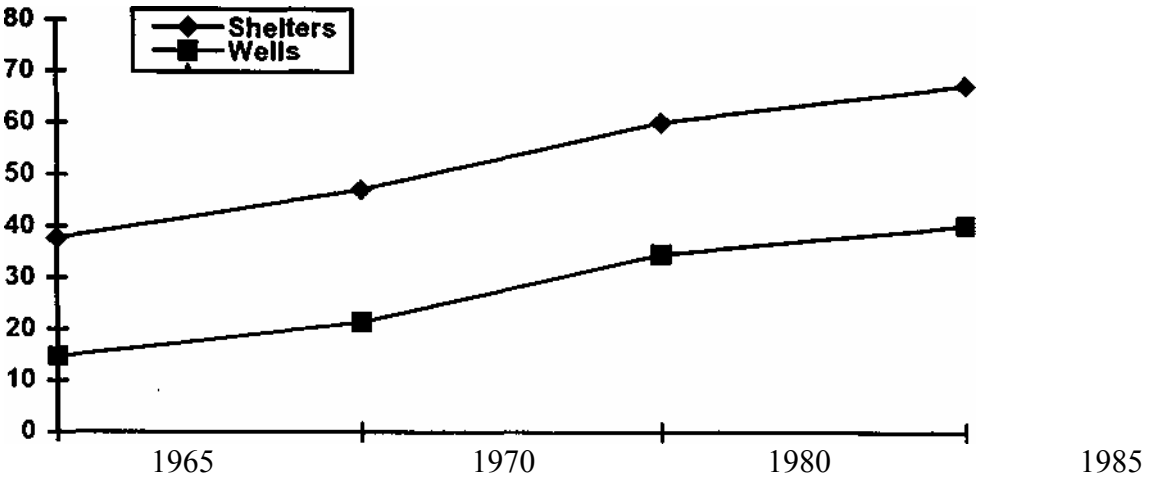


Figure 1: The total number livestock shelters and wells for pastures in Mongolia.
Source: State Statistical Office of Mongolia. Mongolian Statistical Yearbook. (1986)

In 1998, the share of privately owned livestock constituted 95.3% compared to 31.8% in 1990. The cooperatives and state farms have been broken into small household economies. In 1998, the average livestock per family (5-7 people) were only 1 15 (around 230 sheep equivalents). This may mean that the productivity of the sector is falling through a decline in labor efficiency and herders are interested only in subsistence-production. It is becoming increasingly clear that the existing small households badly lack resources in providing such important services for them as preparation of supplementary fodder, medicaments for livestock, transportation and marketing and overcoming production and price risks. There is less utili/ation of supplementary fodder and veterinary services and an apparent unwillingness of herders to use superior stock for breeding purposes, indicating the danger of a long-term decline in animal productivity and the quality of output. Changes in the quantity of major technological inputs during the transitional period are shown in **Table 2.**

Table 2: Changes in the quantity of major technological inputs

	Stocking Rate Sheep Units per 1000 hectare	Supplementary fodder '000 tons	Number of Wells and Reservoirs '000	Shelter Capacities 000 animals	
				Cattle	Small Stock
1988	**401,6**		**47.0**	**2810.**	**28710,4**
1989	**423,4**	**1027,3**	**46,4**	**2821,**	**28678,8**
1990	**440,7**	**696,4**	**45,8**	**2735,4**	**27917.0**
1991	**432,7**	**562,1**	**41,2**	**2281,1**	**25983,9**
1992	**437,8**	**403,7**	**39,2**	**1844,2**	**25898,3**
1993	**443,2**	**410,9**	**38,9**	**2093,4**	**23987,3**
1994	**481,0**	**373,3**	**37,8**	**2147,4**	**24971,9**
1995	**519,8**	**437,3**	**36,5**	**1960,1**	**24992.0**
1996	**537,7**	**349,2**	**n.a.**	**n.a.**	**n.a.**
1997	**518,4**	**340,2**	**n.a.**	**n.a.**	**n.a.**
1998	**541,7**	**330,3**	**n.a.**	**n.a.**	**n.a.**

Source: Slate Statistical Office of Mongolia. Mongolian Statistical Yearbook, (1995. 1998 editions)

and State Statistical Office of Mongolia. Agriculture in Mongolia (1996)

The privatization of the stock and price liberalization provided powerful incentives for maximizing livestock numbers. In 199R, the total livestock number reached 32.l) in or 69.2 m in sheep units. According lo currently available estimates, the total carrying capacitv of Mongolian pasture is around 63 in sheep units per year. Although this number is doubtful the problem of pasture degradation already became a reality in Mongolia weakening the long-term sustainability of the industry. The dramatic increase in the number of herding households resulted in increasing conflicts over pasture resources especially winter and spring camps. Because of transportation and labor constraints to conduct seasonal moves and market their products, poor herders arc mostly captured in low-quality pastures near urban centers, thus exposed lo further poverty.

Thus, transitional reforms centered on privalixation and price liberalization laid out ;i framework in line with overall movement towards a market economy, however, they arc far from being complete. Putting the industry on snstainable path of development through resolving the accumulated problems needs more reforms. In this respect an analysis of productivity of extensive livestock production is interesting and provides useful insights into designing sound development strategies for the industry. Especially, the question of productivity consequences of transitional changes in livestock production entails serious policy implications.

2. Productivity Analysis

The productivity of the industry was analyzed by the use of production function estimated on the basis of panel data for the period from J969 to 1990*. The period was selected on the following grounds. First, extensive panel data on technological inputs needed for modeling production were available only during the socialist period. Second, the peak period of intensification of livestock production during the socialist agriculture provides a good basis for comparing with the transitional period. Third, the question of whether the intensification process undertaken from the 1960's to 1990 led to productivity gains is quite interesting in itself.
The productivity analysis in this study consists of two parts. The first part is designed for highlighting some important features of the specified production function and its policy implications for the sector. In the second part production elasticities of the estimated model are used for estimating productivity losses of on-going reforms which are claimed to be incomplete.

2.1 Production function

2.1.1 General approach to model specification

The general approach to model specification in this study is that, under Mongolian conditions, productivity gains can be achieved more readily by decreasing the mortality rate and increasing the birth rate of animals, rather than by trying to increase yield of products per animal.

This approach is based on the following grounds:

1. Yield of wool, milk and meat from an individual animal was basically constant over the period under investigation (See Table 1). A standard dependent variable in a production function is 'total output' which, in the case of animal production, is derived as animals times per head productivity. It follows that if per head productivity is constant then output is proportional to animals
(See Appendix 1).

' The production function was estimated by the author in his ME's dissertation, UNK, Armidale, Australia, 1997

2. During the transition production decision-making at the herd level, aimed at maximizing livestock numbers, remained much the same while there occurred tremendous changes in areas such as harvesting, storage, transportation and marketing of livestock products. Therefore, the relevance of the production function estimates based on the socialist period can be improved if it deals with the variable that was less affected by the transitional changes.
3. The use of growth rate, rather than harvested products, as a dependent variable avoids the errors associated with the discrepancy between total production and harvested production of meat - the main output of the industry. This discrepancy, which is unduly ignored in some productivity studies, occurs because of the specific feature of animals as being both output and capital assets of production. For example, in unfavorable years, it often happens that the harvested production of meat exceeds its total production. This happens because harvested animals include not only those that correspond to the meat production in a given year, but some of those that are produced in previous years, this is the case of a shrinking herd. On the other hand, in favorable years only a part of produced meat is harvested leading to herd expansion. It is clear that in both shrinking and expanding herd cases the volume of harvested meat docs not represent real production of meal in a given year, hence, it should not he used as a dependent variable in the production function.

It is assumed that an increase in the natural growth rate (NGR) of animals took place mainly as a result of an increased use of technological inputs and technical change, while the impact of other sources of productivity growth such as economies of scale and the degree of production efficiency are assumed to be insignificant.

The hypotheses to guide the study were: (i) livestock production was primarily dependent on weather variables; (ii) the efficiency of animal species differed across agro-ecological regions indicating their different degrees of suitability; (iii) the intensification of production undertaken during the socialist period from the 1960's to 1990 increased the natural growth rate (NGR) of animals as the basic indicator of performance of extensive livestock production, where per head yield of harvested products is generally constant; (iv) a positive and significant technical change occurred in the livestock industry during the study period; (v) under the socialist regime, the policy of encouraging private ownership of livestock had a positive impact on output of livestock enterprises; (vi) overstocking was present and had negative impact on productivity.

2.1.2 The model

The production function was estimated in two stages. The first stage is designed to estimate weather-yield models and test the hypothesis (i). This two-stage estimation procedure was demanded by the need to deal with weather-the main determinant of output in livestock production in Mongolia. The details of the weather-yield model are provided in **Appendix 2**. However the results of the weather-yield model are not discussed in this paper although they have important policy implications for the sector.

In the second stage, the production function was estimated to test hypotheses (ii) (iii) (iv) (v) and (vi).

The production function, in general form, is specified as:

G=f(C. L, F. V, W, H, A. P, T) (1)

Where G - natural growth rate of animals (birth rate minus mortality rate); (.' capital (value of the capital assets minus value of animals); L labor (man-days per a sheep-unit); F- supplementary fodder (k.g. of feed-units per animal); V - veterinary services (veterinary expenditures per animal); W- weather index; li- stocking rate (sheep-units per 1 ha); A- age of herder (proxy for skills); P-

weight of private livestock in total number of herd (proxy for a private incentive); I - time trend (proxy for technical change).

It is hypothesized that the translog functional form is the best representation of the real production function for extensive livestock production in Mongolia. This function allows arbitrary and variable elasticities of substitution among input categories. It provides a seeond order approximation to an arbitrary production function at any given point (Christensen, Jorgenson and Lau, 1973).

The translog function with Hicks' neutral technical change was written as follows:

where G^a = weather-adjusted natural growth rate of animals
n = districts (n-1,2,..., 36)
t = an individual year (t=l,2,..., 20)
k= agro-ecological regions (k=l,2,...5)
Xi= economic variables (i=l,2,...,6)
D = dummies for agro-ecological regions
T= time trend as a proxy for technical change
C , /3, a= the coefficients to be estimated
u = the disturbance term

The validity of the translog specification was tested against the Cobb-Douglas and the CES form. The test statistics were used for testing whether the intercepts in the models (2) and (4) differed between the districts; the possibility of contemporaneous correlation in the analysis of panel data.

2.1.3 The results and discussion

The estimated production function and production elasticities are shown in **Appendix 3** and **Table 3,** respectively.

Table 3: Production Elasticities

Variables	Cattle	Small Stock
Labor	0.019	-0.015
Capital	0.633	0.591
Supplementary fodder	0.543	0.335
Veterinary services	0.121	-0.292
Stocking rate	-0.580	-0.007
Share of private animals	0.726	0.044

As shown in Table 3, the elasticities for cattle are in agreement with our expectations. A one percent increase in labor, capital, supplementary fodder, veterinary services and the share of private animals leads to an increase in the NGR of cattle by 0.019, 0.633, 0.543, 0.121 and 0.726 percent, respectively. Among these, capital, supplementary fodder and the share of private livestock have the largest responses suggesting that these were the most limiting factors which is in agreement with hypotheses (v) and (vi).

For small stock, the elasticities of capital, supplementary fodder, stocking rate and the share of private animals have the correct signs agreeing with hypotheses (v) and (vi). Among these,

capital and supplementary fodder have the largest effect, leading to an increase in the NGR by 0.591 and 0.335 percent respectively.

In contrast to our expectations, labor and veterinary services have negative elasticities. The negative sign for labor is likely due to reporting and measuring biases. The only available data on labor were the number of herders. These data represent the labor available for use rather than the labor actually used (service flows), hence, they are not free from the measurement biases. As concerns veterinary services, the negative sign may indicate that the total expenditure on the services is not a good variable to relate to the NGR of animals. The negative relationship may dominate if (i) a significant portion of these expenditures are related to services such as drenching and jetting which do not much affect the NGR, (ii) the volume of these works are correlated with some weather factors which are not captured by the weather-yield model, but have a negative impact on :he NGR.

One percent increase in stocking rate leads to 0.580 percent decrease in the growth rate for cattle and 0.007 percent decrease in the growth rate for small stock and the degradation of pasture might progress at increasing rate. A shortage of pasture is more serious in the cattle industry. This is likely, because compared with other animals a larger proportion of cattle is located near urban areas, where pasture is most degraded. A relatively low response to stocking rate for sheep and goat can be explained by the fact that these animals are more evenly located throughout the country hence, use less degraded pasture.

As with the aggregate weather-yield model, the dummy variables are included to capture the differences in omitted factors such as topography, water and soil type and management.

The null hypothesis that all the regional dummy variables are equal to each other was rejected at the 1% level for cattle and at the 5% level for the small stock indicating that the agro-ecological regions lie on different levels of efficiency /Hypothesis (ii)

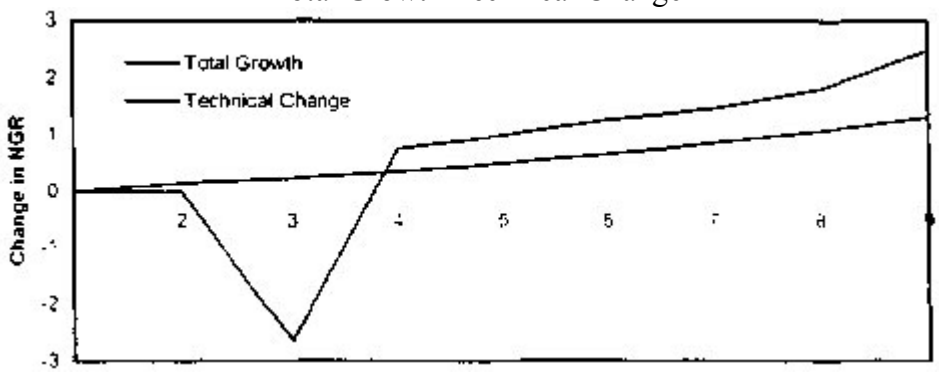
The coefficients of the trend terms indicate that significant technical change, at an increasing rate, occurred in this industry. Thus, hypothesis (iv) was accepted in the case of the cattle industry, but it was rejected in the case of the small stock industry.

The contribution of technical change and the intensification of production to the total growth in the NGR of animals are shown in **Appendix 4**. The NGR of cattle increased from 19.69% in 1976 to 22.17% in 1985. The contributions of technical change and the intensification of production (input growth per an animal) to this growth in the NGR were 52.8% and 47.2%, respectively. The NGR of small stock increased from 33.40% in 1976 to 35.71% in 1985. This growth was entirely due to intensification. Thus, hypothesis (iii) was supported for both industries.

The pattern of growth in the NGR over time is shown in **Figure 2.**

Accounting for growth in the NGR of cattle

Total Growth Technical Change



year 1976=1

Figure 2a. Source: Appendix 4

The NGR of cattle increased at increasing rate over the whole period. Overall, technical change and intensification of production equally contributed to this growth, however, towards the end of the period, the contribution of the latter dominated that of the former. In contrast to cattle, the NGR of the small stock increased at a generally constant rate in the first seven years and declined in the last two years. This decline was caused by a slow-down in the supply of capital and supplementary fodder towards the
end of the period.

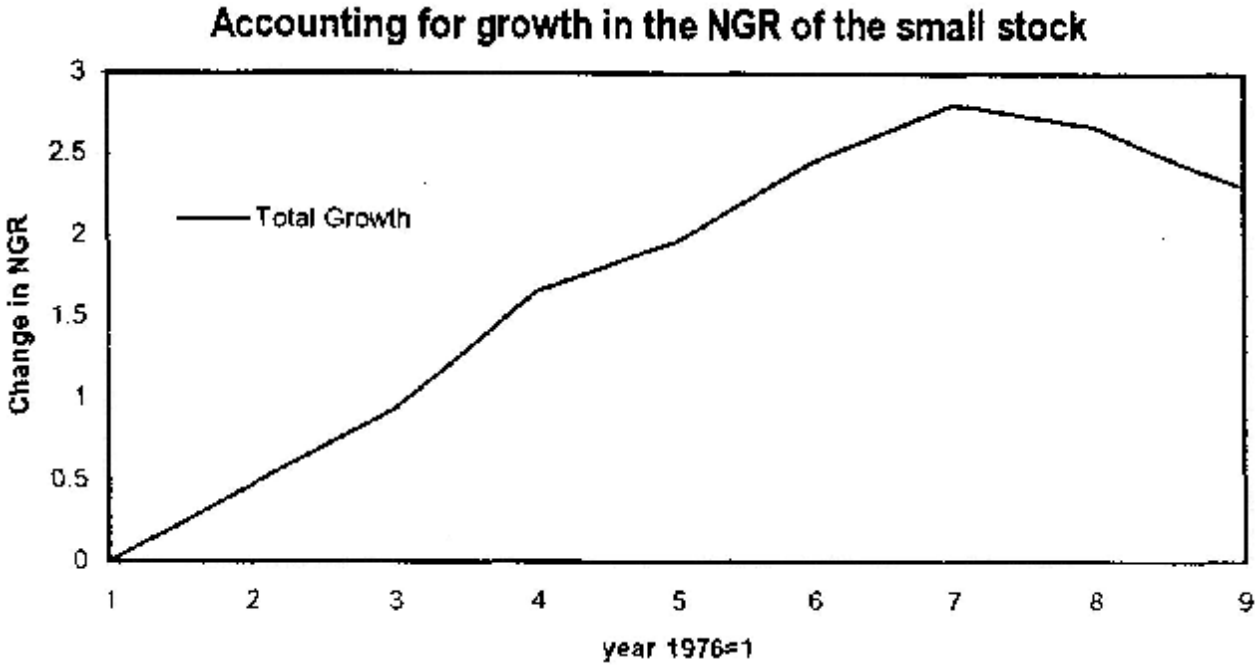


Figure 2b. Source: Appendix 4

The results of this analysis suggest that the intensification process undertaken in late 1960s to 1980s led to an increase in the NCR of animals. More importantly, this intensification process was associated with significant technical change in the cattle industry. Therefore it is quite safe to say that the sharp decline in the supply of technological inputs, which occurred in the transitional period, led to certain productivity losses.

2.2 Estimating productivity losses of incomplete reforms

The actual NOR for cattle and small stock since 19X<S is shown in Figure 3. As it

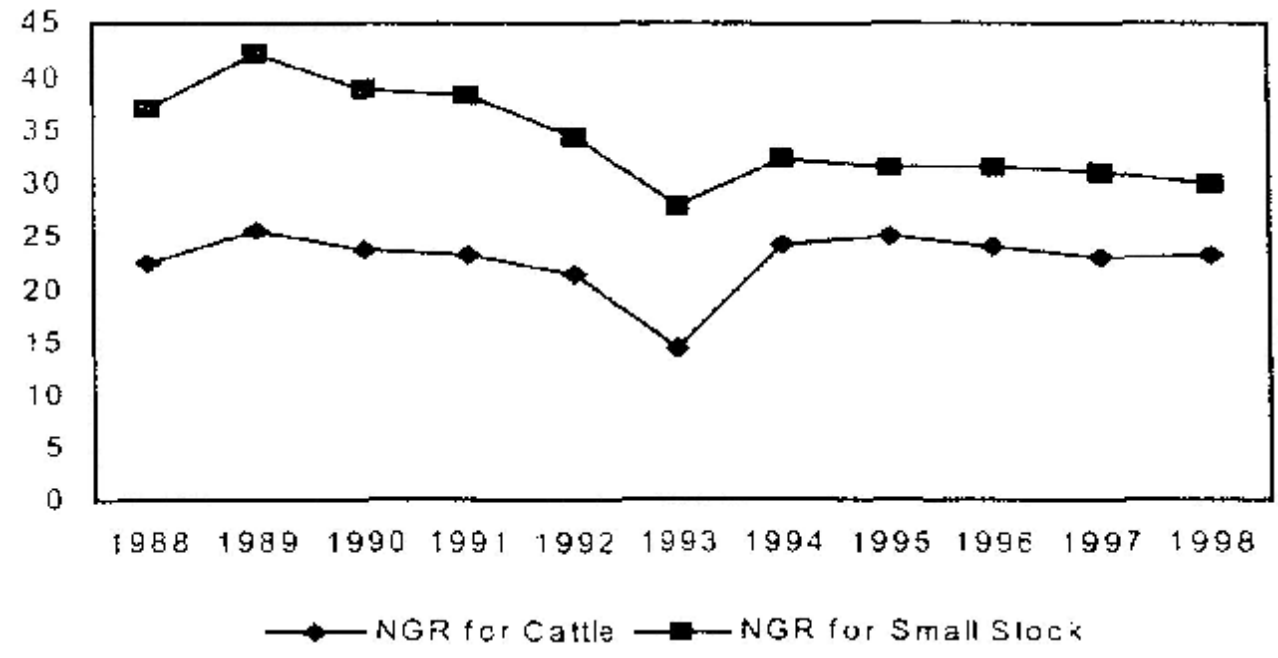


Figure 3: Productivity of animal production in terms of actual NGR
Source: State Statistical Office of Mongolia. Mongolian Statistical Yearbook, (1998 edition) and State Statistical Office of Mongolia. Agriculture in Mongolia (1996)

indicates there is a decline in productivity and it is more apparent in the small stock industry. As shown in the previous section, increasing shortage of pasture resources and failure of on-going reforms to maintain the supply of technological inputs had definite productivity losses in NGR of animals. The sharp decline in the supply of pasture and technological inputs since the beginning of transition are claimed to have greatly contributed to the actual decline in NGR of animals. The liberalization of the sector probably had a powerful positive impact on NGR of animals. However, it is argued that the actual NGR would have been considerably higher if on-going reforms addressed the problems of overstocking of pastures and declines in technological inputs.

In this section an attempt is made, using the production elasticities of the estimated model, to assess productivity losses which would have not been occurred if the existing pasture land tenure and production organization were 'reformed'. Because ol availability of data productivity losses were estimated on the stocking rate as a proxy lor the gracing land tenure performance and the utili/ation of supplementary fodder as a proxy for the production organization performance.

The change in the stocking rate and the utilization of supplementary fodder and the estimation of the resulting changes in NGR for animals since 1990 are shown in

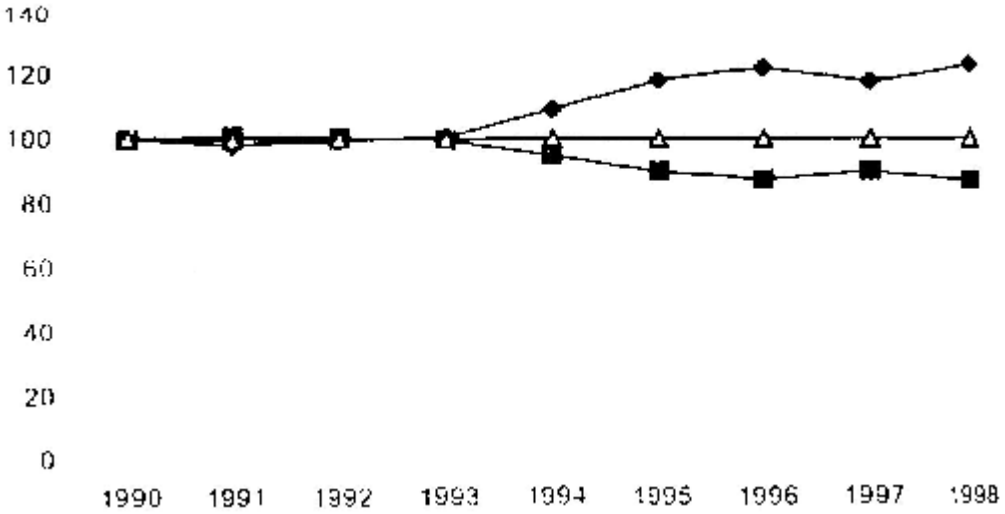


Figure 4a: The stocking rate and associated NGR for animals (1990=100)

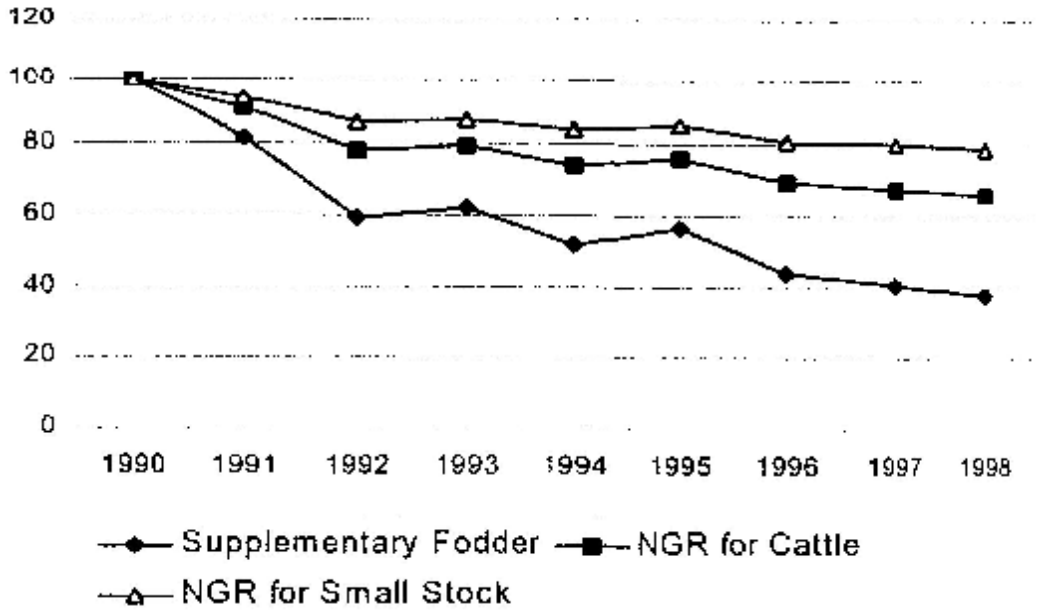


Figure 4b: The utilization of supplementary fodder and associated NGR for animals (1990= 100)
Source: State Statistical Office of Mongolia. Mongolian Statistical Yearbook. (1998 edition) and State Statistical Office of Mongolia. Agriculture in Mongolia (1996)

Figure 4.

As **Figure 4** indicates, from 1990 to 1998, 22.9% increase in the stocking rate led to a decrease in NGR of 13.3% for cattle and 0.2% for small stock. Similarly, 62.5% decline in the utilization of supplementary fodder per one sheep unit caused NGR to drop up to 66.1% in the cattle industry and 79.1% in the small slock industry.

In **Table 4** estimated productivity losses are shown in terms of annual NGR and associated total losses in animal numbers.

Table 4: Productivity losses in terms of annual NGR and animal numbers ('000)

	Grazing land tenure				Production organization			
	Cattle		Small stock Cattle				Small stock	
	NGR	Animal Numbers	NGR	Animal Numbers	NGR	Animal Numbers	NCJR Numbers	Animal
1991	1,05	7,00	0,0127	0,99	-9,84	-65,35	-6,07	-471,30
1992	-0,69	-4,17	-0,0083	-0,57	-14,94	-90,78	-9,22	-635,94
1993	-0,71	-2,88	-0,0086	-0,49	2,34	9,42	1,44	81,61
1994	-4,94	-32,97	-0,0596	-3,85	-8,57	-57,19	-5,29	-341,57
1995	-4,68	-35,43	-0,0565	-3,77	4,56	34,54	2,81	188,01
1996	-2,00	-16,02	-0,0242	-1,70	-12,39	-99,08	-7,64	-537,63
1997	2,08	16,69	0,0251	1,78	-3,99	-31,99	-2,46	-174,20
1998	-2,60	-21,92	-0,0314	-2,31	-3,88	-32,71	-2,401	-176,25
Total		-89,69		-9,93		-333,14		-2067,28

As Table 4 indicates the 'incomplete' grazing land tenure and the deficient organization of production cost much. The figures show that since 1990, 89 690 cattle and 9930 small stock lost because of the 'incomplete' grazing land tenure and 333 140 cattle and 2 067 280 small stock lost because of the deficient production organization.

Table 5 provides rough cost-benefit calculations of increasing the supply of supplementary fodder by 1%. As Table 5 indicates increasing the supply of supplementary fodder is beneficial: 1

rugrug spent pays 1.89 tugrug back.

Table 5: Rough Cost-Benefit Analysis of Increasing the Supply of Supplementary Fodder by 1%

(Average for 1991-1998)

		Industry		Herding household*	
		Quantity	Price** ('000 tug)	Quantity	Price (tug)
Costs	Hay	8908 tons	404883,75	54 k.g.	2454.3
Benefits	Cattle	1 39 14 heads	234848,86	0,024	1440.0
	Sheep	2597 1 heads I	389569,24	0,145	2175.0
	Goat	12507 heads I	137580,59	0,093	1023.0
Total			761998,69		4638.0
Benefits per 1 tug of costs			1,89 tug		1,89 tug

* In 1998. the average herding household was 176 hvestock:20 cattle.79 sheep, 59 goat. 16 horse and 2 camel. The average household consumption of supplementary fodder for 1991-199X was around 2430 k.g. of feed units or 5400 k.g. of hay.

** Price of livestock: 60000 tug for cattle, 15000 tug for sheep, 11000 tug for goat and price of hay is 1000 tug per one bundle or 45.45 tug per k.g.

3. Grazing Land Tenure Reform as an Policy Option

The productivity analysis of the extensive livestock industry suggests that there are two clear domains the sectoral policies need to deal with - pasture land tenure and organization of production. Reforms in grazing land tenure are needed make sure that pasture resources are used in a sustainable way. Reforms in the area of organization of production are needed to modify the existing condition in which herders substantially lack resources to obtain necessary inputs and market their product efficiently.

This section discusses the grazing land tenure reform as a policy option leading to not only sustainable use of pasture resources but also an option working towards the solution poverty and better organization of production.

It is commonly acknowledged the importance of understanding land reform as not only ownership reform, but in the broader sense of land usage patterns which are based on the whole spectrum of property rights down to possession and various land usage rights, whether formal or informal. In this sense land reform inevitably includes changes in organization of farming.

3.1 Grazing land tenure

The traditional Mongolian perception of land is best expressed in the concept 'nutag'. In scientific language, nutag is a piece of natural ecosystem with adequate relief to choose seasonal camps from: summer-autumn pastures with available water sources, sufficient rainfall to produce grasses for livestock, and not too hot temperature and cooling wind velocity to provide a comfort for both herdsmen and animals; winter-spring pastures with non-freezing water sources or snow not deep to hamper animals to gra/c but sufficient enough for animals to become drinking sources in remote pastures and not too cold temperature and low wind velocity to help animals to survive with minimum losses. Thus, traditionally, Mongolians perceive the grazing land as a medium for animals but not only a feed base as suggested by some these days. The well being of herdsmen totally depends on the quality of nutag. In niitug a herdsman becomes a part ol ecosystem: living within it, controlled by it and manipulating it as best as he can.

Because of low productivity and inter-seasonal and inter-annual variability of plant production, pastures can rarely be divided between households as private individual grazing lots. Viable pastoral territories are usually quite large to take account for pastures for all four seasons and variability of weather across favorable and unfavorable years ands vary considerably according to local ecological conditions. Such territories generally increase in size as suitability of nutag for a given species of animals decreases and weather variability increases. Territories range in size from 100 to 200 sq. km. in productive mountain valleys to several thousand sq. km. in the Gobi desert (PALD, 1993). Mongolian herding communities are generally organized around the management of these grazing territories. Customary grazing and water rights have evolved as a set of social customs regulating behavior within and between such groups with little intervention from authorities. Such customary regulations include informal mechanisms to allocate pastures to households, to monitor and enforce compliance, and resolve conflicts. Although affected seriously by attempts to regulate land use through centralized plans customary regulations continued to exist during the socialist collectivization period from late 1950s up to 1990-1992. The privatization of livestock followed by the break of the former large-scale cooperatives into small household economies in 1991-1993 led to traditional customary regulations re-emerging actively. At present, they continue to work well but cannot cope with the newly emerged challenges unless new, formal systems of land tenure are adopted which support and extend them.

3.2 The Proposed reform

The grazing land tenure reform is suggested through strengthening or formalizing the existing informal rights of herding communities such as ' neg goliinliori /people from one river/, ' neg jalgiinharf /people from one valley/ (Enkh-Amgalan, 1997b).

It is recommended that the registration of tenure rights be introduced at a group level for large-scale resources such as summer and autumn pasture and a household or "khot ail" (a group of herding families based on the use of common pasture and labor-sharing) level for small-scale resources such as spring and winter shelters. A special attention needs to he-paid to considerations such as reciprocal grazing rights between groups in ease of emergencies and the use specific resources such as water point and marsh land. The registration of informal grazing rights is believed to significantly contribute to:

1. Sustainability of the use of pasture resources. Land titling makes the protection and the efficient use of pasture resources a matter of self-interest of herders ands provides an incentive to invest for the improvement of pasture resources and adopt more advanced production strategies rather than increasing livestock numbers.
2. Reform of the existing organization of production. If works well the formali/ation of customary herding communities will make a robust basis for cooperation among herders thus pushing towards a better form of production organization.
3. Rural poverty alleviation. There is increasing evidence showing that because of lack of transportation facilities poorer households tend to be trapped in low quality pastures near urban centers thus exposed to further poverty. The protection of poor herders, who are heavily dependent on livestock herding, by securing their rights to adequate pasture resources is getting crucially important.

It is strongly recommended that the small-scale project be first implemented in a forest-steppe area to test the feasibility of the whole idea of group titling of grazing resources. The main factors to be considered in designing the project are:

- willingness of herders and local governments to co-operate in testing the project idea, i.e. how well local people understand the need and importance of the project ideas. This factor is primarily dependent on the degree of pasture shortage. The less the degree of pasture shortage

the stronger the willingness of herders to freely use abundant pastures therefore, the less their motivation 'to be fixed' to a particular location.

- The extent and frequency of disturbance to normal or 'equilibrium' pattern of herders' movement.
- The level of development and stability of customary institutions, their boundaries and memberships.

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