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AGRICULTURE IN TRANSITION

AGRICULTURAL PRODUCTIVITY AND MARKETING

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MONGOLIA

FEBRUARY 18, 2015

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Acronyms and Abbreviations

ADB	Asian Development Bank
ASDS	Agriculture Sector Development Strategy
BoM	Bank of Mongolia
CIDA	Canadian International Development Agency
DSPP	Department of Strategic Planning
FAO	Food and Agriculture Organization
FMD	Foot and Mouth Disease
FSCF	Fund on Supporting Crop Farming
FU	Fodder Unit
GASI	General Agency for Specialized Inspection
GDP	Gross Domestic Product
GFSI	Global Food Safety Initiative
GoM	Government of Mongolia
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practices
ha	Hectare
HDF	Human Development Fund
HIES	Household Income and Expenditure Survey
IBL	Integrated Budget Law
IBLIP	Index-based Livestock Insurance Project
IFC	International Finance Corporation
kt	Thousand metric tonnes
LEWS	Livestock Early Warning System
LDF	Local Development Fund
LPI	Logistic Performance Index
MDG	Millennium Development Goals
MIA	Ministry of Industry and Agriculture
MNCC	Mongolian National Chamber of Commerce and Industry
MNT	Mongolian Togrog
MOFALI	Ministry of Food, Agriculture and Light Industry
MSUA	Mongolian State University of Agriculture
mt	Metric Tonne
MWCA	Mongolian Wool and Cashmere Association
NAMAC	National Association of Monglian Agriculture Cooperatives
NAMHEM	National Agency of Meteorology, Hydrology and Environmental Monitoring
NEMA	National Emergency Management Agency
NLP	National Livestock Program
NPC	Nominal Protection Coefficient
NPFS	National Program for Food Security
NSO	National Statistical Office of Mongolia
OFFS	On-Farm Food Safety
OIE	International Organization for Animal Health
PES	Payment for Environmental Services
PPP	Public Private Partnerships
R&D	Research and Development
RIAH	Research Institute of Animal Husbandry
SDC	Swiss Development Corporation
SLP	Sustainable Livelihoods Program
SU	Sheep Unit

TB	Tuberculosis
UN	United Nations
UNDP	United Nations Development Program
VABU	Veterinary and Animal Breeding Unit
VAT	Value Added Tax
WB	World Bank
WHO	World Health Organization
WIPO	World Intellectual Property Organization

Map of Mongolia

- ***This space reserved for Social Indicator Data Sheet***

FOREWORD

The role of agriculture in rural and economic development is well acknowledged in both literature and in practice. Agriculture not only supplies food and essential nutrients but is a source of income and employment, and an engine of growth. Countries such as Vietnam have transformed both the rural and national economies through policy, legal and institutional reforms, and government commitment. Mongolia is a country at a crossroads transitioning from a centralized planned economy to a free market economy.

The transition has disrupted economic activities and institutions as well and agriculture and rural livelihoods. De-industrialization drove many households back into herding, where they remain today, most entrenched in poverty. Since 2006 however, agricultural output has increased by 34 percent and Mongolia is now self-sufficient in meat, wheat, and potatoes. With the rise of the mining sector, agriculture now contributes just 15 percent of GDP, but continues to provide for 37 percent of employment. A variety of additional reforms are required to realize the potential contributions that Mongolian agriculture can make to reducing poverty and rural-urban migration, improving rural livelihoods, generating export revenues, and to economic development generally.

This study was undertaken to identify gaps in policies, laws, regulations, and practices from production to the consumer end point, and to stimulate discussions about how to leverage the agriculture sector's potential contributions to national development objectives. The report is intended for a variety of audiences including public officials and policy makers, researchers, students and researchers, development practitioners, and the general public. It is the first comprehensive report of this nature in English and Mongolian languages addressing the full range of issues affecting agriculture in Mongolia.

The number of livestock animals has doubled from around 25 million prior to the transition period to 52 million by 2015. This unsustainable increase has imposed severe pressure on natural resources, and coupled with climate change, may lead to severe consequences if left uncontrolled. Gaps are also evident in the value chain connecting production to marketing. The recommendations offered here to close these gaps provide a useful reference with which to inform decision making as Mongolia shapes its agenda for agricultural development in the coming years.

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EXECUTIVE SUMMARY

Mongolia's ongoing economic transition generates levels of uncertainty that often inhibit investments in productivity and marketing improvements on the part of producers and processors. The transition consists of a number of defining elements, including the following.

- **From a command economy to an integrated, globalized market economy.** The transition of a market economy has created a private agriculture sector and opened many new markets. Yet, after 24 years, elements of the old legal framework, institutions, and strategic planning remain largely in place. These have major impacts on land tenure and usage, animal health systems, banking and finance, market structure, cooperative law, and risk mitigation.
- **From a rural to an urban population.** More than 50 percent of Mongolians now live in cities, primarily Ulaanbaatar. This creates new and growing markets for agriculture products, especially milk. As the middle class grows, there is an emerging market for safe, high quality, diversified food products. However, for the average urban resident, rising food prices are a strain on the household budget. This may be eroding public support for rural subsidy programs.
- **From a low-income agriculture-based economy to a middle-income market economy led by mining.** The emergence of the mining sector has moved Mongolia into the ranks of middle-income countries and marks a departure from the country's pastoral image. The resulting diversification and growth of the economy benefits agricultural markets. While the growing market for mine sites may help to establish and strengthen value chains, increasing competition for rural labor may also lead to increased production costs within the agriculture sector and the risk of "Dutch Disease."
- **From low-input, subsistence production to intensified, commercial production.** Most agricultural producers operate at or near subsistence and are living in poverty or are vulnerable to falling into poverty. Government, donor, and private initiatives have demonstrated improved production and resource management techniques which are now appearing in commercial production, especially near urban market centers. However, industry-wide adoption has not reached a critical scale because of constraints in financing, input supplies, markets, infrastructure, and supporting services and systems.
- **From a perception of abundant resources to one of resources at risk.** There is slowly growing awareness by producers, local governments, the MIA and Mongolians at large that over-stocking is leading to perilous pasture degradation and contributing to the severity of livestock mortality during the extreme winter weather events known locally as *dzuds*. In the crop sector, farmers and agriculture specialists recognize erosion and declining soil fertility as a long-term risk to production. Additionally, under-regulation of the mining sector negatively impacts both grasslands and water sources and is a source of conflict in rural areas. Climate change adds additional risks to the availability of resources.

Mongolia's shock therapy transition in the early 1990's created an institutional vacuum with negative and lasting effects on agriculture and rural livelihoods. De-industrialization drove many households back into herding where they remain today, the majority entrenched in poverty. However, since 2006, agricultural output has increased by 34 percent and Mongolia is now self-sufficient in meat, wheat, and potatoes. With the rise of the mining sector, agriculture now contributes just 15 percent of GDP, but continues to provide for 37 percent of employment.

Mongolia's competitiveness in livestock and crop production is impaired by inefficiencies throughout the value chain, including persistent issues related to hygiene and animal health, low levels of productivity, and product quality. Issues begin at primary production with constraints and inefficiencies in the condition of land and pasture, water, feed supplies, genetics, disease status and management. These constraints continue through the value chain to processing and distribution where scale, technology, and management are issues. This situation is compounded by the limited amount of applied research and extension for technology transfer, incomplete market infrastructure and logistics, a limited credit market, especially for small enterprises, and rising labor costs. Finally, production and market risks are high and there are limited mechanisms available for managing risk.

Livestock productivity has stagnated during the transition. Growth in output has come from growth in animal numbers versus any improvements in productivity. Livestock numbers doubled between 1990 and the end of 2014 and 70 percent of pastures are now degraded because of overstocking and poor pasture management. The greatest livestock productivity advances will come about through improved animal nutrition through pasture management and supplementary feeding, which in turn lead to higher rates of reproduction and growth and reduced winter mortality. Feeding programs to increase the annual rate of offtake and average carcass sizes would increase the volume and total output of slaughter and improve carcass quality and consistency. The benefit would accrue to both primary producers and processors.

Productivity in the crop sector on the other hand has been increasing. Cereal yields are up 21 percent since 1990. Potato producers have also increased productivity although average yields remain a good deal lower than those achieved by more advanced commercial producers or producers in other countries. Vegetable production, which is dominated by smallholders, has shown the least improvement, constrained by old seed, lack of mechanization and technical and managerial knowledge. The greatest productivity advances in crop production will come about through soil conservation, fertilization, improved varieties, efficient water use and better managerial and technical skills.

To focus its long-term agricultural development, Mongolia should strategically identify domestic and export markets based on a combination of factors including: a) potential production and surpluses in light of feed resources, resource sustainability, and future population growth; b) competitiveness under current conditions and recognizing the risk of currency appreciation and Dutch Disease which could accompany mining sector growth; c) export readiness and, d) market access issues. A multi-prong approach to market development is recommended that would include both import replacement and export development over the short, medium and long-term.

China and Russia provide the greatest export market potential given their size, proximity, and established trading relationships. Ensuring stable access to both of these markets will require the Government of Mongolia to negotiate trade agreements with favorable quota and tariffs levels. It will also require Mongolian food products to meet the sanitary and phytosanitory requirements of the importers.

Asian milk imports are forecast to grow 30 percent as consumption continues to increase during the next decade. Although existing production and processing constraints currently preclude Mongolia from capitalizing on this growing regional demand, in the longer term this greater market represents a vital opportunity for Mongolian exports. The development of an efficient and profitable dairy industry will

rely on integration with the crop sector for the supply of feeds, and therefore generate opportunities for spin-off benefits throughout much of the greater agriculture sector through the development of markets for feeds and diversified crop production.

Recommendations

Mongolia's continued transition impacts the production and marketing of agricultural products and the level of employment and quality of livelihoods in the sector. Mongolia must first ensure the sustainability of its natural resource base including soils, water, and pasture. In addition, the country should move away from the bulk production of low quality commodities and work in a strategic and coordinated way to develop high quality, cost-competitive value-added products. The first indications of Dutch Disease have already become evident in agricultural labor costs and the declining competitiveness of products in international markets.

a. Transition from a command economy to an integrated, globalized market economy.

Establishing a complete and stable enabling environment. Complete the legal and policy framework to promote long-term investment by primary producers and processors. Eliminate market distorting policies and programs and reallocate their budget to cash transfer programs that are "de-coupled" from production and do not distort resource allocation.

Support poverty alleviation and labour transition. Promote the ability of the rural population to fully engage in economic activities by addressing the structural issues of rural poverty through the provision of social services, social safety nets, and job retraining. At a more sustainable and commercial national herd size, many fewer families will be supported by the herding sector. Employment and business opportunities would support rural communities and slow migration to Ulaanbaatar.

Market systems and infrastructure. Supply chains are under-developed, with too many inefficient stages contributing to high retail prices. Make public investments in market infrastructure directly or in PPPs, as appropriate. Continue to improve logistics infrastructure and services. Review the agricultural commodity exchange system and its impact on market systems and efficiency.

Grading systems and facilities. Marketing systems should establish clear and reliable price differentiation based on enforced quality standards that will meet the needs of industry and provide the incentive for herders to improve product quality. Being able to source the specific quality standards required by processors would reduce transaction costs and improve efficiency. The Government should work in partnership with industry to develop new grades, standards, and pricing systems that will meet the needs of Mongolian agriculture into the future.

International market access. International market access is constrained by the lack of negotiated trade arrangement with other countries. The Ministry of Foreign Affairs and the Ministry of Finance need to provide trade services to enhance market access, negotiate trade agreements, build export readiness, and provide favorable investment and taxation programs.

Avoiding Dutch Disease. The Government of Mongolia should pro-actively take measures to offset the risk of Dutch Disease by using a portion of extractive industry revenue inflows to support the development of competitive, value-added industries, building those that demonstrate or have the

potential to demonstrate technological innovation, productivity growth, above average incomes, environmental sustainability and export intensity. The investment in human capital is a central element of preventing Dutch Disease.

b. Transformation from a low-income, rural agricultural nation to middle-income urban market economy led by mining.

Strengthening the domestic food supply chain. Supermarkets and fast food chains can play a leading role in introducing new retail procurement logistics and standards and, in turn, stimulate the commercialization and modernization of farms. In Mongolia, services that support the mining industry can also support demand-driven development of the food supply chain and logistics.

Food safety and quality. Food safety is a public health issue and a determinant of the marketability of Mongolian agro-food products both domestically and abroad. As incomes rise, Mongolians will increasingly demand safe food. Improve hygiene standards and food safety systems for Mongolian food products to ensure public health, expand markets, and improve price levels.

c. Evolution from low-input subsistence to intensified, commercial production.

Linking primary producers to markets and value-chains. Strong linkages between agribusiness firms and producers can be formed through cooperatives, producer associations and contract farming. Contract farming has been successfully used in many countries to connect smallholder farmers with processors, wholesalers, and retailers, particularly in markets for perishable products like milk. Promote these systems and ensure that there are no legal restrictions to the contracting arrangements.

Agricultural inputs. Government should step back from direct provision of inputs and use rebates and other cost offsetting approaches that will not interfere with private sector input supply. Contract farming arrangements between agribusiness firms and primary producers should be pursued as a means of making inputs available for certain subsectors such as dairy and vegetables.

Agriculture finance. Financial services need to be expanded in term of the products offered and the eligibility of small-holders with limited collateral. Mongolian bankers need more detailed information on agricultural productivity, profitability, and risks. Dealing with a cooperative can offer both the financial institution and the cooperative economies of scale and risk mitigation.

Value-added processing and cluster development. Increasing the proportion of value-added production in Mongolia's agriculture sector will be an important way to improve competitiveness and to avoid Dutch Disease. Industry clusters have been successfully used in other countries to promote innovation and competitiveness. Clusters bring together processors to benefit from jointly used input-output markets and other marketing infrastructure and systems.

Integration and intensification of crop and livestock production. Integrating crop and livestock production allows for improved year-round utilization of resources, cross-financing of farm activities, provision of inputs between crop and livestock production, soil conservation through crop residue management, revenue diversification, and production and price risk management. Intensification leads to greater levels of productivity and higher net returns to producers. Promote intensification through investment programs, training, and secure tenure for facilities and infrastructure.

d. Change in perception from "resources in abundance" to "resources at risk"

Sustainable resource management. Pasture management and the control of animal numbers are urgent imperatives. In crop production, soil conservation and the protection of fragile lands will need to be addressed. Within the existing legal framework, pilot projects have shown that leases and grazing fees are possible. In addition to these tools, Payment for Environmental Services approaches, which are supported within national strategic programs, should be introduced. Payment for Environmental Services approaches can be used to facilitate the preservation of pastures and the rehabilitation of crop land. Monitoring is an important element of conditional schemes which can be supported by Mongolia's Ecological Site Descriptions program which rests under the NAMHEM.

Strengthening Institutions

Risk management. Risk management systems contribute to a stable investment and operating environment and are instrumental in facilitating improved productivity. Programs can be provided through government, private, or public-private parternship arrangements. Mongolia should strengthen resource management and monitoring systems, including LEWS and local pasture management planning, continue to strengthen and expand the livestock insurance program, introduce crop insurance programs and promote more price risk management tools such as forward contracting between processors and primary producers and/or their representative cooperatives.

Professional and technical services. Some of the key areas where capacity building is required include veterinary services, food safety along the entire supply chain beginning on-farm, through processing and distribution to the end consumer, innovation functions (R&D, education and extension), policy development and strategic planning including investment planning, policy implementation and M&E and inter-agency and donor coordination.

Cooperatives. To support producer cooperatives to fully take on their roles in agro-product value chains, it is necessary to continue strengthening the cooperative law and regulations, ensure coherence between cooperative and other policy regimes including taxation policy especially related to VAT and provide training to cooperative executive to strengthen management and leadership in terms of goverance, operational management, capitalization, market orientation and business principles.

Pasture management groups and mechanisms. Pasture management groups have frequently been employed in pilot projects but often lose their effectiveness after program resources are withdrawn. Support umbrella organizations and local service providers who can deliver training, information, and other services and integrating marketing and economic activities into the group structure to provide greater motivation for membership and enhance sustainability. A more directive approach could be to link some portion of the IBL and LDF resources to the preparation of annual pasture management plans.

Private Sector. Individual herders and farmers need to develop new attitudes, skills, and knowledge in agricultural production, food safety, marketing, and business management. Processors require training in business management, finance, quality control, food safety, new technologies, marketing, and export management.

1 Background to the Study

1.1 Background and Objectives

1. The Study of Agricultural Productivity and Marketing was undertaken by the Department of Strategic Policy and Planning (DSPP) of the Ministry of Industry and Agriculture (MIA) as part of a larger agricultural sector review, with the support of the World Bank (WB) and Food and Agricultural Organization (FAO) of the United Nations (UN). The overall objective of the study was to provide a comprehensive overview of the characteristics and a better understanding of trends in production and productivity, marketing systems and constraints, profitability, comparative advantage and potential markets for agriculture and livestock products in Mongolia. The specific objectives were to:

i. Analyze trends in production and marketing of crop and livestock products over the last five years.
ii. Analyze agricultural growth in relation to the Mongolia's Gross Domestic Product (GDP) and compared to other sectors of the economy and estimated potential contribution of agriculture to the economy if constraints are addressed.
iii. Analyze the input and output marketing of the major agricultural and livestock products and identification of major constraints to marketing and distribution of inputs and agricultural and livestock products within and outside Mongolia.
iv. Analyze exports of agricultural and livestock products to other countries, particularly the neighboring countries with emphasis on terms of trade.
v. Analyze comparative advantage and economic profitability of major agricultural and livestock products.
vi. Determine the potential market sources for agricultural and livestock products.
vii. Provide policy recommendations for the Government's attention.

1.2 Methodology and Issues

2. An initial field mission to Mongolia was undertaken in October 2013 to carry out data collection. The study involved a literature review of recent in-depth studies by the Asian Development Bank (ADB) and Oyu Tolgoi as well as stakeholder consultations. Specific data analysis was carried out on production and productivity, agriculture's current and potential contribution to GDP, input/output markets, exports, potential markets and comparative advantage. Based on the findings of these findings, recommendations on future policy directions were provided.

3. The study addressed agriculture at the aggregate level and for the major sectors of livestock and crops and subsectors of extensive livestock (primarily sheep, goats and cattle), intensive livestock (emerging production of poultry, pork and livestock fattening), dairy, grains (primarily wheat), oilseeds, potatoes, vegetables and small fruits. Information was disaggregated by agro-climate zone to the degree that provided relevant information about each of the productive subsectors and marketing systems. Related to this, consultations were carried out in two agro-climatic/marketing zones including a primarily extensive livestock location in the gobi-steppe (Gobi-Sumber) and a cropping/intensive livestock production area on the khangai/steppe in the central cropping zone (Selenge/Tov).

4. The market analysis included a summary assessment of the input and output marketing for each subsector focused on industry actors, the adequacy of input/product flows and constraints along the supply chain and distribution networks. Export analysis included a statistical review of export trends and an assessment of constraints and opportunities for export markets based on the literature review and consultations. The analyses of economic profitability and exports and assessment of comparative advantage focused on meat, wool and cashmere, dairy, wheat and flour, and potatoes. The overall analysis draws upon the work of recent projects in these areas with updates as required. Productivity indicators were collected from Mongolia and other countries for the purpose of comparison. Potential production levels and tradable surpluses were projected using various levels of productivity against projected population growth to 2050.

1.3 Structure of the Report

5. The report is organized into nine chapters. Chapter One provides the background and rationale of the study. Chapter Two provides a summary description of the natural resources supporting Mongolian agriculture and the policy environment that guides its development. Chapter Three summarizes aggregate agricultural output and the sector's contribution to GDP and employment. Chapter Four deals with trends in demand and trade, including imports, exports, terms of trade, and potential markets. Chapter Five provides descriptions of the major subsectors of Mongolian livestock production (extensive livestock, semi-intensive and intensive livestock, dairy) and crop production (grains and oilseeds, forages, potatoes, vegetables and small fruits) including production practices and productivity issues. Chapter Six provides information on the marketing systems for each of the agricultural sectors. Chapter Seven provides an assessment of processing and value added. Chapter Eight then provides an analysis of the competitiveness of Mongolian agriculture by sector, potential productivity and profitability and potential markets. Finally, Chapter Nine presents the major recommendations for improving agricultural productivity and strategically positioning the sector for the future.

2 The Agricultural Setting

2.1 The Challenge of Shifting Paradigms

6. Mongolia remains a country in transition, and the processes of change generate uncertainties that can inhibit investment on the part of producers and processors to improve productivity and marketing. A number of transformations are underway, including the following.

- **From a command economy to an integrated, globalized market economy.** The transition of a market economy has created a private agriculture sector and opened many new markets. Yet, after 24 years, elements of the legal framework, institutions and strategic planning are still in transition which impacts land tenure and usage, animal health systems, banking and finance, market structure, cooperative law and risk mitigation.
- **From a rural to an urban population.** More than 50 percent of Mongolians now live in cities, primarily Ulaanbaatar. This creates new and growing markets for agriculture products, especially milk. As the middle-class grows, there is an emerging market for safe, high quality, diversified food products. However, for the average urban resident, rising food prices are a strain on their household budgets. This may be eroding public support for rural subsidy programs.
- **From a low-income agriculture-based economy to a middle-income market economy led by mining.** The emergence of the mining sector has moved Mongolia into the ranks of middle-income countries and marks a departure from its pastoral image. The resulting diversification and growth of the economy benefits all agricultural markets. The new market for mine site catering could help establish and strengthen value-chains. There may also be opportunities for new public-private partnerships with the mining sector to support agriculture and rural investment. On the other hand, increasing competition for rural labor leading to increased production costs can increase the risk of "Dutch disease."
- **From low-input, subsistence production to intensified, commercial production.** Government, donor, and private initiatives have demonstrated improved production and resource management techniques which are now appearing in commercial production, especially near urban market centers. However, industry-wide adoption has not reached a critical scale because of constraints in financing, input supplies, markets, infrastructure and supporting services and systems. A critical constraint in the adoption of new production methods is the limited awareness and willingness of producers. Most agricultural producers operate at or near subsistence and are living in, or are vulnerable to, poverty. They have few assets, inadequate storage, lack access to financing, and tend to focus on cost minimization and risk avoidance. This constrains their investment and marketing options and ability to adopt new techniques.
- **Change in perception from "resources in abundance" to "resources at risk."** There is slowly growing awareness by producers, local governments, the MIA and Mongolians at large that over-stocking is leading to perilous pasture degradation and contributing to the severity of livestock mortality during *dzuds*. In the crop sector, farmers and agriculture specialists recognize erosion and declining soil fertility as a long-term risk to production. Additionally, under-regulation of the mining sector negatively affects both grasslands and water sources and is a source of conflict in rural areas. Climate change adds additional risks to the availability of resources. This concern may generate sufficient political will to introduce the changes that are required to secure a sustainable agriculture sector.

88 percent of Mongolia's territory is agricultural land, of which 98 percent is pasture and less than 1 percent is considered arable.

2.2 Agricultural Resources

7. Though blessed with a huge territory of agricultural land, agricultural production in Mongolia is both challenging and risky. Fully 88 percent (115 million ha) of Mongolia's territory is considered agricultural land, of which 98 percent (113 million hectares (ha)) is pasture and less than 1 percent (651,000 ha) is considered arable. The territory consists of several environmental zones including mountainous areas (altai), forest (khangai), grassland (steppe) and desert (gobi).

8. The four seasons present extremely diverse conditions with temperatures ranging from over 40C in the summer (July) to less than -40C in the winter (January). The conditions are generally semi-arid to arid with a short growing season that constrains agricultural production. Extreme weather in the form of severe winter snowstorms (*dzuds*), recurring droughts, late and early frosts, windstorms and hail can occur throughout the year.

9. Recent studies show that about 70 percent of Mongolia's pasture areas are degraded to some extent, of which over 22.4 million ha of pastures, of which 19.5 percent are eroded. Researchers and government officials recognize that land degradation is directly related to the number of animals. The pressure animal numbers exert on land is exacerbated by the lack of professional agricultural land management throughout the system. The various institutions with responsibilities for land management have limited staff and resources to work, especially at the soum level, and herders need to improve their knowledge and skills in land and pasture management. Policy does not yet incorporate tools such as livestock taxes and grazing fees and does provide the right mixture of incentives and disincentives to promote good land and pasture management.

10. The majority of Mongolia's limited arable land is contained in the central cropping zone between Ulaanbaatar and the Russian border. This area has a lower elevation, longer growing season, and heavier soils than the rest of Mongolia. The central cropping zone includes Selenge, the largest crop producer, as well as Darkhan Uul, Tov, and Bulgan. The eastern region of Zavkhan also produces crops as does Khentii. Smaller pockets of arable land are found throughout the country. Various statistics show that 60 to 70 percent of Mongolia's crop land is eroded to some degree.

11. Prior to transition, 518,000 ha of land were considered suitable for irrigation, of which 57,000 ha were under registered irrigation schemes, primarily in the north and west where there is more abundant surface water and soil types suited to crops.[1] Most of this area (49,500 ha) was served by highly mechanized irrigation systems, while the remainder used less expensive surface and flood irrigation.

[1] ADB Agriculture Sector Strategy Study (ASSS), Volume 2, Irrigation Rehabilitation

52,000 ha are now under irrigation and MIA's current policy is to eventually stabilize irrigation at 80,000 ha.

12. Mongolia's geography and demographics pose additional challenges to agricultural development. Having the lowest population density (1.77 people/sq. km) of any independent nation and borders of 3,485 km with Russia and 4,677 km with China presents unique difficulties in providing infrastructure and social services to its citizens and developing efficient agricultural production and marketing systems owing to: i) highly dispersed production and markets; ii) transportation costs of inputs, raw materials, and outputs; iii) challenges in information dissemination; iv) the provision of agricultural extension services; and, v) animal disease control, surveillance, and reporting.

2.3 The Policy Environment

13. The economic transition of the early 1990s created poverty and food insecurity in Mongolia as incomes and agricultural production plummeted simultaneously. Many food staples which had been produced domestically were imported, leaving the country susceptible to global inflation, protectionism, and shortages.[2] Caloric intake was insufficient for many and food aid was required.

14. Since the transition, the agriculture sector's continued inability to keep pace with growth in the rest of the economy caused much poverty to become entrenched in rural Mongolia. The frequency and severity of natural disasters contribute to the rigidity of rural poverty. Following the dzuds of 2009/2010, rural poverty rose from 46.6 percent in 2007-2008 to 49.6 percent in 2009 and 49.0 in 2010.[3] More recent National Statistical Office (NSO) publications provide additional details on the regional nature of rural poverty. In 2010, overall rural poverty was 49 percent whereas poverty in the western region, khangai and eastern regions was 52.6 and 52.0 percent respectively while the rates in the eastern and central regions were 42.4 and 29.8 percent respectively. Another way that this has recently been analyzed is by the level of urbanization. In 2010, the poverty level in the countryside was 56% while in soums, aimag centers and Ulaanbaatar, the poverty rates were 39.5, 37.4 and 31.0 percent respectively. Though the national poverty rate declined from 38.7 percent in 2010 to 27.4 percent in 2012, a distinct inequality remains between urban and rural Mongolians. In 2012, the poverty rate in Ulaanbaatar, the capital city, was 19.8 percent compared to 23.2 percent for all urban areas, 30.4 percent in aimag centers and 39.8 percent in the countryside.[4] This disparity stimulates rural-urban migration and Ulaanbaatar is now home to nearly 50 percent of

Following the dzuds of 2009/2010, rural poverty rose from 46.6 percent in 2007-2008 to 49.6 percent in 2009 and 49.0 in 2010.

[2] Oyu Tolgoi PPT p10
[3] NSO, 2013, 2010. (This NSO series includes data from the HIES)
[4] ibid

the national population.

15. Mongolia's current goals for food security and rural development are to develop a market-oriented, efficient, and sustainable agriculture sector and reduce poverty by providing increased income opportunities. The main objectives are to increase food and agricultural production, quality, and security while ensuring environmentally and socially sustainable development. To this end, the Government of Mongolia (GoM) has introduced major policies and programs focused on agricultural development and national food security.

1. The National Program for Food Security (NPFS) (2009-2016) aims to provide the entire country with secure supplies of accessible nutritious and safe food to enable healthy livelihoods and high labor productivity founded on the participation of the people, government, and the public and private sectors.
2. The national Millennium Development Goals (MDG) targets are aligned to MDG target 1 to halve the proportion of people whose income is below the national poverty line, and target 2 to halve the proportion of people who suffer from malnutrition between 1990 and 2015.
3. The National Livestock Program (NLP) (2010) objectives are to: (i) develop a livestock sector adaptable to changing climatic and social conditions and create an environment for an economically viable and competitive sector in the market economy; (ii) provide a safe and healthy food supply to the population; (iii) deliver quality raw materials to processing industries; and, (iv) increase exports. Under the NLP, the Intensive Livestock Program and the Pasture Program have been implemented.

16. The Agriculture Sector Development Strategy (ASDS) provides much more information on the role of agriculture in the Mongolian economy, including its comparative advantage, current agricultural development policies, budget resources committed to agriculture, and existing agricultural development initiatives. A number of other laws and programs such as the 2009 State Policy on Herders and the Government Action Plan affect the environment for agriculture investment. Among the other major policy and regulatory elements which seek to establish an enabling environment for agriculture sector investment, whether already in place or in the process of being formulated, are the following.

a. Public-Private Roles in Livestock Production

17. The privatization of state and collective farm property carried out in the early 1990s is now nearly complete, with 98.8 percent of livestock animals privately owned. The Mongolian Constitution stipulates that livestock is national wealth and is to be protected by the state, thus establishing a continuing and prominent role for the GoM in winter preparation and emergency response.

18. The Constitution of Mongolia states that "The land, except that given to the citizens of Mongolia for private ownership, as well as the subsoil with its mineral resources, forests, water resources and wildfowl shall be the property of the State." The GoM takes responsibility for the rational use and protection of pasturelands, hayfields, and croplands through various laws and policy programs such as the State Policy on Food and Agriculture Development, the National Program on Water, the Animal Fodder Production Program, the National Program on Support to Protection of Animals From Droughts and Dzuds, the NLP and others. The Division of Agricultural Land Affairs and Pasture Watering, established in 2008 at the Livestock Policy Implementation and Coordination Department of the former Ministry of Food, Agriculture and Light Industry (MOFALI), now MIA, is responsible for the rational

utilization of the total agricultural land, rehabilitation and increasing pastures productivity and improving water supply of crop areas and pastures by improving utilization possession of water points.

19. At the level of local implementation and regulation, overlapping and conflicting responsibilities sometimes occur, setting Government programs at odds with each other. A soum agricultural specialist gave a recent example of the conflict that can exist between hay makers and livestock producers. At the soum level, agricultural specialists are responsible for allocating and managing pastures while the Governor distributes hayfields. Summer pasture can be used as hay fields, which creates potential conflict. In the example given, hay making was granted on land that was also being used as summer pasture. The double allocation was not communicated and when hay making started, livestock were still grazing the pasture and damaging the cut hay. It was suggested that a local parliament resolution could resolve the issue. A second example involved in-migrants from western aimags. These new families camp on land next to crops and hay fields and graze without tenure or permission. This too can be regulated by the local government.[5]

20. The legal framework for co-management of pastures, the issuing of pasture use fees and mechanisms for settling pasture use disputes remains unstable and discourages investments in pasture improvements and forage production. The current Land Law provides for pasture and hay field possession by herder groups only. This can be a disincentive to individual households investing in productivity improvements and, in the absence of other incentives for good management and disincentives against overuse of pastures, contributes to the decreasing productivity of natural resources. A new Land Law now in development includes pasture management and incorporates grazing and livestock fees. These can be effective tools for influencing pasture use decisions. A draft Pasture Law is also in the process of being developed. This type of concurrent policy development consumes scarce human resources and contributes to obscuring the policy environment.

21. It has been demonstrated that effective co-management approaches can be implemented to facilitate improvements in productivity even under the current land and pasture policy framework. The Millennium Challenge Account (MCA) Training of Herders and State Officials in Pasture Land Management Project worked in peri-urban areas to train herders and agricultural, land and environmental officers on pasture land management topics.[6] The project also piloted 15 year leases to groups of herders. The leases had a positive impact on changing herders' behavior in that the secure tenure and long-term investment horizon encouraged them to decrease herd sizes and invest the time and money necessary to improve productivity. The project-based training and successful piloting of long-term group leases demonstrated that changing behavior to better manage pasture resources and improve productivity is possible even before policy reform.

b. Animal Health and Breeding Laws

22. The Animal Health and Breeding Laws have been recently separated as per the guidance of the World Organization for Animal Health (OIE). Currently, there are two draft laws on Animal Health being

[5] Interview with soum Agriculture Specialist.

[6] The objectives were to provide train herders to improve and maintain grazing practices and pasture conditions, properly manage water supplies, more effectively market their products, and improve the overall management of their livestock businesses as well as to provide training to national/local-level agricultural, land and environmental officers to carry out their pasture land-related job responsibilities in an effective manner.

developed. The MIA is working on an Animal Health law based on OIE requirements which clearly define roles of government and the private sector and priorities for public sector investment. The draft Law identifies the direction of the veterinary service and the professional veterinary association and provides a clear understanding of the OIE reporting requirements. This type of consistency with international standards and the requirements of the OIE is fundamental to achieving the internationally recognized animal health status needed to ensure access to livestock and livestock product markets. Parliamentarians are simultaneously developing a separate animal health law – another instance in which parallel legislation threatens to unfold at cross-purposes and further complicate the regulatory and investment environment.

c. Food Safety

23. The GoM passed a new Food and Food Safety Law in December 2012which was entered into effect on March 1, 2013. The challenge will be to implement the Law to impact change throughout the food production system. International standards on food safety have been laid out by globally recognized bodies (Codex/OIE/World Health Organization (WHO). The GoM has been working with FAO and the WHO for several years to develop the necessary capacity to adopt CODEX standards in Mongolia. This included the implementation of the Strengthening Capacity of Mongolia to Implement Codex project. In addition, the International Finance Corporation (IFC) has worked with the General Agency for Specialized Inspection (GASI) since 2009 to implement a risk-based approach to inspections. GASI uses the Food Project Safety Law, which was developed with support from IFC, the Law on State Control and Inspections and both national and CODEX standards in the check lists and guidelines for inspections in food processing, catering and food retailing.

d. Crop Programs

By 2012, Mongolia was self-sufficient in production of wheat and potatoes, but only 58 percent self-sufficient in vegetables production.

24. The "Third Crop Rehabilitation Campaign" also called the "Third Virgin Land Program (Atar 3)" (2008-2010) was the central and most successful GoM program for the crop sector. The program goals were to: i) create favorable economic conditions for farming; ii) increase agricultural production; iii) ensure food safety; iv) eliminate dependence on imports; v) increase self-reliance; and, vi) intensify development of crop production. Government targets under this program were to stabilize production on 600,000 ha of arable land and achieve, by 2010, 100 percent self-sufficiency (420,000 mt) in wheat, 131.0 percent (173,000 mt) in potatoes and 102 percent (171,000 mt) in vegetable production based on bringing a total of 238,000 ha of abandoned land back into production. In 2010, actual production was 345,458 mt of wheat, 167,956 mt of potatoes and 82,266 mt of vegetables. By 2012,

total production of these crops were 465,300 mt, 245,900 mt and 98,900 mt respectively, representing self-sufficiency in wheat and potatoes, but only 58 percent self-sufficiency in vegetables.

e. Finance and Insurance

25. The Investment Promotion Law was approved in October 2013 to promote investment in remote areas by providing tax relief. Additionally, the Ministry of Finance has proposed returning agriculture under the income tax law and changes that would allow the government to charge a per head tax by species. This would provide the government with a very effective tool for controlling overall animal numbers and the herd composition by species. Other laws currently being drafted include livestock insurance, which is based on the Indexed-Based Livestock Insurance Project (IBLIP) of the WB.

26. Numerous programs are being financed under the Chingas and the Samurai Bonds, which provide soft loans to processors and producers. The Government Action Plan for 2012-2016 considers loan funds of 300 billion Mongolian Togrog (MNT) for the cashmere industry, MNT 300 billion for the leather industry, MNT 50 billion for the wool industry, and MNT 100 billion for the meat industry. Stakeholders indicated that there is a need to improve the process and procedures for the review and approval of loan applications under these programs. Because of the recent downturn in the economy, industry participants expressed uncertainty over whether recently promised project funding will actually be made available and when.

f. Commodity Exchange, Auction and Related Subsidies

27. The Mongolian Law of Agricultural Commodity Exchange approved on June 2, 2011 is designed to establish mechanisms for gaining fair prices and creating animal product standards. It is also designed to encourage formation of business co-operatives and aggregation of products from herder households. The Agriculture Commodity Exchange is coordinated, with oversight by the 12 member Agricultural Exchange Coordinating Board and the 10 member Working Office. Board members include represented organizations and ministries and are led by the Vice Minister of Agriculture. Other members include the National Association of Mongolian Agricultural Cooperatives (NAMAC), the Mongolian Wool and Cashmere Association (MWCA), MIA and other stakeholder organizations. The Agriculture Commodity Exchange is operated as a state owned enterprise, the Agricultural Commodity Exchange Company, with various departments including Auction, Membership, Clearing and Payment, Logistics, Information and Technology and Administration. The Company started its operation on April 5, 2013.

28. In accordance with the Law, Mongolia will have only one agricultural commodity exchange. The auction operates as a desktop exchange, whereby the delivery of physical product is separated from the bidding and financial settlement. Commodities are traded in specified units of weight (e.g. cashmere is sold in 10 kg units) and numerous instructions and regulations govern the transactions. Only registered brokers may participate in the auction. Permanent brokers must have storage and laboratory capacity. This limits most cooperatives to a “non-broker” or “non-permanent” status. Without assurances that permanent broker status can be attained, investment by cooperatives into the required storage and laboratory facilities is discouraged. The government is attempting to overcome this constraint by providing soft loans to cooperatives for infrastructure improvement. In 2012, 20 cooperatives in 20 aimags were selected as model cooperatives and received MNT 45 million each for facility improvement.

29. Sheep and camel wool subsidies were initially introduced in 2011. Since the launch of the Agriculture Commodity Exchange in 2013, the Exchange has acted as a vehicle for the payment and administration of subsidies. Sheep and camel wool are traded through the exchange. Sheep wool receives a subsidy of MNT 2,000/kg. In 2014, plans were made to expand the subsidies to hides and skins (MNT 15,000/large animals, MNT 3,000/small animal) paid once a year. The GOM is also considering subsidies for milk, meat and crops to be paid out through commodity exchange transactions.

30. Opinion about the usefulness of the wool subsidy, commodity exchange and auction is mixed. The MIA feels that the sector is strengthening as a result of these developments. At the pre-subsidy price of wool of MNT 250/kg, producers were known to discard rather than sell the product. Processers were utilizing only 4,000 mt of Mongolia's 20,000 mt of annual wool production while the rest was sold to China or not used. Meanwhile, about 80 percent of wool processors were operating for only three or four months per year because of raw product constraints. In 2013, the MIA forecast 18,000 mt of wool would remain in Mongolia with domestic processors. They report that the value of processed wool has increased from MNT 20 billion in 2010 to MNT 50 billion in 2013.[7] The Draft Report of the Review, Estimation and Analysis of Agricultural Subsidies in Mongolia[8] reports that, while the subsidy program has achieved its primary goals of improving the welfare of herders and encouraging them to sell to local processers, there may have been unintended, negative impacts. The Producer Nominal Protection Coefficient (NPC) for wool in 2012 was 3.39, or more than three times the border price, which may have contributed to a rapid increase in sheep numbers relative to any other species during the time period of the subsidy and that would be in contradiction to one of the primary goals of NLP, which is to ensure sustainable use of pasture resources. The study also indicated the subsidy may be trade distorting and "may act more as a welfare transfer to herders rather than a sustained support to production."[9]

31. Other issues include the overall cost of the program, targeting and its impact on market signals. Payments to herders were MNT 9.8 billion for 8,000 mt of wool in 2011 and forecast at MNT 30,000 billion for 18,000 mt in 2013. Because the program is not targeted, the largest producers capture the majority of the benefit. The size of the subsidy relative to the market price and any quality-based incentives that the auction or processors might offer, signals producers to focus on quantity rather than investing to improve the quality of their raw wool. Some market observers believe the subsidy provides enough cash income that herders do not sell sheep, thus contributing to the meat shortage and escalating meat price over the past two years.

32. Issues concerning the function of the exchange and auction also emerged. The Draft Report of the Review, Estimation and Analysis of Agricultural Subsidies in Mongolia also noted that, "now the national association of processors decides the overall maximum price level and the local companies operate exclusively creating an opportunity to reduce competition. Herders may have no bargaining power in the process." Additionally, industry participants indicated that some former traders (commonly referred to as "changers") have established cooperatives in name only, which operate primarily to formalize the changers' business within the new policy framework. Some of the brokers in the system

[7] Source: http://www.mofa.gov.mn

[8] Dr. Kisan Gunjal "Draft Report: Review, Estimation and Analysis of Agricultural Subsidies in Mongolia", Mongolia Agirculture Sector Review, Ministry of Industry and Agriculture, World Bank August 2013, pages 17 and 21.

[9] ibid, page 22.

are representatives for Chinese companies, which may be in contradiction to the policy goal of promoting domestic industry. Finally, the mandatory restrictions on wool market avenues have inhibited processors' ability to run quality-based value chains directly with producers. In the long run, the system may be financially unsustainable and, when government subsidies are withdrawn, leave the sector focused on the production of low quality commodities without the value chain development necessary to provide processors with high quality raw materials required to be competitive in an open market.

g. Integrated Budget Law (IBL)

33. The new IBL and the Local Development Funds (LDFs) have provided a new level of autonomy in planning and financial resources to soum governments. This should make a major contribution to improving local planning. However, as this includes budget authority for Veterinary and Animal Breeding Units (VABUs), it also introduces the risk that their operations and important strategic programs they are meant to implement may be underfunded, leaving them unable to operate as intended. Some dedicated budget lines and/or compliance requirements may need to be incorporated to ensure continued support to the (VABUs), pasture management plans and winter preparedness activities.

3 Agricultural Output and Contribution to GDP

3.1 Transition's Impact on Agriculture and Rural Livelihoods

34. Mongolia's shock therapy transition in the early 1990s created an institutional vacuum which has had negative and lasting effects on agriculture and rural livelihoods. Transfer payments from Russia and export markets to Soviet (Comecom) countries were simultaneously lost immediately after transition and the economy collapsed, bringing inflation, unemployment, a decline in social services and increased poverty. Strategic planners and policy makers unfamiliar with market mechanisms were ill-prepared for the task of charting a country's course in a global, market-based economy. The legal and regulatory framework for a market economy was largely absent. The banking system, having acted primarily as a cash transfer system to state entities, was inherently weak and suffered multiple collapses.

35. The economic transition had a profoundly negative effect on the agricultural sector. Prior to 1990, Mongolia was self-sufficient in many commodities and exported a number of them. Rural infrastructure and agricultural support systems collapsed during the economic transition and the productivity of agricultural production declined sharply as producers were left without access to markets, transportation, production inputs and financing. In the crop sector, the total area planted to all crops in Mongolia declined from 788,000 ha to 112,900 ha (-86 percent) between 1990 and 2007 while total production declined from 718,400 mt to 114,400 mt (-84 percent).

The economic transition of the early 1990s had a profoundly negative effect on the agricultural sector.

36. The de-industrialization of the country drove many households back into herding, where they remain today. The number of herding households rose from 75,000 in 1990 to 192,000 in 2000. This number is slowly declining, but 146,000 households remain in herding, most with too few animals to be commercially viable. Whereas the national herd was maintained at about 25 million animals prior to transition, a number previously considered sustainable, herders are now driven to increase herd sizes in order to achieve a basic income. Without adequate pasture rotation and production of supplementary winter feeds, livestock numbers cycle to ever increasing highs (33.6 million 1999; 44.0 million in 2009) followed by devastating collapses (23.0 million head by 2002; 32.7 million head in 2010). The constant overgrazing is eroding pastures and making the likelihood of dzud loses greater with each year.

37. Rural Mongolia has been slower to recover from the transition than urban Mongolia. From 2000 to 2010, GDP growth averaged 7.7 percent while agriculture agricultural GDP growth averaged 4 percent growth annually. Contributing factors to agriculture's slower GDP growth include, but are not limited to, an unstable and incomplete policy framework for agriculture that discourages private investment, a lack

of affordable long-term financing and recurring natural disasters. This is reflected in the entrenched levels of poverty in rural Mongolia.

3.2 Agriculture's Contribution to GDP and Employment

38. Agriculture has always contributed significantly to the Mongolian economy, and remains vital to achieving sustained economic growth and poverty reduction. During Mongolia's transition to a market economy, agriculture sustained the nation by providing over 35 percent of GDP and 45 percent of the country's employment through the 1990s. In 2000, agriculture was still the largest contributor to GDP (27.8 percent) compared to industry (24.6 percent) and services (19.5 percent). Recently, agriculture's contribution to GDP and employment has shrunk in relative terms. Table 3.1 shows that, by 2012, agriculture's share of GDP, at current prices, was only 15 percent, roughly equal to mining (16 percent). Meat and milk represent the greatest share of agriculture output, by themselves contributing 7 percent of GDP.[10]

39. Regional differences in the contribution of agriculture to local GDP are important to note. In 14 aimags, pastoral livestock contributed more than 50% of local GDP in 2010. These included Dornod (50.5 percent), Bayankhongor (54.5 percent), Govi-Altai (55.6 percent), Uvs (55.9 percent), Ovorkhangai (60.3 percent), Selenge (65.1 percent), Zavkhan (65.4 percent), Khovd (66.5 percent), Dundgovi (67.3 percent), Khentii (68.1 percent), Khuvsgul (73.0 percent), Arkangai (77.6 percent), Bulgan (78.7 percent) and Tuv (79.2 percent).[11] Non-agricultural sectors are poorly developed in rural aimags and their contribution to total GDP is very low. For example, the six western and central aimags of Govi-Altai, Bayan-Ulgii, Zavkhan, Gobi-Sumber, Dundgovi and Dornogovi, other sectors produce less than one percent of Mongolia's GDP.[12] The weakest aimag economies share the challenges of: i) being very remote from Ulaanbator, ii) having poor infrastructure and industry; iii) displaying low levels of urbanization; and, iv) being dependent on pastoral livestock.[13]

Table 3.1: Real GDP and Agriculture's Share at Constant 2005 Prices (Billon MNT)

Indicators	2006	2007	2008	2009	2010	2011	2012	% Change Over 2006
GDP	3 017.4	3 325.9	3 622.7	3 913.7	4 162.8	4 891.8	5 492.7	82%
Agriculture	654.1	757.4	801.2	796.3	664.2	660.7	801.3	23%
Mining	646.3	665.0	645.9	711.5	736.9	791.0	861.5	33%
Agriculture %	22%	23%	22%	20%	16%	14%	15%	
Mining %	21%	20%	18%	18%	18%	16%	16%	

Source: NSO

40. Though agriculture and mining currently contribute equally to GDP, agriculture makes a much larger and broader contribution to employment. At 15 percent of GDP, agriculture contributes the largest share of employment (34 percent) of which 90 percent is generated by the livestock sector.[14]

[10] Oyu Tolgoi 2013
[11] *Study on Opportunities to Develop Four Clusters (Meat, Wool-Cashmere, Sea Buckthorn and Tourism) Aimed at Improving National Competitiveness in Mongolia, MED, Mongolian Development Institute, ADB, Ulaanbaatar, Mongolia 2012.*
[12] *ibid.*
[13] *ibid.*
[14] Oyu Tolgoi 2013

While mining contributes 16 percent of GDP, its contribution to employment is only 5 percent (Table 3.2).

Table 3.2: Agriculture's Share of Employment ('000 persons)

Divisions	2006	2007	2008	2009	2010	2011	2012
Total Employment	1 009.9	1 024.1	1 041.7	1 006.3	1 033.7	1 037.7	1 056.4
Agriculture, forestry, fishing and hunting	391.4	385.6	377.6	348.8	346.6	342.8	370.0
% share	39%	38%	38%	35%	34%	34%	37%
Mining and quarrying	41.9	44.1	46.5	34.8	34.1	45.1	46.7
% share	4%	4%	5%	3%	3%	4%	5%

Source: NSO

3.3 Agricultural Output

41. Shaped by its climate and geography, Mongolia's agriculture sector is dominated by extensive livestock production, with a smaller segment focused on the cultivation of wheat, potatoes and vegetables. Agricultural output was severely impacted by the transition from collective socialism to a market economy in the 1990s. The situation was aggravated by the severe winter weather (dzuds) of 1999, 2000 and 2001, when 29 percent or 9.7 million livestock died over the course of three winters. The crop sector also suffered from the economic transformation, collapsing from self-sufficiency to the supply of just 25 percent of the domestic wheat consumption in 2008.

42. Total gross agricultural output has increased by 34 percent since 2006 and Mongolia is now self-sufficient in meat, wheat and potatoes (Table 3.3). Livestock numbers have increased 58 percent between 1990 and 2012 and recent numbers indicate that livestock numbers receached 52 million by the end of 2014, a 100 percent increase from 1990. Recent agricultural programs, combined with high international prices for agricultural commodities, have led to significant increases in crop production. Whereas livestock contributed 85 percent of agricultural output in 2006, it now contributes 77 percent owing to the recent doubling in the value of crop production output. Meat and milk are the primary products of the livestock sector, contributing 61 percent of livestock output while hides, skins and fibers contribute 39 percent.[15]

Table 3.3: Gross Agricultural Output (Billion MNT) at Constant 2005 Prices

Sector	2006	2007	2008	2009	2010	2011	2012	% Change Over 2006
Total	928. 5	1 066. 9	1 143.4	1 208.3	1 015.3	1 034.8	1 241.9	34%
Livestock	785. 7	919. 7	962.3	1 001.7	799.1	770.1	957.8	22%
Crops	142. 8	147.1	181.1	206.7	216. 1	264.7	284.1	99%
% livestock	85%	86%	84%	83%	79%	74%	77%	
% crops	15%	14%	16%	17%	21%	26%	23%	

Source: NSO

[15] Mongolia's Meat and Dairy Sector, (Oyu Tolgoi Study, 8 May 2013

43. Annual production of meat is 220.4 thousand metric tonnes (mt), up 29 percent from 2006, but roughly equal to 2008 (Table 3.4). This reflects the cyclical pattern of herd build-up and rapid collapse that is becoming an increasingly prominent feature of Mongolian livestock production. More than half of the meat produced is mutton and goat. In the absence of any significant productivity improvements, output increases have been directly related to the increased number of animals.

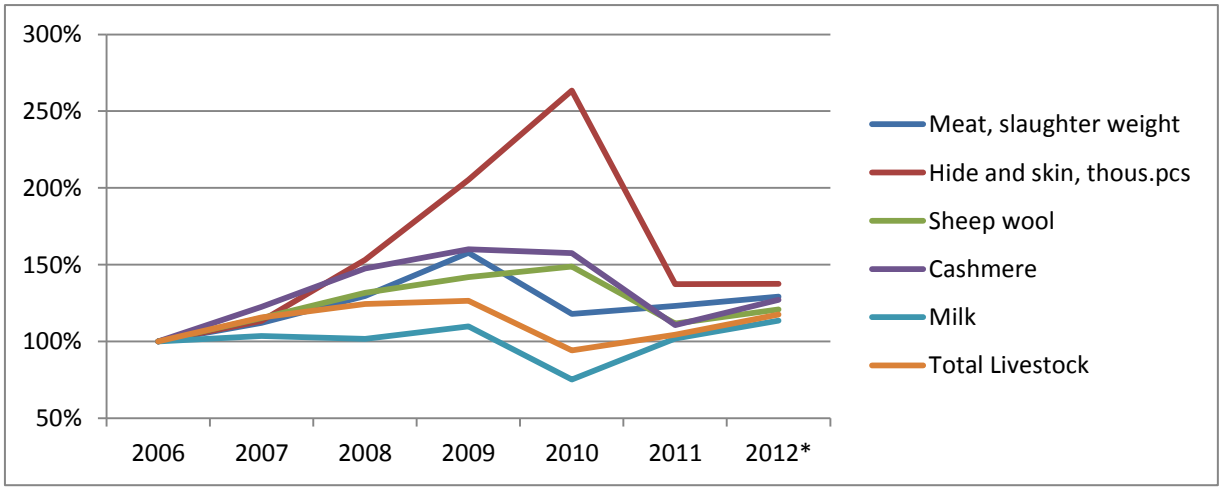
Table 3.4: Output of Main Livestock Products ('000 mt) and Percentage Change from 2006

Commodities	2006	2007	2008	2009	2010	2011	2012	% change
Meat (slaughter weight)	170.7	191.2	221.3	269.1	201.2	210.0	220.4	29%
Mutton & goat	88.4	102.8	119.9	168.9	127.5	123.1	123.6	40%
Pork	0.2	0.3	0.2	0.3	0.2	0.4	0.4	96%
Hides/skins (mln pcs)	6.374	7.218	9.762	13.076	16.785	8.744	8.768	38%
Sheep wool	15.8	18.2	20.8	22.4	23.5	17.6	19.1	21%
Cashmere	4.0	4.9	5.9	6.4	6.3	4.4	5.1	27%
Milk	450.1	465.6	457.4	493.7	338.4	458.6	511.0	14%
Eggs, mln.pcs	19.0	46.2	47.9	30.8	53.6	69.4	69.4	265%

Source: NSO

44. The impact of climate, dzuds, and the exacerbated livestock cycle is illustrated in production numbers of extensive livestock and products. Figure 3.1 shows the cumulative percentage change in the production of meat, hides and skins, wool, cashmere and milk from 2006 to 2012. The production of meat, wool and cashmere peaked with animal numbers in 2009 prior to the dzud and then dropped with the death of large numbers of animals. Hides and skins, conversely, spiked after the dzud as households sold the hides and skins of dead animals. This cyclical production creates great instability in household incomes, driving families into temporary poverty or out of herding all together. Likewise, it creates unstable streams of raw product for processors and adversely affects their overall capacity use and efficiency.

Figure 3.1: Percentage Change in Livestock Product Production 2006-2012



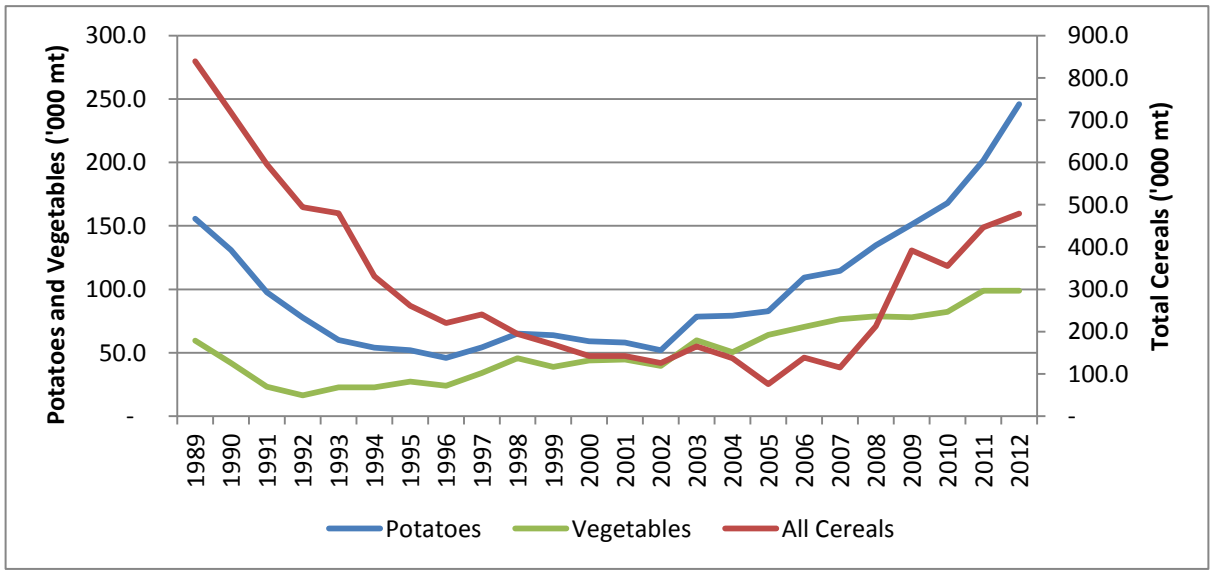
Source: NSO

45. The crop sector consists mainly of grains, oilseeds, potatoes and vegetables. All suffered significant declines in production after transition but have now recovered, albeit at different rates and

under different circumstances of private sector investment, government support and donor aid (Figure 3.2).

46. Cereal crops experienced the greatest decline in production as farmers lost access to production inputs and machinery and mills lacked the operating funds to purchase grain. Production collapsed from 839,000 mt grown on 673,000 ha in 1989 to just 76,000 mt grown on 159,000 ha in 2005, the year of a severe drought. The total area seeded to cereals reached its minimum of 122,000 ha two years later in 2007. Cereal production has recovered since 2007 aided largely by the governments' Atar 3 Program for crop sector rehabilitation which supplied agricultural machinery, increased the area of irrigation through renovation and new construction, and imported improved seed. The improvements made to production capacity were complemented by favorable price conditions including price subsidies and rising world prices for wheat. Cereal production, which is primarily wheat, has increased 246 percent from 2006 and the country was self-sufficient in flour production in 2012. Weather makes this level of production unstable. Poor weather conditions in 2013 led to reduced plantings and yields and a 20 percent decline in the wheat harvest to 369,000 mt, similar to the five-year average. Wheat import requirements for 2014 are estimated at 100,000 mt.[16]

Figure 3.2: Crop Production since Transition ('000 mt)



Source: NSO

47. Potato production, which began its recovery in 1996, is now 58 percent higher than it was prior to the transition, and with occasional surpluses. The Swiss Development Corporation (SDC) has provided long-term support to the regeneration of the seed potato stock, the development of commercial potato seed multiplier farms, and the introduction of improved production techniques. Programs such as the Government's Green Revolution and several donor projects targeted at household food security have promoted vegetable production through the provision of subsidized equipment and demonstration activities but with no direct price supports. Vegetable production began its recovery as early as 1992 and has increased total production steadily since, reaching 99,000 mt in 2012, 66 percent higher than pre-transition levels and providing for approximately 55 percent of domestic needs.

[16] GIEWS Country Briefs, Feburary 6, 2014

48. Mongolia is now self-sufficient in wheat and potatoes. Vegetable production has increased, but still only satisfies 55 percent of domestic demand. Details of crop production since 2006 are provided in Table 3.5.

Table 3.5: Output of Main Crop Products ('000 mt) and Percentage Change from 2006

Commodities	2006	2007	2008	2009	2010	2011	2012	% change
Cereals	138.6	114.8	212.9	391.7	355.1	446.1	479.3	246%
Wheat	127.8	109.6	209.8	388.1	345.5	435.9	465.3	264%
Potato	109.1	114.5	134.8	151.2	168.0	201.6	245.9	125%
Vegetables	70.4	76.4	78.6	78.0	82.3	99.0	98.9	40%

Source: NSO

4 Demand and Trade

4.1 Trends in Domestic Demand and Consumption

49. Domestic demand for Mongolian agricultural products will increase as population and income levels rise. Mongolia has a young and growing population which is projected to grow from its 2012 level of 2.87 million to reach 4.3 million by 2050. This will increase the domestic demand for all food products and significantly affect any surpluses available for export (Chapter 8). Additional demand will come from increasing tourism and larger numbers of foreign workers. These factors will also increase the demand for greater diversity in food products and safer and higher quality food.

50. With urbanization the proportion of the population who produce none of their own foodstuff increases, and consumers' growing reliance on retail food outlets and their growing incomes bolsters market demand. Between 2000 and 2012, GDP per capita increased, in current US dollars, from US $456 to $3,672. Measured in Purchasing Power Parity, GDP/capita rose from $1,900 in 2000 to $4,708 in 2012. In Ulaanbaatar, the emerging middle class now has the purchasing power to buy higher quality and safe foods. Their exposure to international foods and a growing awareness of the link between diet and health is promoting diversity in their food purchasing habits.

Mongolia has a young and growing population, which will increase the domestic demand for all food products.

51. The number of restaurants, commercial food service and agricultural food processors utilizing local products is growing. A number of mines need to source large quantities of food products through their catering services (hired or internally managed). These businesses require a wider range of products and a higher level of consistency and food safety standards in the food they purchase. The combination of urbanization and the rapid development of the mining industry is creating new and larger regional demand centers. These include Ulaanbaatar, with a population of 1.2 million, Darkhan (94,000), Erdenet (90,000) and South Gobi where the population is projected to increase from 64,000 to 107,000 by 2020 including a new urban centre of 30,000 in Khanbogd (Oyu Tolgoi 2013).

52. For the poor in Mongolia, rising incomes will mean finally attaining food security and a nutritious diet. The typical diet is still heavily based on meat, milk and flour with few vegetables, fruits or eggs. Table 4.1 shows the impact of the economic transition on the composition of the Mongolian diet and the positive impact of recent income and supply increases. When the economy and cropping system in Mongolia failed, people returned to a traditional diet of meat and milk products and cut back their overall food intake. Consumption levels have been increasing over the past two decades and now, with

the exception of fruit, the total consumption of all food types is higher than pre-transition levels on a per capita basis.

Table 4.1: Per Capita Food Consumption, Mongolia (kg/capita and % of 1989)

Year	Meat/Meat Products		Milk/Milk Products		Eggs		Flour and Bakery		Potato		Vegetables		Fruits	
	kg	%	kg	%	pc	%	kg	%	kg	%	kg	%	kg	%
1989	93.1	100%	120.7	100%	26.9	100%	105.3	100%	27.4	100%	21.5	100%	12.1	100%
1990	97.0	104%	118.0	98%	29.0	108%	97.0	92%	23.0	84%	20	93%	9.0	74%
1992	109.6	118%	119.5	99%	11.0	41%	77.0	73%	12.0	44%	3.2	15%	0.4	3%
1994	96.1	103%	120.0	99%	3.5	13%	82.1	78%	13.0	47%	4.8	22%	0.5	4%
1996	97.0	104%	125.8	104%	1.4	5%	95.1	90%	27.4	100%	8.5	40%	0.3	2%
1997	96.0	103%	125.8	104%	3.8	14%	100.1	95%	23.0	84%	9.0	42%	0.0	0%
1998	94.8	102%	126.0	104%	3.6	13%	98.4	93%	12.0	44%	16.8	78%	2.4	20%
2000	120.0	129%	130.8	108%	8.4	31%	108.0	103%	13.0	47%	12.0	56%	3.6	30%
2001	97.2	104%	100.8	84%	14.4	54%	110.4	105%	11.0	40%	16.8	78%	3.6	30%
2002	97.2	104%	100.8	84%	14.4	54%	110.4	105%	13.1	48%	16.8	78%	3.6	30%
2003	98.4	106%	130.8	108%	16.8	62%	114.0	108%	21.6	79%	18.0	84%	4.8	40%
2004	94.8	102%	138.0	114%	15.6	58%	105.6	100%	21.6	79%	16.8	78%	6.0	50%
2005	99.6	107%	140.4	116%	19.2	71%	118.8	113%	43.2	158%	25.2	117%	12.0	99%
2006	97.2	104%	145.2	120%	14.4	54%	120.0	114%	38.4	140%	25.2	117%	6.0	50%
2007	91.2	98%	147.6	122%	20.4	76%	128.4	122%	39.6	145%	24.0	112%	8.4	69%
2008	91.2	98%	147.6	122%	27.6	103%	126.0	120%	40.8	149%	20.4	95%	8.4	69%
2009	100.8	108%	163.2	135%	27.6	103%	127.2	121%	38.4	140%	21.6	100%	6.0	50%
2010	100.8	108%	126.0	104%	32.4	120%	128.4	122%	39.6	145%	21.6	100%	8.4	69%
2011	98.4	106%	145.2	120%	37.2	138%	129.6	123%	40.8	149%	22.8	106%	8.4	69%
2012	98.2	105%	160.7	133%	38.4	143%	125.8	119%	38.9	142%	23.5	109%	8.3	69%

Source: UNDP and Mongolian Statistical Yearbook, various issues

53. Domestic demand for Mongolian crops includes 260,000 to 270,00 mt of flour, 200,000 mt potato, 200,000 MT vegetables, 50,000 mt veg oil, 100,000 mt fodder and 20,000 mt malt barley. Table 4.2 provides forecasts of potato, vegetable and fruit demand to 2050. With potato production already at 242,000 mt, there is sufficient supply to meet nutritive requirements until 2025 and towards 2050. There is still ample opportunity for import replacement of vegetables given current production levels of 99,000 mt.

Table 4.2: Forecast Demand for Potatoes, Vegetables and Fruits

	2000	2005	2010	2015	2025	2050
Population ('000 persons)						
Actual	2,510	2,745	3,001	3,281	3,725	4,340
Unit person	2,302	2,517	2,752	3,008	3,416	3,980
Demand ('000 tons)						
Potato	149.6	163.6	178.9	195.5	222.00	258.65
Vegetables	151.9	166.1	181.6	198.6	225.52	262.76
Fruits	80.6	88.1	96.3	105.3	119.57	139.32

Source: T. Erdenechuluun. Mongolia in: Marketing of Vegetables & Fruits in Asia and the Pacific 2001, updated with population forecasts for 2025 and 2050 from the US Census Bureau.

54. National per capita milk consumption is approximately 135 kg/year with rural consumption significantly higher than urban consumption. According to government norms of 2008, Mongolia's daily norm for milk consumption is 430g/day or 157 kg/yr. Using this nutritional standard, the total demand for milk products in Mongolia is estimated at 403 million liters. At this rate, the demand for milk in Ulaanbaatar is estimated at 163.1 million liters/year or 447 mt/day. However, actual consumption in Ulaanbaatar was approximately half the recommended intake 75.6 kg (48.1 percent) in 2011.[17] Providing an adequate and stable supply of processed milk to the city would require increasing the percentage of Mongolian milk processed from its current level of 10 to 20 percent in the medium term and 40 percent long-term.[18]

4.2 Agricultural Exports

55. The total value of Mongolian exports increased from US $1.5 billion in 2006 to $4.4 billion in 2012 influenced by increased mineral exports while the total value of agricultural exports declined from $328 million to $303 million (Table 4.3). Textiles and live animal exports were relatively stable while the value of hides and skins and vegetable origin products declined significantly. Food products were the only category of agriculture products to register an increase over the period.

[17] Tsetsegee, unpublished report
[18] ibid

Table 4.3: Export Value, Select Commodities, Standard Classification of International Trade (Mill USD)

Commodity Group	2006	2007	2008	2009	2010	2011	2012
Total	**1,542**	**1,948**	**2,535**	**1,885**	**2,909**	**4,818**	**4,385**
Agriculturally Based							
Textiles and textile articles	247	263	226	192	215	241	232
Hides, skins and fur and products	45	41	41	28	32	53	31
Live animals, animals origin products	26	27	33	45	70	39	26
Food products	2	2	3	6	6	10	9
Vegetable origin products	9	2	-	6	-	5	4
Subtotal:	**328**	**335**	**302**	**277**	**323**	**347**	**303**
Non-Agricultural	-	-	-	-	-	-	-
Natural or cultured pearls, precious metal, jewellery	270	236	601	309	177	111	123
Mineral products	894	1,301	1,528	1,252	2,356	4,297	3,911

Source: NSO (individual values are derived from the total export value and % shares reported by NSO)

56. Because of the growth of mineral exports, agriculture's share of total exports declined from 21 percent to 7 percent between 2006 and 2012 (Table 4.4). By comparison, mineral products now represent 89 percent of total exports. Whereas textiles and textile articles made up 16 percent of exports in 2006, by 2012 they represented only 5.3 percent. In fact, pearls, precious metals and jewelry comprise a larger share of exports (2.8 percent) than hides and skins, live animals and their products, food products and vegetable origin products combined.

Table 4.4: Share of Exports by Major Commodity Group, 2006-2012 (%)

Groups of commodities	2006	2007	2008	2009	2010	2011	2012
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculturally Based							
Textiles and textile articles	16.0	13.5	8.9	10.2	7.4	5.0	5.3
Hides, skins and fur and products	2.9	2.1	1.6	1.5	1.1	1.1	0.7
Live animals, animals origin products	1.7	1.4	1.3	2.4	2.4	0.8	0.6
Food products	0.1	0.1	0.1	0.3	0.2	0.2	0.2
Vegetable origin products	0.6	0.1	0.0	0.3	0.0	0.1	0.1
Total Agriculturally Based:	21.3	17.2	11.9	14.7	11.1	7.2	6.9
Non-Agricultural							
Natural or cultured pearls, precious metal, jewellery	17.5	12.1	23.7	16.4	6.1	2.3	2.8
Mineral products	58.0	66.8	60.3	66.4	81.0	89.2	89.2

Source: NSO

57. Table 4.5 presents the volumes of key processed and semi-processed agricultural exports between 2006 and 2012. The main products are combed goat down (500 mt), intestine (353 mt), fresh meat (3, 100 mt), frozen meat (1,000 mt), vodka (13,400 liters), knitted or crocheted underwear (204,800 pieces) and knitted or crocheted sweaters (132,200 pieces). Mongolian agriculture exports in 2012 consisted primarily of raw products including, but not limited to, greasy cashmere (3,600 mt), sheep wool (4,500 mt), camel wool (1,000 mt), sheep skins (52,000 pieces) and horse hides (197,000 pieces). Given a small domestic market and either underdeveloped or unstable export markets, risk-adverse processors are hesitant to investment in the sector. The low proportion of processed products in the export mix means that opportunities for value-added production and related employment is lost.

Table 4.5: Processed and Semi-Processed Exports, 2006 to 2012

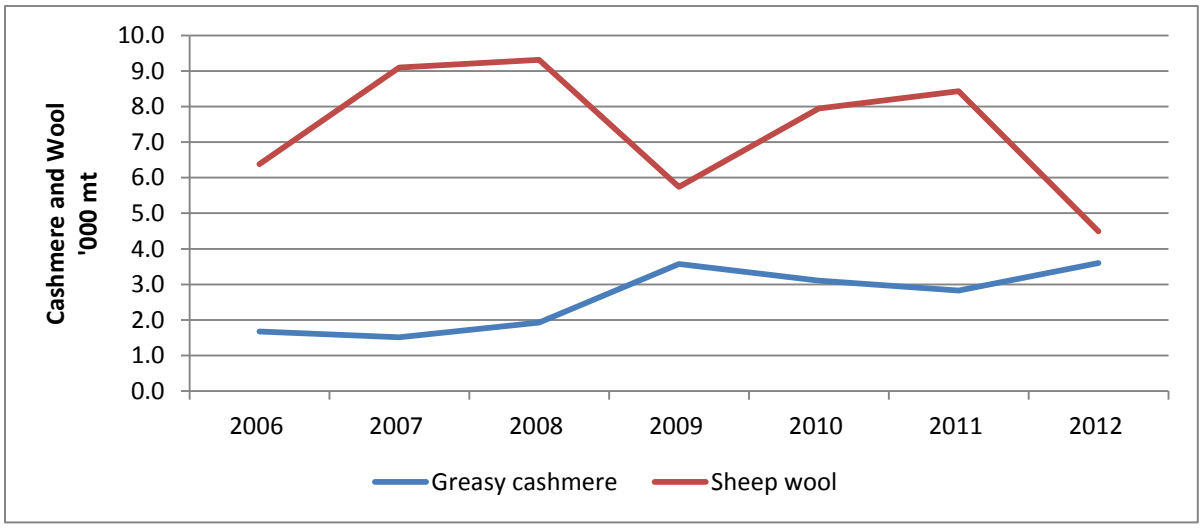
Item	Units	2006	2007	2008	2009	2010	2011	2012	% Change
Coat, jacket	'000 pieces	2.1	2.3	6.8	5.1	11.8	7.0	7.7	267%
Underwear	'000 pieces	9,308	7,675	2,802	196	357	316	205	-98%
Sweater	'000 pieces	4,342	1,809	671	65	52	99	132	-97%
Gloves, mittens	'000 pairs	3.0	2.5	4.9	4.8	13.8	16.0	11.9	298%
Vodka	thous.l	78.2	95.2	92.9	70.0	114.5	48.5	13.4	-83%
Combed goat down	thous.t	1.4	1.8	1.6	1.6	1.0	0.5	0.5	-63%
Meat	thous.t	11.7	10.9	10.3	18.0	26.8	10.2	3.1	-73%

Source: NSO

58. Most agriculture exports volumes were rising into 2010 when this reversed sharply in 2011 and 2012. Among the factors leading to this decline were the loss of meat exports due to animal health concerns and rising domestic demand and prices, collusion in the cashmere industry in 2012 and the reduction in wool exports in response to domestic subsidy programs.[19] Currency valuation may also have influenced export levels in 2011 and 2012. In 2011, the togrog reached its highest level against the US dollar in several years (MNT 1,192/USD), which would decrease the competitiveness of Mongolian products in international markets. The value of the togrog has since declined to MNT 1,600 to the US dolllar, easing the currency factor and the risk of Dutch Disease for the time being. Figure 4.1 illustrates the trends in cashmere and wool exports between 2006 and 2012.

[19] The World Bank wrote in its Quarterly Economic Update, published in June 2012, that "herders and traders attempted to push up prices of greasy (raw) cashmere by limiting the volume of greasy being sold on the market and available for export". As a result, export earnings from greasy cashmere were down by 57% year-on-year (y-o-y) in the first quarter of 2012, while export volumes were 36% lower. - http://www.business-mongolia.com/mongolia/2012/08/27/mongolia-volatility-in-cashmere-2/#sthash.ZmvZOMzw.dpuf

Figure 4.1: Trends in the Volume of Cashmere and Wool Exports



Source: NSO

59. Meat exports have declined sharply since transition. In 1987, Mongolia exported 36.8 thousand metric tonnes (usually expressed as kilotons (kt)), or 16 percent of total production. By 2011, meat exports had declined to 10.6 kt or 5.3 percent of overall production.[20] In 2010, the Mongolian Meat Association estimated that 111.4 kt meats were available for export including 10 kt horse, 10 kt beef, 2.4 kt sheep and 89 kt goat. However, only 10 percent of the potential amount was exported due to the inability to meet importing countries' sanitary and phyto-sanitary standards – especially those relating to Foot and Mouth Disease (FMD). Exports were also affected by inadequate and highly seasonal supplies, poorly developed trade logistics, high transport costs, and poorly coordinated marketing chains.[21]

Meat exports of Mongolia have declined sharply since the transition of the early 1990s.

60. In 2011, 56 percent of Mongolia's meat exports were destined for Russia, 19 percent for Vietnam, and 15 percent for Kazakhstan.[22] Mongolia's poor animal health status contributes to the instability of market access from year to year. The use of sanitary/phyto-sanitary requirements as informal trade barriers is common in the international trade of agriculture products and Mongolia's animal health issues make it particularly vulnerable to trade sanctions for both legitimate and political purposes. China is the current export focus because it has

[20] Oyu Tolgoi page 5
[21] ibid, page 5
[22] ibid, page 5

relaxed its health protocols to allow for more imports from Mongolia in response to high levels of Chinese domestic demand and high meat prices. Russia opens and closes its border to Mongolian meat imports from time to time based on health status. Horsemeat has a stable export to Russia, in part because it is not affected by FMD. Complicating this problem is the generally poor quality of Mongolian meat and meat products, low volumes, and seasonal supply.

61. These factors combine to make meat exports highly unstable. Table 4.6 shows the annual exports of meat from 2008 to 2012 along with the type of meat and total quantity to each destination market. Russia is consistently the top export market and bought between 8,700 and 16,600 mt annually through 2011. However, in 2012, meat exports to Russia were only 1,700 mt because of animal health issues. China and Kazakhstan are the next most consistent markets. Other markets have been found, including Saudi Arabia (2008), Japan (2009), North Korea (2010, 2012), Kyrgyzstan (2011), but are maintained for only short periods. Vietnam and Iran appear to be developing as consistent markets, having purchased in 2010, 2011 and 2012, though at declining volumes. This illustrates the need for Mongolia to attain disease free status (i.e. FMD free with vaccination) in order to stabilize market access and to improve export readiness in order to support export market development.

Table 4.6: Meat Exports from Mongolia, 2008-2012

Year	Export (mt)	Markets (Country, mth, type)		
2008	10,300	Russia	9,935.8	beef and horse
		Kazakstan	371.7	beef
		Saudi Arabia	40.1	mutton
2009	18,000	Russia	16,611.4	beef and horse
		China	1,134.2	sheep, horse and beef
		Kazakstan	286.3	beef and horse
		Japan	6.9	Horse
2010	26,800	Russia	13,878.9	horse, sheep and beef
		Vietnam	8,984.5	mainly goat
		Iran	2,069.3	mutton and goat
		China	988.0	horse, mutton and goat
		Kazakstan	166.5	beef
		North Korea	11.0	mutton and goat
2011	10,600	Russia	8,705.7	beef and horse
		Kazakstan	525.2	beef and horse
		China	294.8	horse
		Iran	264.0	mutton goat
		Vietnam	221.0	mutton and goat
		Kyrgyzstan	155.2	horse and mutton
2012	3,099.31	Russia	1,736.7	horse and beef
		Vietnam	592.5	mutton and goat
		Kazakstan	468.1	beef
		China	225.4	horse
		Iran	53.6	mutton and goat
		North Korea	26.0	mutton and goat

Source: General Customs Department of Mongolia

4.3 Issues in Export Readiness

62. Several factors constrain the growth of exports. The Mongolian National Chamber of Commerce and Industry (MNCCI) conducted a survey in 2007 with more than 100 firms.[23] These firms faced both external and internal constraints to exports. Externally, transportation logistics, export documentation and trade regulations were the largest issues. Internally, the lack of finance and product quality and packaging were the principal issues. The cost of raw materials was also indicated. Half of the firms surveyed required service and advice on export marketing and trade contracts and payments as well as training on standardization. The main issue for exporters was how to meet international and other standards required by importing countries (Table 4.7).

63. Logistics are a central element of the marketing infrastructure and system. The World Bank's Logistic Performance Ranking (LPI)[24] compares countries logistics across six key dimensions: 1) customs; 2) infrastructure (e.g., ports, railroads, roads, information technology); 3) the ease of arranging international shipments; 4) the competence of logistics services; 5) the ability to track and trace consignments; and, 6) timeliness of shipments. Out of 160 countries measured, Mongolia ranked 135 in 2014, scoring lower than its regional and income peer classes on each component measure.

Table 4.7: External and Internal Factors Affecting Export Readiness (% of Firms Reporting)

External factors	Internal factors
• Transport logistic (32%) • Export documentation/forms (24%) • Trade rules and regulation, licenses (21%) • Governmental organization's activity and service (15%) • Others (8%)	• Lack of financial resource (41%) • Quality of products and its packaging (25%) • Human resource skills and knowledge (13%) • Other, including technology, lack of information and data, high cost for raw materials, utilities cost. (21%)

Source: NMMCI

64. These same issues were reflected in interviews held with stakeholders in October 2013. They indicated the most important issues were i) meeting globally accepted standards related to animal health, HACCP etc. and ii) difficulties in handling import/export paperwork and requirements including the import tax regimes of other countries. Their recommendations to the Mongolian government were to:

- Focus on domestic market development first
- Develop policies to support marketing, storage and distribution
- Develop the quality standards and related inspection and compliance systems (HACCP, ISO etc) needed before any sizable and sustainable export market can be developed
- Use clusters to accelerate the accumulation of adequate volumes to secure export contracts
- Develop the logistics needed to deliver a consistent volume and quality of products
- Create an export development policy to facilitate linkages to foreign markets
- Negotiate trade agreements.

[23] MNCCI, "Quality management: linking TROPS and NSBS for export success."
[24] World Bank Logistics Performance Index: http://lpi.worldbank.org/international/scorecard

4.4 Agricultural Imports

65. The composition of agricultural imports shifted between 2008 and 2012 (Table 4.8) in response to gaining self-sufficiency in some crops. Wheat imports dropped from 175,000 mt in 2008 to 4,000 mt in 2012 while first class flour imports decreased from 97,000 mt to 26,000 mt. Likewise, potato imports dropped from 35,000 mt to 3,200 mt while vegetable origin products dropped from 160 mt to 77 mt.

66. Some changes in imports reflect changes in processing capacity in Mongolia. UHT milk has declined from 4,800 mt to 729 mt while milk powder imports have increased from 1,300 mt to 4,700 mt, which may reflect an increased capacity to reconstitute and package powdered milk.

67. Even though domestic pork production is increasing, imports of pork have increased from 83 mt to 1,700 mt, indicating increased consumer demand, possibly as a substitution effect given the high prices of other meats in Mongolia. Likewise, chicken imports have increased from 2,200 mt to 8,300 mt. Imports of inputs, including breeding animals (18,000 to 1.3 million head[25]) and fertilizer (27 million kg to 68 million kg).

[25] This value likely includes poultry, including grandparent stock

Table 4.8: Agricultural Imports, 2008-2012 with Country of Origin (2012)

Agricultural Imports	units	Total Volume					Main Countries of Origin in 2012 (volume)					
		2008	2009	2010	2011	2012	Country	Value	Country	Value	Country	Value
Breeding Animals		18,271	50,418	95,072	176,837	1,344,672						
Vegetable Origin Products	kg	160,533	98,103	89,449	71,115	77,020						
Animal and Vegetable Fat and Oil	kg	27,629	18,522	27,762	36,778	33,520	Malaysia	43,520	Turkey	22,022	Russia	61
Food Products												
Wheat	kg	175,125,838	114,728,961	66,200,132	7,382,523	4,059,700	Russia	4,059,700	-		-	
Flour / 1 st class/	kg	96,691,332	69,439,574	45,597,517	37,906,048	26,356,486	Russia	23,655,590	Kazakhstan	2,417,000	China	279,125
Eggs	1000.u	36,800	34,779	47,583	72,950	91,983	Russia	91,887	China	96	-	
Meat	kg											
Pork	kg	83,208	14,000	246,031	1,151,624	1,728,612	Poland	1,644,710	-		-	
Chicken	kg	2,201,233	2,432,273	4,827,240	5,999,251	8,275,416	USA	7,331,328	China	878,508	Russia	45,060
Meat Products	kg	906,306	411,909	568,613	867,341	975,372						
Vegetable oil	kg	1,273,790	6,719,621	8,709,146	5,079,627	5,969,559	Russia	5,911,755	Kazakhstan	18,426	Singapore	16,670
Margarin	kg	4,739,800	3,211,956	5,101,026	4,952,309	5,718,723	Russia	5,216,686	Malaysia	438,368	Singapore	54,648
Milk (packaged UHT)	kg	4,848,291	993,632	194,072	121,394	729,595	China	649,192	Russia	18,282	Poland	15,840
Condensed milk	kg	625,607	494,167	906,726	1,466,848	1,379,976	Ukraine	847,657	Russia	293,989	Malaysia	238,294
Powdered milk	kg	1,299,978	1,579,852	2,748,141	3,536,156	4,692,215	New Zelanc	4,259,475	Ireland	250,000	Korea	77,383
Yogurt	kg	649,186	643,459	690,110	803,176	822,719						
Butter	kg	77,120	83,244	106,072	101,435	108,292	New Zelanc	85,056	Russia	10,858	France	6,494
Cheese and Quark	kg	232,749	140,999	275,288	346,354	493,433	Russia	164,626	Germany	152,066	Austria	68,376
Potato	kg	35,445,785	23,215,156	8,504,979	5,779,990	3,162,440	China	2,960,640	Germany	75,000	Russia	59,800
Onion, garlic	kg	14,358,858	19,809,077	25,148,549	15,242,744	10,477,146	China	10,447,796	Netherlands	24,300	Russia	4,000
Fresh fruit	kg	16,555,936	17,354,983	15,615,787	13,246,582	15,250,893	China		Russia			
Alcohol drinks	l											
Beer		20,469,118	10,629,804	18,847,788	21,943,256	28,674,544	Russia	16,571,434	Korea	10,648,341	Czekh	355,368
Raw and processed hides, skins, fur and articles	u	2,515	32,532	2,803	5,901	6,678						
Textiles and textile articles	m2	38,335	28,445	36,629	50,076	56,179						
Livestock Feed	kg	544,955	250,139	2,061,649	329,052	236,472						
Fertilizer	kg	27,769,108	23,410,821	31,910,579	47,652,168	68,099,259	Russia	51,925,094	Uzbekistan	12,701,330	China	3,120,050

Source: *NSO*

4.5 Terms of Trade

68. The overall terms of trade for Mongolian exports strengthened between 2006 and 2012, increasing from 115.5 to 131.5, as shown in Table 4.9. This however is not the case for agricultural products, which are usually exported as raw products while imports are of high quality processed foods, footwear, and improved live animals. For live animals and original products, the terms of trade declined from 0.95 to 0.69 between 2006 and 2012, while the index for raw and processed hides and skins declined from 0.97 to 0.22. For processed agricultural products, the terms of trade have improved. The terms of trade index for food products increased from 0.96 to 2.06 while the index for textiles increased from 1.01 to 3.28. Promoting further value-added will enhance the terms of trade in the future.

Table 4.9: Terms of Trade Index, 2006 to 2012 (2005 = 100)

Price indexes:	2006	2007	2008	2009	2010	2011	2012
All Commodities							
Exports	137.4	171.4	202.0	210.3	275.4	359.4	379.8
Imports	118.9	159.2	190.5	180.3	246.1	270.4	288.9
Terms of trade index:	115.5	107.7	106.0	116.6	111.9	132.9	131.5
Live animals, animal origin products							
Exports	97.5	90.7	90.4	81.2	79.3	95.9	151.1
Imports	102.3	110.3	142.7	161.0	200.9	225.2	220.9
Terms of trade index:	0.95	0.82	0.63	0.50	0.39	0.43	0.68
Food products							
Exports	105.3	228.9	279.2	225.4	273.2	306.4	397.4
Imports	109.2	122.3	156.4	152.3	168.1	192.6	192.7
Terms of trade index:	0.96	1.87	1.79	1.48	1.62	1.59	2.06
Raw & processed hides, skins, fur							
Exports	95.9	81.8	134.1	83.5	163.5	275.7	122.4
Imports	98.8	177.7	221.4	372.1	356.5	360.0	550.0
Terms of trade index:	0.97	0.46	0.61	0.22	0.46	0.77	0.22
Textiles & textile articles							
Exports	100.2	118.8	147.5	391.0	471.8	651.4	862.8
Imports	98.8	106.2	93.1	143.2	350.6	177.0	262.7
Terms of trade index:	1.01	1.12	1.58	2.73	1.35	3.68	3.28

Source: NSO

69. Currency appreciation and domestic inflation influence Mongolia's terms of trade. Appreciation of the real exchange rate by 11 percent in the first quarter of 2012 reflected higher rates of inflation in Mongolia relative to other countries.[26, 27] This inflation had important effects on the competitiveness of Mongolian products, with negative consequences for the agriculture and agriculture processing sectors. Throughout 2013, the Mongolian exchange rate declined, easing this pressure on competitiveness. However, this threat of "Dutch Disease" will re-emerge when the mineral sector rebounds and demand for the Mongolian togrog increases.

[26] WB, Mongolia Quarterly Update – June 2012

[27] Measures the price of a basket of Mongolian goods against the similar basket of goods in its main trading partners.

5 Agricultural Production and Productivity

5.1 Livestock Sector

5.1.1 Production Systems

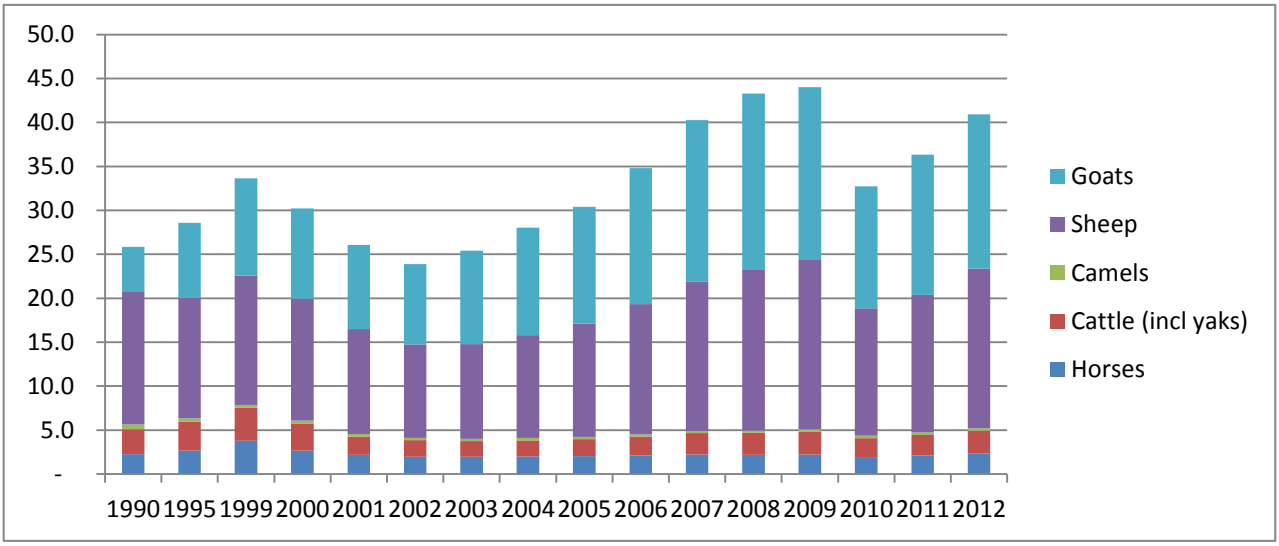
a. Extensive Livestock

The extensive herding sector consists of 146,000 households whose primary source of incomes comes from herding.

70. The extensive herding sector consists of 146,000 households whose primary source of incomes comes from herding. Several thousand other households own livestock but earn the bulk of their income elsewhere. In addition, some institutionally and privately owned livestock tended by herders for a fee. In total, 208,000 households are involved in the herding sector. Livestock production is based on the traditional nomadic herding system but is shifting towards a less mobile, semi-settled system.

71. In 2012, the national herd consisted of 41 million animals including 18.1 million sheep, 17.6 million goats, 2.6 million cattle, 2.3 million horses and 277,000 camels (Figure 5.1). By December 2013, the herd had increased another 11.3 percent to 45 million.[28] Mongolia's agro-climatic zones flow east-west and the northern belt, where the most moisture and best soils are found, holds 58 percent of the sheep, 71 percent of the cattle and 60 percent of horses in the country while the desert area of the southern Gobi is focused on goat production and is home to 69 percent of Mongolia's camels.[29]

Figure 5.1: Extensive Livestock Numbers, 1990 to 2012



[28] UB Post, 5 January 2014.
[29] Oyu Tolgoi, 2013.

Source: NSO

72. The Mongolian livestock industry is based on low-input, low-output and low productivity extensive production. Livestock production follows the availability of feedstuffs, namely pasture. Productions costs are minimized by relying on pasture with little supplementary feed. Subsequently, livestock lose 10 to 30 percent of their body weight each winter. Because of nutritional constraints, mortality rates are high and reproductive rates and growth rates are low.

73. The purchasing power of livestock products has declined and the size of a herd considered adequate to provide a basic family income is now 300 head, compared to 100 to 150 head in the late 1990s. Herders interviewed for this study considered the threshold for making commercial decisions and investing in productivity improvements to be 500 animals.[30] In response to these economic pressures, herders have expanded their individual herds. By 2012, the national herd was 58 percent larger than in 1996. Market forces have also shifted the ratio of sheep to goats within the herd from 3:1 to nearly 1:1, driven by the need for herders to generate cash from high-valued cashmere to pay for basic needs.

74. The increased grazing pressure on pasture resources because of the both the size and composition of the herd, combined with inadequate investments into supplementary feeds, is contributing to the continuing decline of pasture carrying capacity and subsequent severity of livestock mortality during dzuds. The cyclical pattern in catastrophic winter livestock mortality is perceived as becoming more frequent and more extreme. In 1999, the livestock herd reached 33 million head and over the following three severe winters, 9.6 million animals (29 percent) died. By 2009, herd numbers nearly doubled, growing from 23 million to 44 million or 70 percent more than what was generally considered a sustainable number in 1990. Over the winters of 2009 and 2010, 10 million animals (23 percent) died.

75. Despite the dramatic increase in the national herd, the vast majority of Mongolian herding households remain at or near a subsistence level. In 2012, 67 percent of households had 200 head or fewer while only 9 percent had 500 head or more, the size at which herders begin to invest in productivity improvements. For these subsistence households, production and marketing decisions are often driven by short-term household needs such as medical care and school fees rather than longer-term commercial considerations. A detailed breakdown of herder households was provided in the World Bank Livestock Sector Study of 2009.[31]

- Families with 500 or more livestock are wealthy and gain fulltime employment through herding. Pasture and inputs are adequate. A similar level of income is provided by smaller intensive herds.
- Fulltime herders with growing herds of 200 to 500 livestock are not poor, but are vulnerable to dzuds and have limited access to capital and pastures.
- Fulltime herders with 200 or fewer are poor and highly vulnerable. Herding may not be their preferred livelihood but alternatives are absent.
- Periodic herders enter and exit the herding sector depending on external economic conditions. Some in-migrants to urban areas are in this group.

[30] anecdotal information from stakeholder consultations

[31] World Bank, Report No. 50277-MN MONGOLIA Livestock Sector Study VOLUME I – SYNTHESIS REPORT Sustainable Development Department East Asia and Pacific Region, September 15, 2009.

- Part-time herders with small herders which may be their own or tended for others and who supplement herding with other income sources.

76. Subsistence herding affects the number and quality of livestock animals and products marketed. Most products are consumed within the household. Sales are made based on cash needs of the family rather than the overall profitability of the herd. Milk is the primary source of income for most families. Up to a herd size equivalent to 300 Sheep Units (SU), milk provides 51 percent of household income while meat provides 20 percent and cashmere only 5 percent. Only with a herd the size of 800 SU or more does meat provide more than 50 percent of household income (Table 5.1).

Table 5.1: Income structure of extensive livestock herders (%)

No. SU	Meat	Milk	Cashmere	Other
Up to 300	20	51	5	24
301-800	47	34	7	13
801-1300	56	26	9	9
Over 1301	54	28	14	4
Average	**44**	**35**	**9**	**13**

Source: MoFA, SDC, UNDP, 2007

77. The average offtake per year in Mongolia is calculated at 20 percent using total production and slaughter numbers (Table 5.2). Average carcass weights were calculated using the total offtake and total meat production numbers. These calculated values show the average carcass weight of all animals slaughtered was only 26.3 kg, which reflects the high proportion of small livestock (sheep and goats) in the slaughter mix. The average carcass weight calculated for cattle was 127 kg and 16 kg for sheep and goats. Similarly, the World Bank Livestock Sector Study (2009) indicated that Mongolian beef carcasses range from 120-130 kg compared to international yields of 250 to 300 kg and Mongolian sheep carcasses range from 15-18 kg compared to international yields of 18-30 kg. Carcass yield ranges discussed with industry were consistent with these figures. The ranges of live weights, carcass weights, and yields at a Mongolian slaughterhouse are provided in Table 5.3.

Table 5.2: Mongolian Offtake and Carcass Yields, 2012

Year:	Total Herd (million head)	Offtake (million head)	%	Meat (000 mt)	Average Carcass (kg)
Total Livestock	40.9	**8.365**	20%	220.4	26.3
Horses	2.3	0.238	10%		
Cattle	2.6	0.470	18%	59.7	127.0
Camels	0.3	0.025	8%		
Sheep	18.1	3.680	20%	123.6	16.2
Goats	17.6	3.952	23%		

Source: NSO Data

Table 5.3: Carcass Yield Ranges, Mongolia

	Live Weight			Carcass			Yield		
	Low	**High**	**Ave**	**Low**	**High**	**Ave**	**Low**	**High**	**Average**
Beef	280	350	315	110	125	117.5	39%	36%	38%

Mutton	40	50	45	23	25	24	58%	50%	54%

Source: Interview

78. Offtake and carcass yield rates were examined in relation to beef in Canada and sheep in Australia (Table 5.4). Beef breeding females as a proportion of the herd are 48 percent and 41 percent in Canada and Mongolia respectively. Annual offtake is 30 percent in Canada but only 18 percent in Mongolia. Comparing Mongolian and Australian sheep performance indicators, Australia holds a higher proportion of breeding ewes in the herd than Mongolia (60 versus 46 percent). Total slaughter and live exports from Australia represent 42 percent of the total herd annually, or twice the offtake level for Mongolia while the average carcass weight in Australia is 23 kg as compared to 16 kg in Mongolia. These performance indicators are strongly linked to nutrition and the resulting lower reproductive rates and the older age of slaughter in Mongolia. This results in a larger inventory of animals being carried, lower turnover and income generation for herders, greater grazing pressure, and more need for supplementary feeds.

Table 5.4: Comparison of Mongolian and International Meat Yields, 2012

Productivity Indicators	**Mongolia**	**Comparison**
Cattle		**Canada**
Inventory (million head)	2.6	12.5
Breeding females (%)	41%	48%
Annual Slaughter (%)	18%	30%
Average Carcass (kg)	127	371
Sheep		**Australia**
Inventory (million head)	18.1	74.7
Breeding ewes (%)	46%	60%
Annual lamb slaughter (%)		27%
Annual sheep slaughter (%)		13%
Live exports (%)		3%
Total slaughter and exports (%)	20%	42%
Ave Carcass – (kg)	16	23

Source: Various sources

b. Semi-Intensive and Intensive Livestock

79. Semi-intensive livestock production in Mongolia includes some sheep and beef feeding units and many of the dairy farms where supplementary feeds are provided. Intensive livestock production includes primarily pork and egg production and a few dairies and feedlots. Both semi-intensive and intensive production, especially pork and poultry production, is increasing after collapsing in the early 1990's. Production is located mainly in the central cropping zone near feed supplies and markets. The number of intensive and semi-intensive livestock farms and the total number of intensive livestock have increased several times since 2005 (Table 5.5 and Table 5.6).

Table 5.5: Intensive and Semi-Intensive Livestock Farms, 2005 to 2011

Number of Farms	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Dairy	186	395	494	413	523	649	901	

Number of Farms	2005	2006	2007	2008	2009	2010	2011	2012
Cattle			10	48	94	101	64	
Meat and wool sheep			15	57	107	128	200	
Swine	21	72	79	172	135	190	187	
Poultry *(mostly layers)*	38	81	111	225	105	148	217	
Bee			40	56	58	68	81	
Feedlots *(beef/ sheep)*	127	130	133	137	141	229		

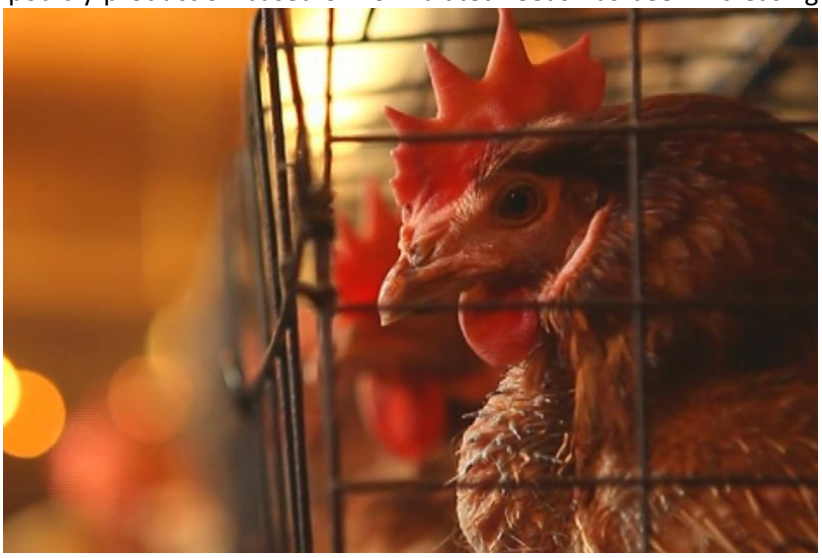
Source: Statistical data for Food, Agriculture and Light Industry Sector, MIA, 2012

Table 5.6: Intensive and Semi-Intensive Livestock Numbers 2005-2010

Number of Animals	2005	2006	2007	2008	2009	2010	2011	2012
Dairy (improved)	4,343	8,012	10,070	12,648	19,298	21,412	27,501	
Swine	2,670	32,761	36,000	29,300	19,959	15,064		
Poultry *(primarily layers)*	88,068	390,173	395,200	307,164	396,551	397,468		
Feedlot beef, sheep	na	na	na	Na	na	na		

Source: MOFALI statistics

80. New investment into caged poultry production based on formulated feeds has been increasing and the output of eggs has increased 265 percent since 2006 with some very large farms emerging including AJGINA at Nalakh and Bayanchandmani, which have 500,000 broilers each, and Tumenshugoth which has a fully automated system for 120,000 layers and plans to increase to 200,000. There are also several smaller farms around Ulaanbaatar and in the aimags. By 2011, there were 217 poultry farms operating. Breeding eggs are imported from Russia and hatched in Ulaanbaatar.



New investment into caged poultry production based on formulated feeds has been increasing.

81. While the volume of pork production has nearly doubled since 2006, the total production is insignificant compared to production of meats from the extensive livestock sector. There has been a sharp increase in the number of intensive cattle (beef) and sheep (meat and milk) farms, rising from 10 and 15 in 2007 respectively to 200 and 187 respectively in 2011. The number of beef feedlots has increased from 127 in 2005 to 229 in 2010.

82. The production of milk, eggs, broilers, and pork is supported by domestic consumer demand, cash markets, interest from producers and government policy. The growth of the semi-intensive and

intensive livestock sectors in the central region of Mongolia is driving increased private sector feed and fodder production. In order to increase productivity of animals, the Government has lent MNT 200 million for investment in 100 dairy cows and meat cattle and 165 high-yielding breeding pigs to 80 herders, farmers, cooperatives, and intensive farms. In addition, 300 head of imported dairy cows have been distributed to 12 large enterprises in Tuv and Selenge provinces, and peri-urban areas, along with MNT 700 million in loans.

83. The intensive livestock sector is significant because it has generated a demand for feed crops and manufactured fodder that the extensive livestock industry does not. Intensive livestock products have cash-based markets with a higher rate of turnover and farmers have the willingness and ability to pay for livestock feeds. This has prompted the re-emergence of manufactured fodder producers. In particular, the dairy industry is developing around urban areas such as Ulaanbaatar and Darkhan. The steady cash flow into the dairy sector has been the main stimulus for the re-emergence of alfalfa crops and manufactured fodders. The existence of this production capacity now provides new options for providing feed and fodder to the extensive livestock industry, as it can piggy-back on the development of the intensive livestock feed markets. Secondly, the growing market for intensive livestock products offers herders an additional exit strategy from extensive livestock production. The extent of these opportunities will vary by climatic zone and the presence of consumer end-markets. These factors need to be considered before any intensive livestock programs are promoted in a particular area.

c. Dairy Production

84. Annual milk production is 458 million liters of which 65 percent is cows' milk.[32] Milk is produced from traditional extensive herds across the country by 146,000 herder households and other households with livestock (209,000 total) and from several hundred semi-intensive dairies in the vicinity of urban centers. Seasonality in production related to breeding and nutrition programs is significant with 80 percent of milk produced between May and September. Productivity is very low (Table 5.7). According to the Agriculture Census of 2011, the average milk production of a Mongol cow per day is only 2.57 liters over a 6.7 month lactation period (516 liters per lactation) while the average milk production of a purebred cow is only 4.4 liters per day over an 8.2 month lactation period (1082 liters per lactation).[33] By comparison, the FAO reported the following annual milk yields per cow in 2005: Morocco, 903 liters; Vietnam, 1,680; China 3,700; New Zealand 3,838 and the USA 8,400.[34]

Table 5.7: Average Milk Production by Region – Extensive Production – 2011 (litres)

Breed	Average	Khangai	High Mountain	Steppe	Gobi
Mongol cow					
Average milking per day, liter	2.57	2.59	2.31	2.81	2.26
Average milking period months	6.7	6.8	7.2	6.5	5.7
Yak cow					
Average milking per day, liter	1.83	1.94	1.67	1.72	2.01

[32] Oyu Tolgoi, 2013
[33] Mongolian Agricultural Census, 2011
[34] FAO 2010: Status of and Prospects for Smallholder Milk Production – A Global Perspective, by T. Hemme and J. Otte. Rome

Breed	Average	Khangai	High Mountain	Steppe	Gobi
Average milking period months	6.7	6.0	7.2	5.1	6.3
Pure breed cow					
Average milking per day, liter	4.40	4.45	-	4.40	3.83
Average milking period months	8.2	8.4	-	8.1	10.0
Hybrid cow					
Average milking per day, liter	3.72	3.70	3.88	4.39	-
Average milking period months	8.7	8.5	9.3	8.0	-

Source: Agriculture Census 2011

85. Semi-intensive dairy farms represent a growing proportion of the dairy subsector. There were 901 dairy farms in 2011 with 27,501 head of cattle, or 31 cattle per farm (Table 5.8). This is more than double the number of farms in 2006 and more than triple the total number of dairy cattle. The average number of cattle per farm has increased by 55 percent since 2006.

Table 5.8: Number of Dairy Farms, 2006 – 2011

Year	Number of Dairy Farms	Number of Cattle	Number of Cattle per Farm
2006	395	8,012	20
2007	494	10,070	20
2008	412	12,648	31
2009	523	19,298	37
2010	649	21,412	33
2011	901	27,501	31
2012			
% Change from 2006	128%	243%	55%

Source:

86. Most dairy farms are operating in a semi-intensive fashion, with some supplementary feeding and breeding and production management programs improved to some degree. Feedstuffs tend to be low quality and rations are typically unbalanced. Average productivity in semi-intensive dairies is 7.5 kg/day (7.3 liters/day) and 2,500 to 2,900 kg/year (2,427 – 2,816 liters/year) over a lactation period of 150 to 200 days compared to 300 to 305 days in developed nations. There are few mechanized dairy barns in the country. Milking is done by hand or by small milking machines, which are inefficient and increases the chances of milk contamination with bacteria and foreign substances. Post-harvest losses in milk handling and storage are high (estimated at 40 kg/ or 39 l/capita).

Semi-Intensive Dairy farmer – Gobi Sumber

The semi-intensive farm has approximately 20 cows. They feed hay and put up more than 40 mt per year by cutting on public land. They also feed bran purchased from Ulaanbaatar.

There are a variety of breeds in the herd including Altaihou (Kazakstan), which is considered the most productive, Simmental, Steppe Red and some crossbred (Altiahou x French breed and Angus crossbreds). Using staggered natural breeding they milk all year. The lactation period is 280-300 days with summertime yields of 10-11 litres/day in two milkings. Milking is done outside by hand even though they have a small electric milking machine. Cows are milked for 8 to 10 years. In 2004, they invited an AI tech from Ulaanbaatar to inseminate 5 cows but obtained no pregnancies.

Marketing is local. In summer they transport milk in a van to customers and sell directly. In winter, they supply kindergarten and schools with milk under contract with public enterprises. Milk sells for 800 MNT/litre in the summer and 1100-1200 MNT/litre in the winter.

The farmer, a woman, wants to build a mechanized milking barn and have 5-10 high producing cows in order to save labour, increase productivity and make better profits. Since feed resources are limited and there is no possibility to produce silage, they want to keep fewer but more productive cows.

5.1.2 Improving Livestock Productivity

87. The greatest issue facing the extensive livestock system is overgrazing and the mounting risk of system collapse in the most affected areas. The World Bank Livestock Sector Study indicated that productivity declined 26 percent between the periods of 1986-1990 and 2001-2007. A growing number of producers are interested in improved genetics, fodder production, irrigation schemes, machinery, shelters, and other means, but face difficulties in access to inputs, financing and technical support. More importantly, the market does not reward them for higher quality. While a new sheep breed may improve meat and wool off take, herders weigh this investment decision in light of the time and feed required, the animal's ability to survive in Mongolian conditions, and the profit they ultimately receive. The potential returns to improvements in productivity must be high enough to warrant the additional investment and associated risks. As long as the productive resource (pasture) is essentially free and markets do not provide a premium for quality, there is little incentive for producers to limit their animal numbers and invest in productivity improvements. To the contrary, it is a rational decision for herders to expand their animal numbers based on internal growth of the herd to take advantage of a free resource.

88. When the market signals provide the right incentives for investment, herders do respond differently. Projects such as the MCA Peri-Urban project, the WB SLP and the SDC Green Gold Program have demonstrated that when herders are provided with opportunities for greater profits, secure land tenure, credit and training, improvements in productivity follow. Mercy Corp has found that when their herder groups received better prices and increased revenue because of value-chain contracts, this translated into improved management.

89. Investments into productivity and production shifts in response to market demand is seen mainly where there is close proximity to markets and producers have established herds large enough to be commercially-oriented. Sumber soum in Gobi-Sumber, which is located easy distance to Ulaanbaatar by paved road and train and relatively well serviced with infrastructure, has a large number of herder households with 300 to 500 livestock each. Herders interviewed reported that with a herd size of 500, investments in quality begin to occur including buying improved breeds from other aimags such as Zavkhan buurll goats, Kazak whitehead, and improved beef cattle. Some have piloted the planting of fodder crops. Herders have also invested in improved animal shelters. Dairy farms, vegetable production and small scale processing are also present. In this soum, they also tend to form groups and cooperate. Gobi Sumber has two cooperatives with more than 100 members each.

a. Nutrition

90. The main constraint facing the livestock sector, especially the extensive livestock sector, is animal nutrition. Nutritional restrictions negatively affect mortality, reproduction, growth, and product quality. Inadequate nutritional reserves reduce resilience to environmental shocks and increase the severity of winter disasters. In Mongolia, extensive livestock routinely lose 10 percent to 30 percent of their body weight each winter and take most of the summer to regain it. This results in livestock taking additional years to reach market weight, which in turn means additional inventory pressure on pastures and lower levels of off take and revenues for households. For processors, it means older carcasses with lower carcass yields and poorer meat quality. During dzuds, inadequate livestock nutrition leads to mass starvation and death. Nutrition is also the key constraint for semi-intensive and intensive livestock, including dairy. Feed can represent up to 70 percent of the cost of milk production.

91. In 2009, the World Bank Livestock Sector Study identified several issues affecting the availability of feeds and the reluctance to invest:

- over-reliance on standing crop
- hay is cut late and is low in protein and energy
- fodder and silage production has declined
- high quality supplementary feeds are considered expensive
- Inadequate differentiation between emergency feeding for survival and supplementary feeding for productivity;
- lack of knowledge about nutrition, feed quality and feeding programs leading to an unwillingness to invest in inputs
- limited national capacity to produce compound feeds.

92. In 2013, the severity of some of these issues was declining. The growing demand for feeds from the semi-intensive dairy and intensive livestock sectors has spurred a reversal in forage/fodder production and renewed interested in silaging. Wheat production has greatly increased, increasing the supply of crop by-products available for feeds. The introduction of canola/rapeseed and the presence of new crushing facilities will make additional high protein meals available. Feed milling capacity in the country has increased and mills like Altan Taria are producing compound feeds for the dairy and intensive livestock sectors.

93. Since 2011, the MIA has had a policy to build up the fodder industry in 80 soums. This program provided a 50 percent subsidy for machines until 2013. The NLP has allocated MNT 3 billion for development of the animal feed sector in 2014. Stakeholders suggest that capacity building programs on feeds, feeding and dairy production would be helpful. The MIA also recommended that Mongolia needs its own system of research and extension for feeding trials.

94. **Pasture Management.** Pastures are the main source of feed for Mongolian livestock. Overstocking and overgrazing since transition have led to degradation of up to 70 percent of pastures. This decreases the carrying capacity of pastures and causes related declines in livestock productivity and increased risk of mortality during winter disasters. Based on national estimates, the carrying capacity of the pastures is now exceeded by 2 to 9 times in some areas. In 2009, the World Bank funded a survey that allowed Dr. Dennis Sheehy to update pastureland sampling originally conducted in 1996/97 under the Asian Development Bank's "Study of Extensive Livestock Production Systems" project. The results showed that in the intervening years there had been a 34 percent loss in plant species in the Gobi region and about a 30 percent loss in the forest steppe.[35]

95. Improving pasture productivity is possible through a number of means, many of which require collective action on the part of herders, including.[36]

- Establishing *otor* areas for winter pasture[37]

[35] Sheehy, D. update on pasture productivity

[36] Greengold/Mongolian for Range Management: Fostering the sustainable livelihoods of Herders in Mongolia via collective action. 2010

[37] The traditional migration strategy of moving to regions with less severe conditions, thereby escaping the possibility of facing high loss rates.

- Allocating haymaking areas
- Determining pastures rotations and rest periods
- Purchasing fencing materials and installing fences
- Planting forage and/or reseeding and fertilizing hay fields and pastures
- Improving and building irrigation systems
- Planting trees or shrubs
- Improving roads to improve pasture access
- Repairing and building wells to increase pasture usability.

96. Trials on pasture improvement by SDC and MSUA using exclusion techniques have had positive impacts on pasture productivity.[38] Establishing annual pasture management plans, such as those supported through the WB SLP and the SDC's Greengold project is necessary in planning pasture usage given shifting weather and climate conditions. The need for financing and secure user rights is linked to the pasture management and improvement plans.

Pastures are the main source of feed for Mongolian livestock.

97. Some areas of pasture are under-utilized because of shortages of water and/or difficult access. Greengold reports that herding patterns have changed in the past decade, with movements increasingly directed by water scarcity rather than rotational grazing.

98. **Pasture and Land Rehabilitation.** The pasture and forage production area can also be increased by rehabilitating abandoned land and degraded pastures. The SDC Green Gold project, the USDA/USAID, MSUA and others have conducted pilot projects on pasture rehabilitation in Mongolia using a variety of forages and establishment methods with positive results. In addition, mining companies, especially Boroo Gold, have carried out pasture land rehabilitation as part of mine reclamation activities. These projects and private initiatives in pasture rehabilitation provide an excellent resource for adapted technical approaches for land rehabilitation in Mongolia.

99. There are 400,000 ha of abandoned cropland that is currently underutilized. It is possible to bring at least part of this area back into production through reseeding to perennial grasses and forages. The cost of soil preparation to eliminate weeds and prepare a seedbed, seeding and establishment would vary depending on the type of grass selected and the level of weed population. Broad scale land rehabilitation was successfully undertaken in Canada after the "dust bowl" of the 1930s and has also been undertaken in parts of the western USA. These experiences can provide useful technical examples for land rehabilitation in Mongolia. Rehabilitation by the private sector is not likely to happen until a

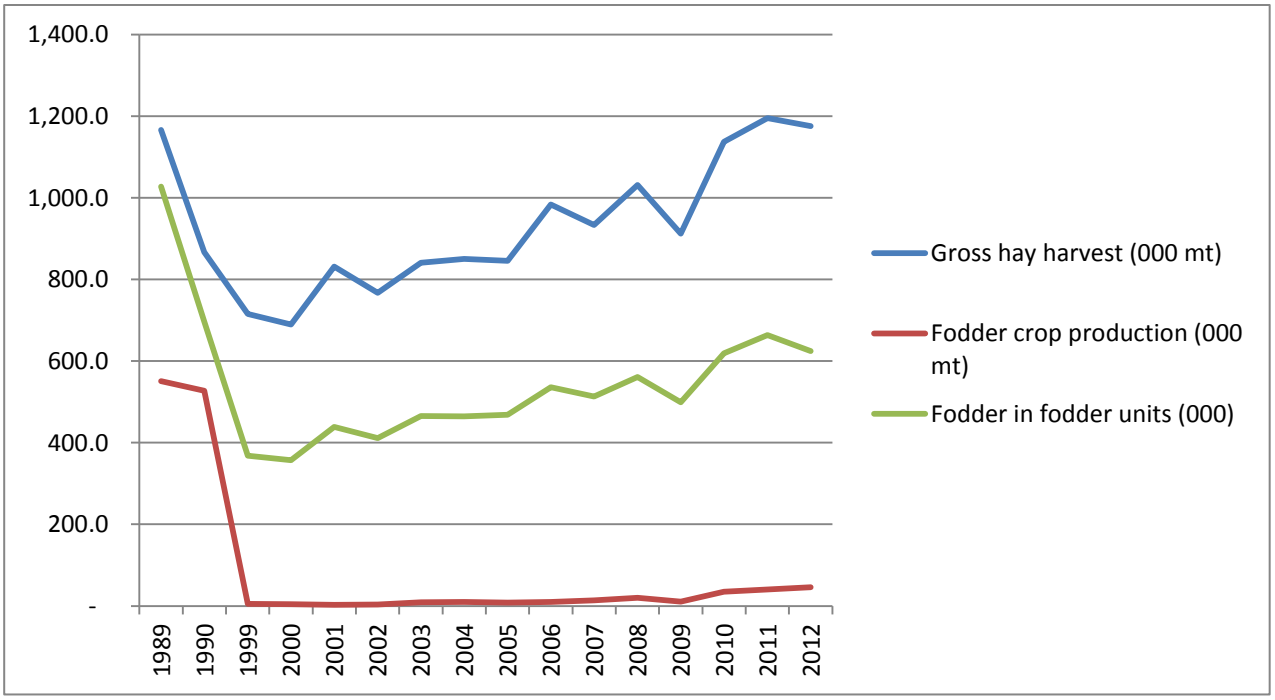
[38] SDC and MSUA (Gantulya)

commercial forage market emerges and there is incentive to invest. Approaches based on public-private partnerships, especially on the most viable lands within the central cropping area near intensive livestock production, might be viable and worthy of piloting on a small scale. There is also an opportunity to seek collaborative research into effective rehabilitation approaches and seed multiplication with mining companies which are required to carry out rehabilitation of mine sites.

100. **Supplemental feeds, fodder and silage.** Most fodder production is in the form of hay cutting, either on natural or planted stands. Hay cutting and fodder production is done by herders for their own use and by commercial hay cutters who cut hay on identified public lands, usually under contract from the government for National Emergency Management Agency (NEMA) supplies. Herder demand for purchased hay and fodder from commercial suppliers is very unstable, so commercial hay cutters have little incentive to invest. Instead, they tend to cut hay only when contracted to do so by NEMA. Most off-farm fodder inventory exists with the NEMA emergency reserve supplies rather than with commercial fodder producers.

101. The gross harvest of natural hay has returned to pre-transition levels, but has not kept pace with the increase in animal numbers. Fodder crop production essentially ceased after transition, as shown in Figure 5.2. The area of fodder crops has quadrupled since 2009, but is still only 14,000 ha. Total production of fodder crops is now 46,000 mt. Silage was produced for dairy farms prior to transition, but has almost disappeared. Some of the more commercial dairy farms and larger beef feedlots are now beginning to produce silage again.

Figure 5.2: Hay, fodder crops and total FU (1989/90 and 1999 to 2012)

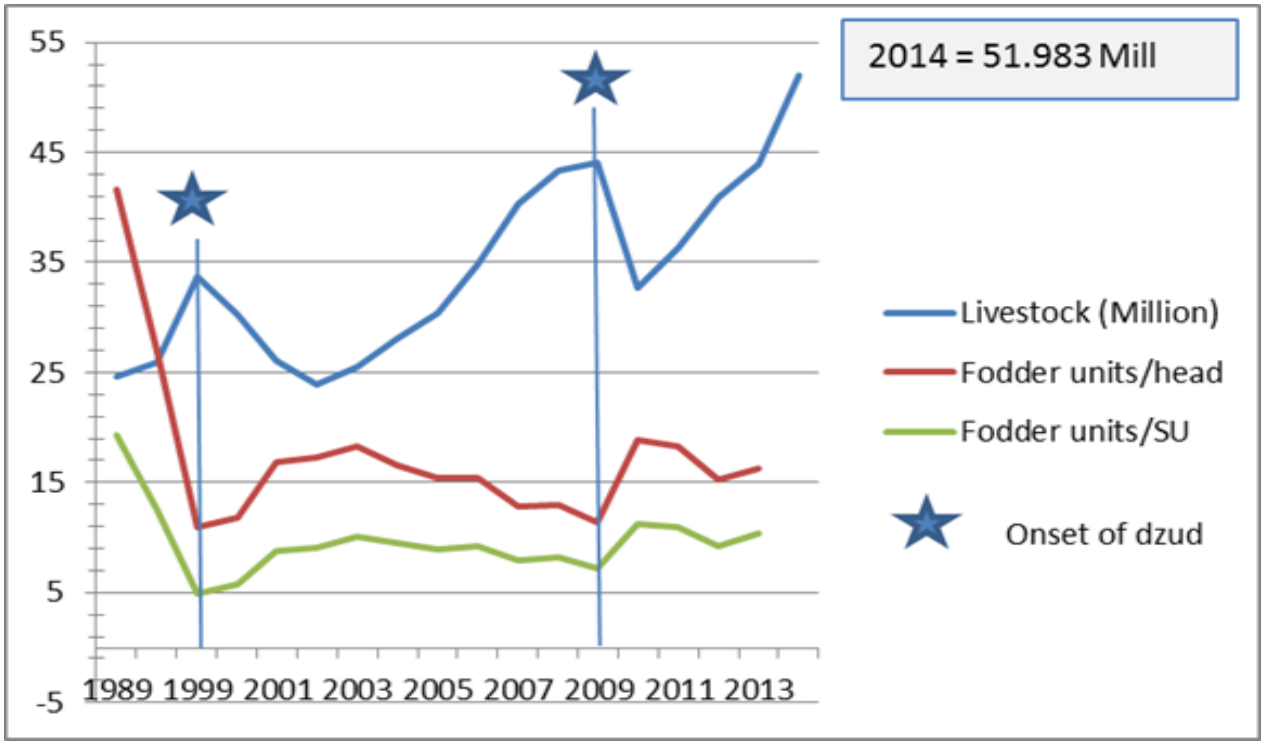


Source: NSO

102. Figure 5.3 tracks the total livestock population and total supplemental feeds (hay, fodder) since 1989. Under the command system, total livestock numbers were about 25 million and available fodder was more than 40 Fodder Units (FU)/head. By 1999, when livestock numbers reached 33 million,

available fodder was only 10.9 FU/head or 5.0 FU/SU. This marked the onset of the first major dzud after transition. By 2010, although herders were preparing more winter feed, animal numbers had reached 44 million and the available fodder was only 11.3 FU/head or 7 FU/SU. That year, the second major dzud occurred. In 2013, livestock numbers reached 44 million again, but because of increased feed production, the available fodder also increased above what may be a critical level. By the end of 2014, livestock numbers reached a new high of 52 million head, stretching available feed resources ever thinner and increasing the risk of high animal losses during dzud.

Figure 5.3: Total livestock to available fodder (1989/90 and 1999 to 20132014)



Source: NSO Statistics

103. The quality of feeds available is generally low and prices high in relation to quality. Natural hay, cut late and with low protein and energy levels, is loosely bound in 20 kg bales. These sell for 1,000 to MNT 2,000/bale in a normal year and can rise to MNT 15,000 /bale during a dzud. Earlier cutting, better baling and proper storage would all improve the quality and value of local hay. Improved storage for hay would allow hay makers to keep inventory in good condition for several years. As the demand for purchased hay is sporadic, this would allow for a stockpiling of hay resources that could be drawn down during periods of high demand and make it a more stable and attractive business and ensuring a more stable and affordable supply of hay for producers.

104. Establishing improved perennial forage crops would further increase the volume and quality of available feedstuffs. Herder groups can be encouraged to increase their perennial forage areas through investment programs for seed, fencing, irrigation, equipment and storage. This should be supported by training and technical support on the topics of forage selection, establishment, cutting, storage and feeding.

105. Additional forages, feed grains and livestock protein feeds can be introduced as crop rotations with wheat. Most likely, the primary market demand for these feeds would come first from the semi-intensive and intensive livestock sectors and some extensive livestock producers in or near the central cropping region. Over time and with the development of more high density manufactured feeds and supplements, the entire extensive livestock sector would benefit.

Fodder Producer – Gobi Sumber

This farm cooperative has the capacity to produce 1,000 mt of fodder but, because there is no consistent demand, they cut only upon request. Demand is growing slightly for planted crops (oats) for race horses and is predicted to increase for green fodder for dairy.

Natural hay sells at 125,000 MNT/mt and they sold 800 MT in 2012 on subscription to various offices for the emergency fodder fund. The hay is usually cut within the aimag but this year they travelled to Khentii. The current local price of hay is 3,500 MNT/bale. They produce and sell 2,500 MNT. Their cost of production is 950 MNT/bale excluding labour and 1500 MNT with labour. For their own use in dairy production, they cut hay and have done pilot tests with oats, Sudan grass and silage corn. They had previously tested alfalfa but the field was too far from a well to irrigate and there was no germination. They now have 300 kg of alfalfa seed and will plant again in 2014 at a rate of 16 kg/ha. The cost of production of planted fodders is about 200,000 MNT/mt. MIA provided seeds through the Crop Development Fund and information was provided through the aimag agriculture offices. Official information is lacking and this farmer used personal contacts and relationships to find the information he needed.

Issues: Transportation - Their own trucks have broken down and spare parts are not available. Having to rent trucks makes their hay price uncompetitive and makes them unprofitable. Storage - Since demand is intermittent, producers need storage to keep the hay multiple years. A covered storage shed able to withstand Gobi winds and with capacity for 4,000 20-kg bales would cost 65 million MNT.

106. **Feeding Programs**. Improving livestock feeding, either for weight maintenance or fattening, would allow herders to market livestock at a younger age, over a longer period of the year and into the late winter and early summer when meat prices peak. The decreased seasonality of supply, improved carcass quality and consistency that would come with feeding programs would improve the capacity utilization of processing plants.

107. Some livestock feeding programs are emerging either to maintain animal weight through the winter or to actively fatten cattle for slaughter. Greengold reported that in some areas close to markets, a herder will choose, rather than selling livestock after a dry summer, to purchase fodder and feed their animals during winter so they can sell them in spring when meat prices peak. In the cropping zone where feedstuffs are available, it was reported that there are four or five farms, including Gatsuurt and Arvinkhuur, feeding from 1,500 to 4,000 head of cattle.

108. More research and demonstration is required to determine the optimum feeding programs in terms of feed conversion potentials and profitability under different conditions. Accompanying this, more information and training needs to be made available to producers.

b. Animal Health

109. Animal health programs, services and status have declined since transition. This has resulted in the resurgence of Tuberculosis (TB), Brucellosis, FMD and other reportable diseases in the national herd, which pose a threat to public health and has locked Mongolian livestock products out of most export markets. Production diseases have also increased and have immediate impacts on livestock productivity and raw product quality, negatively affecting the profitability of primary producers and processors. Specific examples of animal health improvements that will lead to improved productivity, product value and market access include:

- Control of infectious disease in livestock would decrease mortality and increase the marketability of livestock and livestock products. It is a prerequisite to securing stable export market access for meat and milk products. This is perhaps the most significant change that could be made to enhance the marketability and income potential from Mongolian livestock. The potential sales value in regional markets is valued at US$334 million annually based on current the Mongolian Meat Association estimates of maximum potential meat exports of 111,400 tons (2010) and the export price of US$3/kg as used in the ADB cluster study.
- Control of internal parasites to improve nutritional status, feed conversion and strengthen livestock immune systems. Control of worms will improve milk production, weight gain, carcass composition, conception rate and other economic traits. The West Virginia University Extension Services[39] reports that, based on weight gain differences, it can be assumed that a return of $3 to $5 will be realized for every $1 spent on parasite control. For Mongolian livestock producers, the combination of improving feeding programs with controlling internal parasites could provide significant productivity improvements and increases in income levels prior to any other significant changes being made to the production and marketing system. Local research, demonstrations, training and access to inputs must be provided. Developing herd health programs that would deal with productive problems of this nature would improve returns to producers and enhance the income potential for private veterinarians.
- Control of external parasite to improve the quality of hides, skins and fibers. Estimates of raw material losses and wastage because of parasite damage are up to 10 percent.[40]

110. **Veterinary Service.** Consistent with OIE protocols, Mongolia has a public and private veterinary service, both of which are challenged.

111. In 2011, Veterinary and Animal Breeding Units (VABUs) were established at the soum level to provide professional and technical services. Each unit has one veterinarian, one animal breeding specialist and one person to deal with SME development, extension and pasture management and fodder production. The creation of the VABU system, in all soums, has provided the basic institutional capacity to deliver service to local communities but the operations of the VABUs have been constrained by a lack of budget. With the passing of the IBL and their budget being allocated by the soum governor's office, their mandate and function is in question. For instance, individual VABU staff reported having been called off of veterinary duties to participate in tree-planting and other activities dictated by the

[39] Cost-Effective Parasite Strategy, Sam Barringer, WVU Extension Service, Veterinary Sciences Specialist
[40] Stakeholder interview

local government. Under the new IBL and participatory governance approaches, local budgets are approved by the community. If public veterinary services, which are often long term and somewhat invisible, there is a real danger of insufficient budget being approved to carry out their mandate. The VABUs need separate financial accounting and autonomy to implement their mandate and deliver services.

112. Private veterinarians work from a list of fees approved by the local and aimag government. Herders pay for all veterinary services except vaccinations. Given the low levels of commercialization and profitability in the livestock sector, incomes for private veterinarians are low. One of the main constraints for the veterinary service is the shortage of young veterinarians entering the system. Low incomes combined with the relatively remote and difficult working conditions discourage young people from entering veterinary medicine. Those who do enter are not motivated to work in rural areas, preferring to work in urban areas and with small animals and pets. Likewise, the government veterinary service has difficulty attracting young veterinarians. In Gobi-Sumber, all of the veterinarians were women between the ages of 48 and 58 years old.

113. **Animal Health Compliance Systems and Programs.** To comply with OIE requirements and eventually gain a secure export status, Mongolia needs a well-functioning program of vaccination and surveillance (monitoring, sampling, laboratories and reporting) supported by the capacity for emergency response and isolation during disease outbreaks. The policy framework supporting and enabling these changes linked or the passing of the new Animal Health Law, which should be compatible with international animal health protocols, laid out the OIE.

114. The establishment of a Disease Free Zone, which was nearly accomplished in 2013, should be pursued. The completion and ongoing support for the animal ID and ear tagging programs should be continued, as it is an integral part of a trace back system for animal disease control and food safety systems.

115. On-Farm Food Safety (OFFS) is important for all food products, but particularly Mongolia's dairy industry. Information, training and technical support needs to be provided to producers so that they can improve on farm animal health and food safety.

c. Animal Genetics and Breeding

116. Animal genetics can improve livestock productivity and product quality, but these impacts are best seen only after nutrition and health constraints are removed. Specifically, genetics and breeding programs can improve growth rates, carcass yields and carcass characteristics in beef cattle and sheep meat, milk yields in dairy cattle and fiber production and quality in sheep and goats. Current issues in productivity that can be addressed with better genetics and breeding management include:

- **Carcass Yield.** The World Bank Livestock Sector Study (2009) indicated that Mongolian beef carcasses range from 120-130 kg while international yields are in the range of 250 to 300 kg. Sheep carcass in Mongolia is between 15-18 kg while international yields are 18-30. Crossbreeding programs can be used to improve carcass size and quality. In Gobi-Sumber it was reported that the live weight of rams has increased from 68 kg to 72 kg in autumn because of cross-breeding with meat sheep from Tov aimag.

- **Cashmere Quality and Yield.** Mongolian cashmere is declining in quality as Chinese purchasers buy in bulk with no price differentiation motivating herders to breed for larger total yields rather than micron fineness. Breeding for bulk over quality has led to cashmere yields in some areas increasing from 250 to 300 grams per animal with a fiber diameter of 16.7 microns to 380 to 410 grams per animal and a fiber diameter of 19 microns.
- **Milk Yield.** Mongolian dairies still rely on local breeds that have not been improved. GoM reports that pure and crossbred dairy cattle represent less than 3 percent of the total cattle number and milk yield potential is very low, at 2,000-3,000 l/year because of insufficient care and feeding of milking cows. Crossbreeding programs with improved breeds (dual-purpose or dairy) and/or establishing more purebred dairy breeds could double milk yields from the 10 l/day achieved at some semi-intensive dairies to 20 l/day. This is already demonstrated in commercial practice by Mongolian dairies that have introduced improved genetics and supported these animals with improved feeds. Research trials would provide farmers with production and economic information to use in decision making.

117. There have been few imports of new dairy genetics since 1988. It was reported in interviews that 300 Holsteins (Australian origin; 6,000 to 9,000 l/yr.) from China were imported over the past three years. Under the Chingas Bond, US$ 27.7 million has been allocated for dairy farm development. MIA plans to import 4,500 purebred cows in the immediate future and 7,500 by 2016. The original plans were based on 15 farms of 300 cows but this scale was deemed beyond the capacity of the private sector so plans were modified to farms of 50 to 300 cows per farm. Six farms have already been selected to receive imports. Qualification requirements are that the housing, collection and cooling must be in place and the farm or coop must have 50 cows. The program is considering Holstein and Monbillard (yellow/white dual purpose 8,000 l/yr) from Europe. There have already been 250 Monbillard imported. Landed costs are reported to be in the range of MNT 9.0 million/heifer.

118. **Breeding Management by Producers.** Breeding programs are currently non-systematic and inbreeding is common. Producers are not practicing regular culling of unproductive animals meaning there is no selection pressure to improve the herd. Livestock producers need to understand the fundamentals of breed improvement and begin to use performance records and culling to improve their herds. Intensive livestock producers need access to improved livestock genetics.

A commercial dairy in Tov aimag milking 70 to 80 cows has experience with three different breeds: "Black and White"(28 l/day), Altau (18-20 l/day) and French Normandy (18-20 l/day), a dual purpose breed. The Black and White had the highest production but were more expensive to feed, making the Normandy possibly the most profitable.

119. **Breeding Services –Artificial Insemination (AI).** The strengthening of the AI system will facilitate the rapid and economical dispersion of improved genetics. AI services have nearly disappeared since the transition because there has been neither sufficient market demand for their services from the dairy industry nor institutional support to maintain the quality of service provided. During the study, dairies and livestock breeding centers consistently reported disappointing experiences with the AI service and the extremely low rates of pregnancies achieved. Reinvestment in AI infrastructure, procurement of improved semen and retraining of AI technicians would support a better

service.

120. Other breeding services are provided through by veterinarians. Whereas the veterinary service has an established fee schedule for animal health services, no such list has been established for breeding services. Veterinarians want to see this established as a reference tool for their services.

121. **Nucleus and Multiplier Herds.** MIA seeks to improve productivity of indigenous breeds of sheep and goats through the improvement of bucks and rams. Livestock nucleus herds exist but have limited numbers of animals, constrained resources and weak programs for genetic improvement. The government is investing MNT 300 million to support the nucleus herd breeding units in six soums including:

- Sukhbaatar aimag, Erdenetsagaan soum – meat sheep
- Tov aimag, Bayantsagaan soum – wool/meat sheep
- Bayankhongor aimag, ShineGinst soum – cashmere, white goat
- Bulgan aimag, Selenge soum – beef
- Dornod aimag, Hulaanbuyr soum - meat sheep
- Arkangai aimag, Khotont soum - wool/meat sheep.

122. The VABUs have been mandated to manage male flocks at the soum level but have limited resources to do so. The planned approach is to have a special unit in each soum to manage bucks and introduce genetic management based on performance information, selection and culling. With the VABUs now managed under the soum government and funded through the IBL and soum investment fund, money can be used for breeding, but this is not guaranteed in any single year and does not provide the stable planning and operating environment needed for long-term breed improvement programs.

123. **Breeding Research and Development (R&D).** Breed improvement programs need to be supported through R&D on breed performance using economic productivity traits. Researchers have a role to play in developing purebred and crossbreeding programs that are based on commercially valued productivity enhancing traits such a growth rates, carcass yield, carcass quality, milk production and fiber quality. This research will support the development of commercially viable animal breeding programs. Preservation of native genetics can serve as the basis for the improvement of local breeds while imported livestock can be used as adapted purebreds or within crossbreeding programs.

d. Infrastructure, Facilities and Equipment

124. Extensive, semi-intensive and intensive producers need improvements in livestock housing. New designs and materials for winter shelters and wind fences could be more effective in protecting animals and more cost-effective than existing systems.

Extensive livestock producers need more investment into wells and other infrastructure such as fencing for pastures and hayfields.

Dairy producers require barns, handling, storage, cooling and transport systems. Silage pits will be required to produce high quality feed for dairy production. Poultry and pork producers also have specialized housing requirements. Local design and materials for modern facilities are limited.

125. Extensive livestock producers need more investment into wells for watering livestock to ensure that all areas of pasture can be utilized and to take grazing pressure off the areas immediately around existing wells. Other infrastructure requirements include fencing for pastures and hayfields and livestock handling facilities for dips, deworming and other treatments. Increased investment in feed production including fencing, seed, irrigation, storage and field equipment is also needed. For all of these infrastructure needs, technical designs, production advice and financing may be provided on an individual or group basis.

5.2 Crop Sector

5.2.1 Production Systems

126. The maximum amount of land cultivated under the collectivized system was 1.2 million ha at 45 specialized crop farms and 25 forage farms .[41] Some negdels also carried out small-scale crop and forage production. The crop farms were privatized in 1994 and farm structure is now divided between a few very large commercial farms and a large number of small, semi-commercial farms. The largest cereal farms seed up to 25,000 ha per year while the smallest may seed only 20 ha. The largest potato producers may have 100 ha of land with a full complement of machinery and irrigation equipment while the majority are households with 5 ha or less. Most vegetable production is carried out manually by small holders on less than one ha of land.

127. Farms were privatized before there were any market-based institutions to provide inputs and finance. Simultaneously, flour mills and other buyers lacked the operating capital to purchase raw commodities and farmers faced a high risk of non-payment. Production plummeted and by 2007 seeded area was only 121,800 ha. By 2012, total sown area had recovered to 379,800 ha with another 280,000 in fallow preparation, making the total utilized crop land 660,000 ha using a 40 percent fallow rotation.

128. Much of the 1.2 million ha of land originally brought under cultivation as part of the first Virgin Land Program in the early 1960s was fragile and eroded quickly under conventional tillage. The MIA now considers 800,000 ha to be the maximum that could be under cultivation. Controlling soil erosion is a goal for the MIA and to that end, the introduction of soil conservation practices such as minimum tillage is part of policy. As of 2013, 30 percent of wheat production used minimum tillage with chemical sprays.

129. The remaining 400,000 ha is currently unused and often referred to as abandoned land. This large area of abandoned crop land has not been properly transferred to either pastures or hayfields. It is heavily infested with weeds and not providing palatable, nutritious forage for livestock. The high costs of rehabilitation and the difficulty of preventing grazing and trampling by livestock deter its return to productive use.

130. Cereals currently represent 81 percent of the sown area. Wheat alone represents 79 percent of the total sown area. Both of these shares have declined as farmers have diversified into other crops. Potatoes are sown on 16,800 ha, or 4 percent of sown area while vegetables are grown on 7,900 ha (2 percent). Fodder production accounts for 4 percent of sown area. Oilseeds are classified as “technical crops” in Mongolia and are primarily rapeseed/canola, which have increased sharply in area over the past four years and now represent 9 percent of sown area. Corn is grown in only very small amounts for silage. The relative areas of sown area by crop are provided in Table 5.9.

[41] State farms produced crops while negdels were herding collectives comprising agricultural stations and herding camps in the soum and subordinate to the Ministry of Agriculture.

Table 5.9: Sown Area by Crop, 2009 – 2012 ('000 ha; %)

	Sown Area				% of Sown Area			
	2009	**2010**	**2011**	**2012**	**2009**	**2010**	**2011**	**2012**
Total	282.2	315.3	345.9	379.8	100%	100%	100%	100%
Cereals	252.4	259.2	299.9	306.2	89%	82%	87%	81%
Wheat	248.8	250.2	291.4	298.3	88%	79%	84%	79%
Barley	1.5	4.8	3.0	4.2	1%	2%	1%	1%
Oats	1.4	3.4	3.8	3.3	1%	1%	1%	1%
Potato	13.5	13.8	15.4	16.8	5%	4%	4%	4%
Vegetables	6.5	7.0	7.8	7.9	2%	2%	2%	2%
Fodder Crops	3.3	11.1	10.9	13.8	1%	4%	3%	4%
Technical Crops	6.4	24.1	12.0	35.1	2%	8%	3%	9%

Source: NSO

131. Diversification is likely to continue in the future with the growth of semi-intensive and intensive livestock and related demand for feed grains and other feed stuffs. Interviewees during this study indicated requests for 100,000 mt of forage and feed requirements of 30,000 mt for chickens, 20,000 to 30,000 mt for pigs and 60,000 mt for dairy. Much of this demand is being met by imported corn from China at this time at a cost of approximately $20 million.

132. **Irrigation.** Prior to the transition period, irrigated area reached 57,000 ha and was highly mechanized on 49,500 ha. The remaining areas used low cost surface irrigation. Many of the old systems used prior to transition were inefficient and could not be run profitably under market conditions. Management systems were dysfunctional and water use fees were not well administered. They fell out of use and much of the working parts were sold as scrap metal in the 1990s. By 2004, there were only 17,307 ha of crop under irrigation. Repairs to canals and head gates are ongoing, carried out by the private sector, often with cost-sharing through government programs.

133. By 2010, irrigated area had returned to 49,642 ha, which was used for grain (20,111 ha), potato (11,642), vegetables (6,736), forage (4,022), technical plants (vegetable oil crops) (832 ha) and other (6299 ha). Table 5.10 shows the proportion of farmers with irrigation in each region. The reasons why they do not have irrigation are provided in Table 5.11. The most common reasons for not irrigating are the lack of a water source followed by lack of financing.

Table 5.10: Households and Business Entities With Irrigated Field, By Region

	Total	**West**	**Khangai**	**Central**	**East**	**UB**
Number of Households	27,078	4,816	6,034	10,534	1,402	4,292
Proportion	100.0	17.8	22.3	38.9	5.2	15.9
Number of Businesses	906	316	144	328	26	92
Proportion	100.0	34.9	15.9	36.2	2.9	10.2

Source: Agricultural Census

Table 5.11: Households and Businesses Without Irrigation, By Reason

	Householder		Business Entities	
	Number	**%**	**Number**	**%**
Total	6,383	100.0	799	100.0
Lacking of water resource	2,871	45.0	398	49.8
Lacking of financial resource	2,149	33.7	311	38.9
Less of human resource	512	8.0	40	5.0
Broken technique	71	1.1	12	1.5
Not necessary to irrigate	1,609	25.2	157	19.6
Others	426	6.7	49	6.1

Source: Agricultural Census

134. **Soil Fertility and Erosion.** Production levels have increased significantly in recent years but without supplementary fertilization, crop rotations or management of crop residues for soil enhancement. As a result, soil fertility may be declining because current practices are “mining” the soil of its nutrients. This combined with levels of soil erosion pose a serious risk to the long-term productivity of the crop sector. Tables 5.12 and 5.13 show that erosion is reported by 58 percent of household crop farms and 66 percent of crop business entities. Typically, both households and businesses are reporting that between 30 percent and 40 percent of their land suffers medium degree of erosion. With the exception of the east, soil erosion on farms owned by cropping businesses is consistently reported higher than by households.

Table 5.12: Soil Erosion by Level, Household Entities

Erosion	Total		West		Khangai		Central		East		UB	
	#	%	#	%	#	%	#	%	#	%	#	%
Number of Households	33,461	100%	5,076	100%	7,917	100%	13,190	100%	2,307	100%	4,971	100%
Non erosion	14,073	42%	1,851	36%	3,229	41%	5,305	40%	1,015	44%	2,673	54%
Weak	8,520	25%	1,323	26%	2,152	27%	3,426	26%	524	23%	1,095	22%
Middle	10,187	30%	1,806	36%	2,457	31%	4,088	31%	717	31%	1,119	23%
High	681	2%	96	2%	79	1%	371	3%	51	2%	84	2%
Total Eroded	19,388	58%	3,225	64%	4,688	59%	7,885	60%	1,292	56%	2,298	46%

Source: Agricultural Census

Table 5.13: Soil Erosion by Level, Business Entities

Erosion	Total		West		Khangai		Central		East		UB	
	#	%	#	%	#	%	#	%	#	%	#	%
Number of Crop Companies	1,705	100%	368	100%	282	100%	818	100%	48	100%	189	100%
Non erosion	580	34%	115	31%	89	32%	263	32%	22	46%	91	48%
Weak	453	27%	108	29%	74	26%	215	26%	10	21%	46	24%
Middle	640	38%	141	38%	114	40%	322	39%	14	29%	49	26%
High	32	2%	4	1%	5	2%	18	2%	2	4%	3	2%
Total Eroded	1,125	66%	253	69%	193	68%	555	68%	26	54%	98	52%

Source: Agricultural Census

135. Despite erosion and declining soil fertility, very few crop producers are making use of soli analysis and fertilization. Table 5.14 shows that only 3.8 percent of household crop producers make use of soil analysis. The rate is higher in the central cropping region, but still only 7 percent.

Table 5.14: Number of Households Which Use Agrochemical Investigation In Region

Households	Total	West	Khangai	Central	East	UB
Number of Households	33,461	5,076	7,917	13,190	2,307	4,971
Number of Household which have agrochemical investigation	1,286	119	93	1,002	24	48
% of Households	3.8	2.3	1.2	7.0	1.0	1.0

Source: Agricultural Census

136. Only 22 percent of the crop land was fertilized in 2010 according to the Agricultural Census (Table 5.15). Land managed by business entities is more likely to be fertilized (23 percent) than land managed by households (16 percent). Households are applying at a much higher rate (3.8 mt/ha) than business entities (0.7 mt/ha) which likely reflects their use of organic fertilizers (manure, compost) on small vegetable plots versus the use of chemical or other fertilizers on large-scale grain fields.

Table 5.15: Fertilized Land and Amount of Fertilizer Applied (ha and mt)

Fertilizer Use	Total	Householder	Business
Planted total area, hectare	367,222	58,768	308,454
Fertilized total area, hectare	80,834	9,616	71,218
Total used fertilizer, mt	87,397	36,700	50,697
Fertilizer portion in total harvested area, hectare	22%	16%	23%
Fertilizer amount mt/ha	1.1	3.8	0.7

Source: Agricultural Census

137. Tables 5.16 and 5.17 show the differences in the type of fertilizers used by households and crop businesses in the different regions of Mongolia. Households use natural (65 percent) and other organic fertilizers (35 percent) regardless of what region of the country they are in. Other fertilizers make up less than 1 percent of fertilizer use. Farm business entities also use a large proportion of natural (75 percent) and organic (22 percent) fertilizers, but are also more likely to use other types (3 percent).

Table 5.16: Fertilizer Use by Households, By Fertilizer Type and Region (mt)

	Total	West	Khangai	Central	East	UB
Total	**36,700.0**	**12,572.1**	**4,120.5**	**17,810.8**	**675.4**	**1,521.2**
Natural fertilizer	23,863.0	3,574.5	3,523.9	15,248.3	558.8	957.5
Others organic	12,770.4	8,993.7	588.6	2,510.7	116.3	561.1
Mineral	66.5	3.9	8.0	51.7	0.3	2.6
Nitrate	42.8	3.2	3.2	34.2	0.1	2.1
Phosphorus	7.2	0.4	0.3	6.3	0.0	0.1
Potassium	1.1	0.1	0.5	0.3	0.0	0.1
Mixed fertilizer	15.4	0.2	3.9	10.9	0.2	0.3

Source: Agricultural Census

Table 5.17: Fertilizer Use by Business Entities, by Fertilizer Type and Region (mt)

	Total	West	Khangai	Central	East	UB
Total	**50,697.3**	**3,206.8**	**16,884.8**	**29,719.0**	**307.7**	**579.0**
Natural fertilizer	38,009.6	1,327.8	14,506.8	21,582.9	216.5	375.6
Others organic	11,028.2	1,877.5	2,146.0	6,805.3	-	199.4
Mineral	1,659.5	1.5	232.0	1,330.9	91.2	3.9
Nitrate	915.5	0.3	113.3	777.3	21.0	3.6
Phosphorus	152.4	0.1	7.3	144.8	-	0.2
Potassium	88.1	0.1	12.0	76.0	-	0.1
Mixed fertilizer	503.5	1.0	99.4	332.8	70.2	0.1

Source: Agricultural Census

138. Plant pest control (herbicides and pesticides) is low, with only 38 percent of fields being treated (Table 5.18). Crops managed by business entities are much more likely (44 percent) to be treated than those owned by households (10 percent). Household, however, apply pesticides and herbicides at twice the rate (1.9 kg/ha) than business entities (0.8). This may reflect the focus of small holders on vegetable production and pesticides versus the focus of crop businesses on grain production and herbicides. The different usage rates can also be influenced by the more limited understanding and level of skills regarding pesticide use among smallholder farmers and the adoption of a "more is better" approach to chemical use, which could be damaging to the environment and their health.

Table 5.18: Pest Control by Area and Amount of Product, 2010

Pest Control	Total	Householder	Business Entities
Harvested area	**367,222.4**	**58,768.1**	**308,454.4**
Treated area (for insect control), ha	140,714.4	6,053.8	134,660.6
Amount of product used, mt	115.8	11.4	104.4
% of planted areas treated.	38.3	10.3	43.7
Product used per ha (kg)	0.8	1.9	0.8

Source: Agricultural Census

139. **Human Resources and Labor Costs.** Farmers need practical training and information in sustainable crop production methods. They are not familiar with the benefits and proper use ad handling of fertilizers and farm chemicals. They need to gain knowledge and skills around farm management, plant nutrition, input use and other key topics.

140. Agriculture labor rates are influenced by the mining sector, which competes for labor, and by the government income transfers paid to Mongolians at MNT 20,000/month. These payments have been suspended for adults, but are still paid to each child under 18 years. Agricultural laborers are now being paid up to MNT 20,000/day. The increase in agricultural labor cost is affecting the profitability of labor-intensive crops, especially vegetable and fruit production.

a. Grain Production

141. The majority of grain production in Mongolia is carried out by farms which are remnants of the state farm system, now owned by private operators. Seeding up to 25,000 ha per year, these farms have equipment, facilities (barns, corrals, storage), transportation, professional agronomist(s) and, often, sources of investment and operating finance from non-farm businesses. Many small grain producers have less than 100 ha of land. These farms lack equipment, facilities, transportation, finance and often, but not always, professional training and expertise. They are often integrated with livestock production and use the cash flow from one operation to finance the other. Between these two extremes, are commercial grain farmers with 1,000 to 2,000 ha. Similar to Western Canada and the USA, this size of dry land farm is well matched to the scale of modern minimum tillage and other farm equipment.

Commercial Grain Farmer – Orkhan Soum

The farmer has more than 1300 ha of which 100 irrigated. He grows 650 ha of wheat, 200 ha of rapeseed and prepares 450 ha of fallow. He feels this summer fallow rotation is ideal. He has purchased seed in the past, but used his own seed this year. He seeds at a rate of 160 kg/ha for dry land crops and 130 kg/ha for irrigated crops. Yields in 2013 were 1.2 mt/ha for unirrigated wheat and 2.2 mt/ha with irrigation. Rapeseed yielded 2.0 mt/ha using a 8-10 kg/ha seeding rate. Factors affecting the low yields were soil fertility and the weather in 2013 which included cold nights and, in June and July, hot days and cold nights.

Most equipment has been replaced. He has machinery capacity for seeding 1800 ha. He harvested 1250 ha this year but feels he could farm 2500 ha at 50% fallow given his equipment. He practices chemical fallow (2 applications per year) then uses conventional seeding with a cultivator and a computerized, conventional Morris seeder. Other equipment includes a Kav 700 tractor (250 hp), one Chinese tractor (160 hp), a sprayer, two John Deere combines and one Ska Russian combine. He has steel bins with capacity of 100 mt storage and older style storage of 500 mt.

The main production issue is fertilizer and soil fertility. Nitrogen costs 650,000/mt and NPK costs 980,000/mt after GOM discounts. Even though the benefit of fertilization is known, grain farmers lack the financing to purchase fertilizer at these prices. He does use some Shim Organiic biological fertilizer. He recommends that field trials on fertilization be carried out so that farmers can make informed decisions on fertilizer purchases.

The cost of production on this farm was reported as 295,000 to 300,000 MNT/mt for wheat and 105,000 MNT/mt for rapeseed. Herbicides/chemicals were noted as a major cost item, costing 21 million MNT in 2013. The farmer feels the best way to decrease the cost of production is through minimum tillage. It was noted that using two 350 HP tractors could save one person's labour and increase the salary of the remaining staff and keep on farm versus losing them to the mining sector. Crop insurance is also needed. It is compulsory for seed fields to be insured. He feels that other crop production insurance should also be compulsory. Commercial farms need access to insurance such as seed producers have.

b. Potato and Vegetable Production

142. Mongolian potatoes are a success story of industry rehabilitation and donor project implementation. In 2004, when the SDC Potato Project began, production was 82,000 mt on 9,600 ha, or 8.6 mt/ha. Consumption was 31 kg/capita compared to the estimated physiological need of 51.7

kg/capita and 50 percent of potato supplies were imported from China. By 2012, Mongolia produced 246,000 mt on 16,800 ha with an average yield of 14.6 mt/ha. Consumption has increased to 83 kg/cap and imports are negligible (3,200 mt). Mongolia now faces the problem of over production, having produced a 50,000 or 60,000 mt surplus in 2012 compared to a demand of 185,000 mt including 145,000 fresh potatoes and 40,000 of seed potatoes. Vegetable production includes carrots (33,000 mt), turnips (24,000 mt) and cabbage (20,000 mt) and much smaller amounts of onion, cucumber and tomato. Production meets about 55 percent of local demand.

143. Smallholders rely on hand labor as they cannot afford to buy machinery. Some need assistance in access to machinery, possibly through financial leasing and soft loans. Inter-farm machinery or a technical station which can provide equipment to farms would be useful.

144. Farmers need to learn best practices in vegetable production, including the application of herbicides and pesticides as agriculture chemicals are still used by only 10-20 percent of farmers. Better access to irrigation is needed. Hand in hand with this, farmers need to learn good skills in irrigation operations and water conservation.

Large scale vegetable production

The owner is an agrotechnican who completed his training at Altanbulag in 1987 and has been active in crop production since. He began his farm with 2 ha in the 1990s and expanded to 10 ha before registering his company in 2008. He now has 100 ha of arable land and more than 20 employees. He plants 50 ha per year including 5 ha of vegetables and 45 ha potatoes. In 2013, he harvested about 1,000 mt of vegetables and potatoes. He has 2 storage facilities with a total capacity of 1500 mt. Three years ago they replaced their old equipment with new German equipment and purchased potato seed at a cost of 100 million MNT. GOM contribution was relief from the customs tax of 10%. In 2009, he imported 30 mt of German potato seed and in 2010 imported 10 mt of Santa Gala Solas to replace his own seed. He gets 25 mt/ha yields and plans for 40 mt.

"Marketing is the greatest challenge." Even at this scale, the farmer is marketing through changers. Producers would like to achieve a cost + 30% price. His cost of potato production is 288,000 MNT/mt, but the current price is 200,000 MNT/mt while the consumer price is 400 – 500 MNT/kg. During 2013, this price spead had not changed despite the seasonality of supply. He feels potato processing would allow producers to achieve a better net price. Vegetable cost of production is 500,000 MNT/mt and producer price is 600 -700,000 MNT/mnt.

MIA had issued a project for a storage and a sales outlet in Ulaanbaatar which could connect producers with end consumers. Their farm was selected but they did not qualify for the bank loan because of insufficient collateral, which the bank had established at only 10-15% of the asset value. The total project was 2.5 billion MNT of which the Khan Bank would provide 700,000 MNT. The government loan would have been 0.7% annually.

c. Fruit Production

145. Sea buckthorn production is being promoted by the GoM and area has increased to 5,000 ha in 2013, up from 1,300 three years ago. The program target is to reach 13,000 ha by 2016 along with another 2,000 ha of other berries. Total production from this area will be 30,000 mt/year. While most production is in small plots, some large scale operations have been established. In Kharhoran, one company has 520 ha and is now delivering to Shar Doctor on contract.

146. Although the cost of producing Sea buckthorn is considered quite low, there is a long start-up period and some irrigation is required. Farmers need assistance through tax breaks and financing until fruit production comes on stream in the third year. Issues facing sea buckthorn include the high cost of labor, especially for harvest, which is done by hand. Labor costs for picking sea buckthorn are MNT 1,000/kg. More cost-effective harvesting methods are being sought. In China, manual scissors can harvest 20 kg/day/person. Using a tree shaker can increase harvesting to 200 kg/day. To test this methodology, the MIA has purchased an olive harvester and a vacuum from Italy and will test the results on Mongolian Sea buckthorn. To improve the productivity of sea buckthorn production, the MIA is supporting research into genetics and varieties and the Sea Buckthorn Association reported that eight institutes across the country have been selected to examine economic traits.

d. Greenhousing

147. Over the past decade, greenhousing has become popular with farmers across the country, particularly around Ulaanbaatar and other large urban areas. Greenhouses tend to be simple structures of a bent wood or metal frame covered in plastic. Some producers are beginning to invest in more advanced greenhouses. Passive solar greenhouses are now being piloted and installed. These structures, based on the Chinese model, have an earthen wall on the north side which acts as a heat sink, a plastic cover on the south and a removable cover to retain heat during the night. The passive solar greenhouse is able to increase the growing seasons by up to four months and allows for a second crop. Crops grown in the greenhouses are primarily tomatoes, cucumbers and peppers.

148. The ownership and size of greenhouses varies. Table 5.19 shows the number and size of greenhouses owned by households in each region. Household greenhouses total 2,067 of which 683 (33 percent) are around Ulaanbaatar and only 193 (9 percent) are in the West. The average area by householder is 96m^2. Table 5.20 shows the size and ownership of greenhouses by business entities in each region. Though fewer business entities own greenhouses, those which do tend to be larger. There are 199 businesses that own greenhouses, primarily in the central region and the west. The average size of a greenhouse owned by a business is 734 m^2. Although only 39 businesses have greenhouses in Ulaanbaatar, they are the largest, at 2437.5 m^2 compared to 452 m^2 in the central region and 154 m^2 in the west.

Table 5.19: Number and Size of Greenhouses Owned by Households, by Region

	Total	**West**	**Khangai**	**Central**	**East**	**UB**
Number of Households	2,067	193	322	528	341	683
Land area, thousand м^2	197.6	21.0	23.4	47.6	31.1	74.5
Area for per Householder, м^2	95.6	109.0	72.7	90.1	91.3	109.0
Proportion in amount						
Number of Household	100.0	9.3	15.6	25.6	16.5	33.0
Land area, thousand м^2	100.0	10.6	11.8	24.1	15.8	37.7

Source: Agricultural Census

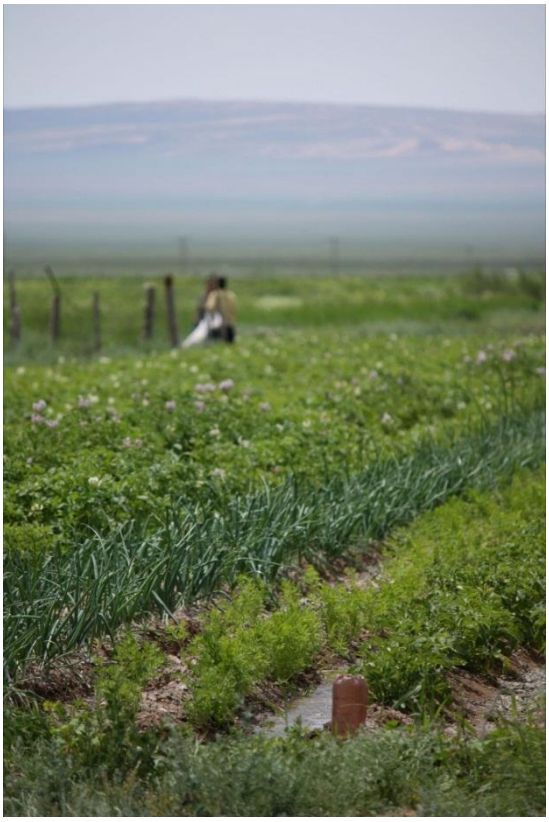
Table 5.20: Number and Size of Greenhouses Owned by Businesses, by Region

	Total	West	Khangai	Central	East	UB
Number of Business entities	199	49	32	74	5	39
Land area, thousand м^2	146.0	7.4	9.1	33.4	1.0	95.1
Area for per Business entity, м^2	733.7	153.2	284.4	452.2	194.0	2,437.5
Proportion in amount						
Number of Business entities	100.0	24.6	16.1	37.2	2.5	19.6
Land area, thousand м^2	100.0	5.1	6.2	22.9	0.7	65.1

Source: Agricultural Census

5.2.2 Improving Crop Productivity

149. The gains in Mongolian crop production were not achieved solely through the expansion of sown area. The sector has benefited from new technologies (minimum tillage) and equipment, improved access to herbicides and improved seed varieties. Cereal yields are 21 percent higher than in 1990 (1.6 mt/ha vs 1.3 mt/ha) and wheat yield is 39 percent higher (1.6 mt/ha vs 1.1 mt/ha). Additional improvements are possible with fertilization, improved weed control, new seeds and better production management. New wheat varieties are available from PSARTI which have average yields of 1.8 to 2.5 mt/ha. This would increase yield by an additional 13 percent to 56 percent over 2012 average yields. This would near the average dry land yields in western Canada which are 2.7 mt/ha for wheat, 3.4 mt/ha for barley and 1.4 mt/ha for canola.



Crop production in Mongolia has benefited from new technologies and equipment, improved access to herbicides and improved seed varieties.

150. Potato yields have increased from 10.7 mt/ha in 1990 to 14.6 mt/ha in 2012, an increase of 36 percent. These improvements have resulted from additional GoM support, donor assistance and private sector investment into new inputs and production methods. While potato producers have increased productivity at 15 mt/ha, average yields are still well lower than commercial yields (30-40 mt/ha) by the best growers in Mongolia and in other countries with similar conditions. Under dry land conditions in Saskatchewan, the average potato yield ranges from 19 to 49 mt/ha depending on soil type and precipitation. Under irrigated conditions in Saskatchewan, 30 to 65 mt/ha are achievable. Introducing more early maturing varieties would allow producers to lengthen their selling season and benefit from higher prices earlier in the year. Mongolia is now producing some early variety potatoes are able to market them by the 20 to 25 of July at a wholesale prices between MNT 600-800/kg, more than twice the price of standard potatoes marketed during the fall. Potato producers can also diversify their production and improve their returns by growing more vegetables in rotation with potatoes.

151. Vegetable production, on the other hand, has increased primarily based on expanded area rather than improved productivity. Production is characterized by smallholders carrying out backyard or semi-commercial vegetable production. There is a need to improve productivity in the vegetable sector through the provision of good seed, machinery, irrigation and improved management methods. Vegetable production is constrained by old seed and lack of mechanization and has the opportunity perhaps double or triple yields from 12.5 mt/ha achieved in 2012 to levels achieved in similar conditions in other countries. In Alberta, Canada, with similar growing conditions, dry land carrot yields are 37 mt/ha and irrigated yields are 52 mt/ha.

152. Fodder production is only beginning to remerge and yields are far below pre-transition levels. Fodder crop yield in 2012 was 3.3 mt/ha compared to 4.5 mt/ha in 1990, a 25 percent decrease. More financial support for seed breeding research, especially vegetable and fodder crop research is required.

153. The crop sector is constrained by climate (precipitation and growing days) and at risk to soil erosion and lost soil fertility. While some productivity gains have been achieved, production potential remains constrained by access to plant genetics, inputs and new technologies and progress is limited by the current production and management skills. Issues continuing to face the crop sector include:

- Land tenure and related issues of collateralization and usage control, especially for small holder vegetable growers
- Soil fertility
- Limited, timely source of quality seeds either because of a lack of supply or a lack of access to funding for their procurement
- Limited range of inputs, lack of knowledge of their proper use and/or lack of funds to purchase
- Inadequate investment in machinery and equipment, and limited investment into new, conservation tillage equipment
- Inadequate irrigation systems and equipment
- High percentage of losses, on farm and in storage/transportation due to poor handling equipment, storage facilities, climate and plant health
- Inadequate crop diversification to allow for healthy crop rotations and production and price risk management
- Poor post-harvest handling and markets
- Management capacities and knowledge of modern, sustainable crop production methods.

a. Plant Nutrition and Soil Fertility

154. The challenge of sustainable crop production in Mongolia is to improve soil fertility and combat soil erosion. This will require the further adoption of minimum and zero till methods and the establishment of crop fertilization programs, including fertilizer application and the use of nitrogen fixing crops in rotation. Since the Atar 3 program, crop production and yields have increased, using up large levels of soil nutrients. These have not been replaced through fertilization or the return of crop residues to the soil. A program of soil fertilization that will return at least as many nutrients to the soil as are used up with each year's crop should be introduced.

155. The replacement of outdated tillage equipment and practices with minimum and zero-tillage is underway, but 70 percent of crop production is still carried out using conventional methods that entail

serious issues of soil erosion. Tillage technologies need to be transferred to minimum- or zero-tillage methods to protect the soil from wind erosion and water loss to evapotranspiration. Along with the conversion to minimum- and zero-tillage methods, the practice of allowing livestock to graze crop stubble will need to end. An essential part of the minimum/zero tillage contribution to soil health is the return of crop residue to the soil to return nutrients and build soil structure. Almost no crop residue is presently returned because of the heavy grazing pressure.

156. R&D, demonstration, and training will be necessary to create awareness of the issues, to establish a knowledge base of best practices, and to develop the skills of farmers to implement programs. Demonstration of the returns to fertilization will generate demand for fertilizers, which will need to be met with improved access, pricing, and financing for crop inputs.

b. Seed and Inputs

157. Seed breeding has improved with increased government and donor support. Research funding to PSARTI has increased to MNT 40 million/year and salaries have been increased so that research staff are not dependent on project funds for their day-to-day incomes. PSARTI has established two new laboratories and has increased its seed breeding capacity. The number of researchers is limited, which means that newly trained graduates will not be hired until existing staff retire. Given the level of funding, only local professional upgrading is possible unless project funds are made available. PSARTI is currently participating in a large program with the IAEA from 2012 to 2015. With a budget of €400,000, they have established a molecular lab and will be able to provide four fellowship trainings and multiple short-term training courses.

158. The underlying system supporting this kind of R&D remains fractured, with the research direction coming from the MIA but the funding coming from the Ministry of Education. Strengthening the coordination between the respective Ministries would facilitate more effective R&D efforts. The research focus is primarily on wheat, but branching into alternative crops, including oats and rye, which are supported by market demand. Crop diversification studies are ongoing.

159. PSARTI has several varieties of wheat including new varieties with great potential. Darkhan 144 and 131 are new varieties newly developed by PSARTI. Darkhan 144 is a medium late variety average yield of 2.2 to 2.5 mt. Darkhan 131 is very short maturity wheat variety which has, over the past three years, yielded 1.8 – 2.0 mt/ha under conditions of very cold summers, early frost and snow. Commercial supply of these varieties has already begun through PSARTI, but the government needs to provide the supportive policy and actions to expand production through multiplier farms to meet industry needs.

160. Multiplier seed farms have been established for potatoes but limited progress has been made in cereals and oilseed or in vegetables. Very successful interventions have been undertaken by the SDC Mongolian Potato Programme to rehabilitate the seed sector and establish commercial multiplier farms across the country. There has been no government intervention in the market place to undercut the development of these commercial enterprises. This same approach can be replicated for the development of a commercial seed sector for grains, oilseeds, forages and vegetables. One important step for the establishment of a commercial seed sector will be for the GoM to remove itself from activities in the seed sector through State Seed Reserve Fund. These activities compete directly with

potential commercial seed producers. A recent study of seed sector policy has made similar recommendations.

c. Irrigation

161. Mongolia's irrigated area has returned to near pre-transition levels. An inefficient, highly mechanized system has been replaced with sprinkler sets for vegetable production, wheel moves and, on larger land holdings, pivot systems. Access to equipment is improving and irrigated area is expanding. Farmers need technical assistance and information on how to make irrigation investment decisions, the pros and cons of various types of irrigation systems and what the complete elements of any given system incudes.

162. MIA policy is to keep 780,000 ha of crop land in production of which 80,000 ha will be irrigated (from 52,000 ha in 2013). The State budget covers the main construction of reservoirs, head gates and pipelines while the farmer pays the remainder. The Government also provides the engineering and will provide loans on irrigation equipment up to three ha with no interest for five years.

163. Irrigation is expensive and can be used on high value crops such as seed grain production, vegetables, fruits, specialty crops, and alfalfa for dairy production. To maximize the economic benefits of irrigation, farmers will have to develop new skill sets. These include soil-water and crop characteristics, principles for irrigation scheduling, operating and maintenance of irrigation sprinklers, pumps, and engines, and, water and soil resource management. They will also have to increase their knowledge on variety selection, the economics of fertilizer and chemical application and financial management. New curricula will need to be developed for university and technical school courses and extension programs and reference materials should be created.

164. The environmental and economic sustainability of irrigation systems must be promoted by developing the irrigation and water management skills of users and by carrying out regular monitoring of irrigated soils and waterways. Salinization, waterlogging, leaching, and erosion all threaten the long-term productivity of the land if the irrigation system is not well designed, constructed, and managed. Long-term irrigation on Mongolia's soils can cause soils to form an impenetrable "hardpan" layer leading to water logging, rising water tables and the reactivation of leached minerals and salts and leading to salinization.[42] Monitoring of long-term water use is necessary and may need additional capacity building within the responsible agencies.

d. Crop Rotations

165. There is both a need and an opportunity to develop crop rotations for soil conservation and disease control. The constraint is that no cash markets are not yet sufficiently developed to absorb the production of the crops in rotation. While the livestock sector in Mongolia is in need of increasing its use of animal feeds, the preponderance of poor households without cash for feed purchases restricts the development of the cash feed market. Some larger farmers are developing their own integrated production and distribution systems for livestock products, which allows them to introduce new feed

[42] Poorly drained irrigated land in areas with high evapotranspiration and clay soils can lead to a reaction between positively charged NACL in the water and negatively charged clay soil which results in the formation of a hardpan layer. This can not be reversed mechanically but must be treated with applications such as gypsum.

crops in rotation with wheat. Some potential livestock feed crops that could be used in rotation include, but are not limited to:

- Barley – some barley is currently produced for silage and feed but the cash market for feed barley is limited. It is primarily used by farmers that have integrated with crop and livestock production. The amount produced in 2006 was reported as 1,800 which increased to 5,900 mt by 2012.
- Oats – there is an existing small market for race horses. The production of oats has increased from 1,000 mt in 2006 to 5,900 mt in 2012. More oats could be grown to be cut before ripening and baled as "greenfeed" or silaged for use as forage for cattle, sheep, goats and horses. It could also be harvested ripe as a feed grain, primarily for race horses.
- Canola – with irrigation, canola can have a good yield. Local canola is being used in manufactured feeds in Mongolia. In 2013, Mongolia cultivated is of 73,000 ha of rapeseed/canola, double the 2012 area.
- Field peas – more extensive field trials are required to establish the viability of this nitrogen-fixing fodder crop.
- Corn – has been grown as a fodder crop and there is interest in using fodder corn in silage for dairy
- Sunflowers – have been grown in Mongolia on a very limited scale
- Alfalfa – could be grown in longer term rotations to produce high quality livestock forage and to fix nitrogen in the soil.

e. Equipment and Storage

166. As mentioned in earlier sections, crop production is constrained by a shortage of new and appropriate equipment for sustainable crop production. Smallholder vegetable producers are particularly constrained, locked into either manual labor or costly equipment rentals. Innovative financing, cooperative equipment ownership, the provision of "equipment circles" and local equipment rental agencies make affordable equipment available to smallholder vegetable producers and smaller grain farmers on a timely basis.

167. Vegetable producers require more quality storage that will allow for the separate storage of different types of vegetables according to their optimum storage temperatures. Joint ownership under a vegetable cooperative can be linked to a larger marketing program. Being able to store vegetables past the annual autumn price glut could improve farmer incomes.

5.3 Integrating and Intensifying Crop and Livestock Production

168. Integration between the crop and semi-intensive livestock sector in the central cropping zone is both desirable and feasible because of the access to resources and major urban markets. The cash based and continuous market for intensive livestock products and the reward offered to improved quality and/or yields for these products provide producers with the profit incentive to purchase feedstuffs. This provides crop farmers the economic incentive necessary to produce more feed crops. This could include alfalfa, which can be produced in rotation with cereal crops to provide high quality forage for dairy cattle and fix nitrogen into Mongolian's low fertility soils.

169. Increased integration between crop and livestock production has several advantages including providing production and market diversification, allowing households to optimize labor usage across seasons and providing nutrition resources between enterprises (i.e. feedstuffs for livestock and manure for crop fertilization). Diversified enterprises are also better able to self-finance as livestock can be sold to secure crop inputs and crop sales assist with supplementary feed purchases. The ability to intensify is influenced by feed availability and cost, access to other inputs, financing, and distance to market and transport costs. These largely determine the availability and cost of feed.

170. The demand for livestock feeds from the intensive and semi-intensive livestock sector will be the driver for Mongolian feed grain production to reach the critical mass where investment into processing and marketing systems occurs. This capacity can then be utilized to provide a wider range of highly nutritious, transportable and storage supplementary feeds to the extensive livestock sector. Dairy production, in particular, will be an important demand driver and could be a leader in the commercialization and diversification of the feed sector. Promoting real integration and intensification of crop and livestock production requires the following.

- Secure land tenure to facilitate private investment in barns, shelter, fences and wells. There are frequent issues with securing the land necessary for intensive livestock facilities. The Peri-Urban project demonstrated a success model for being able to secure land use rights for 15 years within the existing land law framework. This involved gaining prior agreement from all neighboring land users through a consultative process.
- Access to financing. Longer-term financing is required at affordable interest rates. Innovative lending tools may be required. A program to assist herders to downsize herds and establish semi-intensive or intensive operations including land leases, finance for facilities and stock and practical training would encourage the development of this sector.
- Access to productive inputs including livestock genetics, feeds, medications, seeds, equipment and inputs for feed production. Specialized and often small-scale equipment is required.
- Technical support and training including veterinary services with the appropriate skills for intensive livestock. Training in intensive livestock production, feed production and feeding system, silaging, management, marketing and farm financial management should be provided. Local agriculture offices can provide classroom training but are limited in their ability to deliver demonstrations and hands-on training. Study tours would be particularly helpful as they allow farmers to see new systems with their own eyes and to discuss them on a peer-to-peer level with other farmers.
- Policy support from government and the ability to keep livestock separated from crop fields. An example of supportive policy was cited in Darkhan. An intensive livestock program declared that all of Darkhan, Tov, Selenge and Bulgan and the eastern five soums of Khuvsgul would be a region of intensive livestock and cropping. Upon notice of Darkhan being declared an intensive livestock and cropping zone was sent to the western aimags, the in-movement of herders dropped 50 percent.

5.4 Supply and Quality of Inputs

171. Input suppliers, equipment suppliers and feed mills are limited in number and predominantly in the central region of the country (Table 5.21). In 2010, there were only 44 reported input supplies in the whole country to support both the livestock and crop industries. There were 58 equipment dealers, of which 35 were located in the central region. Feed mills have small capacity and are located predominantly in the central region where feedstuffs are available. Despite the rising demand for herbicides and other agricultural inputs, they remain difficult to access and sometimes of questionable quality.

Table 5.21: Input Suppliers, 2010

Region	Input Suppliers (seed, chemicals, livestock supplies) (Number)	Equipment Suppliers (Number)	Feed Mills	
			Number	Capacity (mt/day)
Mongolia	44	58	38	9.90
Central		35	22	8.30
Khangai		2	4	5.00
East		5	5	18.00
West		11	2	15.00
UB		5	5	9.00

Source: MIA Statistics

172. **Seeds:** The GoM has increased its support to national research institutes such as PSARTI and the national capacity for seed breeding for the cereal sector has improved. New higher-yielding and drought resistance varieties developed at PSARTI are ready for commercialization. The private seed multiplication farms needed to produce the volumes of seed required is not in place. Only two private seed multiplication farms are currently in operation and both are affiliated closely with PSARTI. One important step for the establishment of a commercial seed sector will be for the GoM to remove itself from activities the seed sector, through State Seed Reserve Fund, that compete directly with potential commercial seed producers.

173. The SDC Mongolian Potato Programme has provided an excellent model of commercial potato seed multiplier farms across the country. Commercial multipliers are established in every aimag. They have been equipped with irrigation, storage and equipment and trained in good production and handling methods.

174. The vegetable and forage sectors are in great need of improved seed. PSARTI provides some seeds, but not enough for the local industry. Most seeds used by farmers are old and not of standard quality. Vegetable seed is in particularly short supply and vegetable growers use any available seeds available. MIA has requested that the Potato Programme add a component of vegetable seed testing and production during its exit phase to the end of 2015. As a first step, more than 100 varieties of 23 vegetable species have been imported for testing. The Potato Programme is conducting variety trials at five locations in Dornod, Uvs, Bornor and Darkhan. Based on the tests in 2012 and 2013, varieties are ready to be selected and introduced into commercial production in 2014.

175. The second step will be to support commercial vegetable seed production in Mongolia. At present, 80 percent of Mongolian vegetable seed is produced in Uvs aimag, which has the special climate requirements needed for vegetable seed production. Registered seed has been acquired from suppliers and will be used to renovate seed the seed stock at both research institutes and selected commercial farms. Once the base seed stock is improved, commercial seed multiplication will begin. The project has already upgraded seed in the main species of vegetables. For example, since farmers are responding to the market opportunity for onions, seed was imported from Holland in 2012 (24 mt) and 2013 (12.5 mt).

176. **Agricultural Chemicals and Fertilizer:** The introduction of minimum tillage technologies and improved farmer awareness of herbicides and their use had led to increasing demand for these inputs. With the increases in agricultural labor costs, there is a new need and demand for herbicides. This is particularly strong in vegetable production where, if weeded by hand, the field must be done three times. In 2013, the MIA reported that 300,000 liters of Glyphosate was used.

177. An increasing array of herbicides is becoming available. Glyphoate is imported from China, but the concentrations available are not standardized. Access is most difficult in the countryside, so some producers make the often long and costly trip Ulaanbaatar and Darkhan to find inputs. Some larger farmers import directly from China and Russia illegally but there are risks in the type and quality of the product and no usage recommendations are provided. Travelling traders will sell inputs from time to time, but farmers consider the cost of these products to be relatively high. Similar issues occur with livestock production inputs, notably parasite/fly control (Ivomec) and concentrated feedstuffs. Mongolia does maintain a list of approved pesticides and veterinary drugs, but the imported product brought from China and Russia is often mislabeled and/or not inspected.

178. The SDC Potato Programme has worked for 10 years to introduce fertilizer, herbicides and pesticides. The project has tested all the necessary inputs and these are now included in the MIA approval list. They are now introducing new pesticides for vegetable production. Good herbicides are already available for carrots. New herbicides will be introduced for onion, cabbage, and turnips in 2014. The same process of testing herbicides and pesticides and getting them properly registered with the MIA will need to be done for other vegetables.

179. **Equipment and Production Technologies:** Lack of machinery is a major issue for producers. Approximately 45 percent of machinery is still Russian-made and more than 20+ years old. In Darkhan, the some equipment is more than 30 years old. Only 20 percent of equipment is less than 5 years old. State policy for technology renovation now includes soft loans and subsidization of equipment prices and helping the biggest distributors to open agencies in Mongolia.

Lack of machinery is a major issue for producers.

180. With the resurgence of the grain sector, machinery dealerships have become established. Full

dealerships now in Mongolia include two Northern American companies, three Russian companies and two or three European companies as well as many Chinese companies. In Darkhan, there are three major international firms represented, including Caterpillar (Wagner Asia), Ensata from Germany and AgroMach from Russia. Many other machinery and equipment manufacturers are represented in Mongolia by local businesses and large farming companies. Technical service is available from the dealer. Spares are also available, but are considered expensive.

181. For smaller grain farmers, numerous constraints to equipment exist. First and foremost, the small scale of their farms make it uneconomical to purchase new equipment on a profitability basis. Innovative methods of making machinery available should be facilitated, such as machinery rentals and joint ownership. Leasing is also available, but small farmers do not consider it to be affordable.

182. A custom business has emerged whereby small farmers rent equipment services from larger farmers, but this is not ideal. The costs are high and the equipment is only available after the primary owner has completed their fieldwork, meaning that the smaller farmers are perpetually late in their production and harvest activities. Without the financing to do proper fieldwork and prepare the summer fallow, these producers put their next year's crop at risk.

183. **Role of Government.** The GoM remains an active player in the crops sector through the Fund on Supporting Crop Farming (FSCF). Through the fund, the GOM owns storage capacity of 146,000 mt purchases grain directly from farmers (110,000 mt in 2013). These stores are sold to domestic millers or, potentially, exported. FSCF reserved 110,000 mt in 2012 and had 7,000 to 8,000 mt left in the fall of 2013 as flour mills bought wheat during the summer and fall. The FSCF provides crop production inputs, which can be paid for in kind. There are often issues with the timing and quality of inputs provided. In 2013, the GOM will receive 70,000 mt of wheat in return for lending harvest equipment and petrol to farmers. The imputed price used for valuing this in-kind payment is MNT 320,000/mt. As in the seed sector, removing the GOM from direct activities in the input market is a necessary step to nurturing the establishment of a commercial input market. Subsidies on inputs can be delivered in ways that are not distorting to the commercial market. Rebates, tax breaks, financing and other mechanisms are all available and should be used. Setting aside financial reserves would be more cost effective than dealing directly in the handling of inputs.

184. The government has continued to be involved in machinery procurement since transition, with the last major replacement being carried out under the Atar 3 program. For a stable and broad-based equipment network to become established, it is important that the government remain out of the direct business of equipment sales, as this should be the private sectors' role. The supply of equipment should come through private, commercial dealers with the government making use of financing, rebates, tax relief and other less-distorting subsidization methods that do not directly undercut private sector activities.

5.5 Finance

185. Access to banking and financing has improved across Mongolia with banking services available in all soums. Loans and terms remain limited, especially for households and cooperatives with limited collateral. All types of agricultural production and processing require and face constraints accessing adequate, affordable financing. Commercial banking provides only a limited amount of long-term

financing and interest rates, although they have decreased significantly over the past five years, are still prohibitive. This relates to continuing instability in the banking sector and relatively weak procedures in assessing repayment capacity, which least to higher defaults and higher interest rates. The Government, through various programs and funding sources, offers soft financing but it is program-based, limited in its total value and does not provide the industry with a stable source of finance. Likewise, the targeting and assessment process for government backed loans and a laxer expectation on repayment has led to poor financing choices and loan defaults.

186. Table 5.22 shows the number of households and business entities that have received agricultural financing for the first time in the five years up to 2011 along with the terms of the loans. More than 80 percent of the loans provided to households are one year or less, which limits the ability to make investments into productivity improvements which often take more than one year to be realized. Approximately 10 percent are for 1-3 years and only 5 percent or less are for more than three years. The likelihood of receiving longer-term financing is improved for business entities. Only 48-58 percent of business entity loans is for one year or less while from 19-35 percent are for 1-3 years and from 17-23 percent are for three years of longer. The collateral used to secure the loans is usually livestock or equipment for livestock households. For cropping households, collateral may be land, livestock, equipment or other types.

Table 5.22: Households and Business Entities Receiving an Agricultural Loan for the First Time in the Previous Five Years by Enterprise and Term of Loan

	Households				**Business Entities**			
	Livestock	**%**	**Crop**	**%**	**Livestock**	**%**	**Crop**	**%**
Number of households and business entities receiving loans	35,198		5 233		107		747	
Number of loan	77,519	100%	11,732	100%	199	100%	1,578	100%
Loan Terms:								
Up to one year	65,281	84%	9,675	82%	96	48%	922	58%
1-3 years	7,483	10%	1,277	11%	70	35%	298	19%
3 years and longer	3,649	5%	256	2%	33	17%	358	23%

Source: Agricultural Census

187. Processing and intensive livestock require greater amounts of both operating and long-term capital. There is a need to identify innovative financing programs for the agriculture sector. This could include loan guarantees to backstop poorly collateralized groups. Some Public Private Partnerships (PPPs) may be possible. An agricultural finance entity, at arm's length from government and practicing sound lending practices, could be another alternative. The Farm Credit Corporation (https://www.fcc-fac.ca) of Canada is a Crown Corporation that has provided agricultural finance since 1959. They are the primary source of agricultural finance and agricultural business services in Canada. They offer a variety of financing packages for primary production and processing and support input purchases through lines of credit and finance packages with participating input dealerships.

Planning a Dairy in Gobi-Sumber

A Gobi-Sumber fodder cooperative plans to establish a 25 cow dairy farm. The Sumber-Airg Cooperative has 9 members and started on 88 ha of open land. The soum has provided 1 ha for their cowsheds. Over the past 8 years, they have been planning for the establishment of a dairy farm. Using a step-by-step approach as investment fund have been available, they have installed power (2200 meters of which 200 high volt), dug 5 wells (60 m deep) and built unheated underground storage of cement block walls with separate storage areas for up to 200 mt of vegetables and potatoes. They have acquired machinery (manure spreader, tractors, potato seeder, potato harvester), irrigation equipment (4 sprinklers from China (on wheels)) with capacity of 25 ha, and built a greenhouse. The greenhouse has half-wall design to protect it from gobi winds and is used for tomato production. They grow potatoes on 15 ha but were not able to plant in 2013 because of dry conditions and limited operating funds. They now have about 15 cows which can produce 10 l/day/cow. They currently milk 1 time per day and only produce 40 litres of milk. With this, they make yogurt and sell to the local kindergarten. They are selling about 80 litres of yogurt per week. To date, they have invested about 600 million MNT on the preparation work and operating expenses which used up their savings. In 2008, they borrowed 110 million MNT at 1.2% interest, of which the government paid 50%. This loan was repaid completely in 2012, six months ahead of its due date. In 2010, they received a loan for 20 million MNT from the aimag SME fund for the underground storage facility. This was also repaid in time.

Issues: They have spent eight years on preparations, which are complete, but still have no money for the cows and barns. The investment is estimated to be 276 million MNT for 25 cows, the cow shed, a barn for young animals and a composting facility. They plan to build a winter cow shed in 2014 and buy cows in 2015/2016. They are looking for improved breeds already adapted to Mongolian conditions. Financing is their greatest issue. They feel that if they had enough financing, they could start their dairy at once and become profitable. They desire investment loans at 1-2% /year for 7-8 years with a generous grace period during start-up. Currently, the loans available have no grace period and a maximum length of five years.

5.6 Risk Management

188. The few risk management programs available in Mongolia are insurance based and have not been widely used by producers. Table 5.23 shows the number of households and business entitites reporting the use of insurance. According to the Agricultural Census, only 9 percent of the total number of households involved in livestock production are insured, which is the same percentage of wealthier herders that have more than 500 head of livestock (see paragraph 76). Business entities in the livestock industry are insured at roughly the same rate. The majority of these are using the indexed-based livestock insurance program. In the crop sector, insurance coverage is also very low, but business entities are much more likely to be insured (7 percent) than households (2 percent).

Table 5.23: Insurance Covering For Families And Business Entities By Insurance Types

	Households				Business Entities			
	Livestock	**%**	**Crop**	**%**	**Livestock**	**%**	**Crop**	**%**
Number of Households and Business Entities	209,563	100%	33,461	100%	507	100%	1,705	100%
Number of Insured Households and	18,584	9%	547	2%	40	8%	119	7%
Of Which:		0%		0%		0%		0%
Index based livestock	14,387	7%		0%	28	6%		0%
Crop industry insurance		0%	100	0%		0%	30	2%
Other commercial	3,647	2%	256	1%	10	2%	32	2%
Others	944	0%	138	0%	4	1%	45	3%

Source: Agricultural Census

189. Mongolia's extreme weather can pose catastrophic risk to producers. Improved winter preparedness, including more feed production and improved winter shelters, is fundamental to managing the risk of dzud. Support to local forage and fodder production through land allotment, finance, technical assistance and access to equipment would assist herders, individually or as groups, to undertake better winter preparedness.

Improved winter preparedness, including more feed production, is fundamental to managing the risk of dzud.

190. Pastureland Risk Management was a core component of the SLP project. Since the completion of the project, the planning process for the annual pasture management plans has been decreasing. The process is institutionalized at the National Land Agency and is passed as regulation, but the mechanism and resources for implementation is an issue. The completion of annual pasture management plans could be linked, as a prerequisite, to accessing IBL and /or LDF funds. These could be used to support wells, springs, small fodder factories. Ongoing refresher training will be needed on pastureland management plants to maintain the local capacity to development these.

191. The Livestock Early Warning System (LEWS) introduced through the SLP is in the process of being institutionalized at the National Agency of Meteorology, Hydrology and Environmental Monitoring (NAMHEM) with support from SLP through December of 2013. Questions regarding the provision of adequate funding to maintain the system in the future have been raised. This is an example of a program that has proven its worth through successful piloting in donor programs should receive adequate public expenditure to ensure its sustainability.

192. The NEMA is responsible for the Emergency Fodder Reserve Fund. There is a need for capacity building within NEMA and between NEMA and NANHEM for emergency early warning. Since 2013,

Mongolia has to finance emergency response entirely on its own and the burden of financing is difficult[43]. With the introduction of the IBL, resources are now provided directly to the soum. Risk management and forage programs are not necessarily being supported or pasture management plans being developed. In order to ensure that risk assessment and planning continue, it may be necessary to establish a requirement linking the use of LDF monies to the presence of up to date risk assessment and plans.

193. The GoM is now institutionalizing the index-based livestock insurance program piloted under the IBLIP. This will greatly improve the risk management tools available to producers. Crop farmers, except for seed producers, have no access to crop insurance. Crop insurance was available until 1998 when Mongol Datgaal dissolved the insurance and returned the premiums to farmers. A new program for crop insurance provision should be explored.

194. An agricultural sector risk assessment was completed separately as part of this agricultural sector review. The study evaluated production, marketing and enabling environment risks and provided recommendation for improvement. This would include developing a layering of risk solutions where the first layer is risk mitigation against high frequency/low loss events, the second is risk transfer (i.e. insurance) for low frequency/medium loss events and a third layer of risk coping against very low frequency/very high loss events (e.g. emergency response to major dzud). The study found that most risk management in Mongolia has taken the form of emergency response (coping) either as emergency fodder distribution, insurance payouts or social safety nets. At the same time, existing subsidies distort incentives to better balance herds to the available pasture capacity. Combined, these subsidies and coping strategies exacerbate the impacts of risks instead of mitigating them.

"The agriculture sector must be based on knowledge or it can't succeed. A generation of specialists and knowledgeable producers has been lost."

5.7 Innovation – Training, Research and Extension

195. **Training.** All productivity improvements and innovation will spring from the knowledge, skills and creativity of Mongolia's agricultural work force. From researchers and technicians down to primary producers, there is a lack of current knowledge and skills related to market orientation, export readiness, management, processing, production, food safety, quality assurance and sustainable resource management. Finally, competition from the mining sector is driving up labor costs in the countryside making it more difficult for producers, especially vegetable and fruit producers, to find workers who are skilled, affordable and willing to work in agriculture.

196. Agricultural colleges and universities in Mongolia produce large numbers of graduates each year, but curricula and teaching methods have not been upgraded to provide industry with the knowledge and skill sets needed to support productivity and quality improvements. The agriculture sector requires with graduates familiar with both theoretical and practical skills. Basic agricultural training at agricultural colleges and the universities needs to be upgraded to include new technologies and management approaches and more options for practical, hands-on training.

[43] Anecdotal information indicated that MIA staff had been asked to volunteer a day's salary towards the emergency response effort.

197. Researchers, technician and industry professionals and managers need access to professional upgrading and continuing education. Universities are adopting a more research-oriented versus teaching based model, but most of the faculty has not had opportunities to upgrade their research skills. The processing industry suffers from a shortage of professional management skills, long-term planning and specialized technical expertise. Government officers need technical upgrading and training in strategic planning and monitoring and evaluation.

> *"We need research on feeding and feeding trials. There's no good research in the system. People have to go to Gatsuurt to see."*

198. **R&D:** Strengthening local capacity for R&D and facilitating collaborative arrangements between the research organizations and the private sector would contribute to a more productive and competitive sector and would support the development of the intensive and semi-intensive livestock sectors, livestock feeds, horticulture and new product development. This would be a strategic investment in light of the risk of Dutch Disease accompanying the future development of the mining sector. Currently, the capacity for R&D in Mongolia is limited by the shortage of funding from either public or private sources. Mongolian research organizations have been unable to upgrade their research facilities or carry out fulsome professional development and upgrading programs for their researchers. In general, the private sector does not collaborate with local research organizations to find innovative solutions to local production problems or to participate in product development.

199. Public investment in R&D and innovation has significant, positive returns for agriculture and the overall economy. A 1991 study of public infrastructure and R&D investment in 20 US manufacturing industries (including food) showed decreased variable production costs, improved private sector competitiveness and increased demand for labor and capital stock (Nadiri & Mamuneas, 1991). Other studies within agriculture, (Alston, Chang-Kang, Marra, Pardey, & Wyatt, 2000), manufacturing (Peters, 2012) and beef production (Cranfield, 2010) all substantive positive direct and spillover economic effects. Specifically to food processing innovation centers, the private rate of return to R&D investment has been found to range from 10.7 percent (Gopinath & Roe, 1996), between 9.1 and 11.1 (KPMG Consulting, 2013), and some anecdotal estimations reaching as high at 15:1. The Gopinath and Roe study emphasized the need for R&D throughout the value chain including primary agriculture due to their respective spillover effects from one link in the value chain to another, which supports the need not only to promote cluster development but to support cluster innovation with public sector investment in R&D.

> *"Farmers lack knowledge about feeding and nutrition otherwise these methods would be quickly adopted. Some dairy cows that should be getting 20 l/day are only getting 10 l/day and the farmers think it's ok."*

200. **The Need for Effective Extension.** Affecting change in primary production requires a change in the day to day practice of herders and farmers. The greatest issue faced herders is the low productivity of pasture and the inadequate supplies of supplementary feeds. They are constrained in addressing this issue not just by issues of finance and inputs, but by a lack of knowledge and skill in animal nutrition, supplementary feeds and hay and fodder production. There is also a need for herders

to learn new techniques in raw product handling in order to improve returns even under existing market conditions.

201. Changing attitudes and building knowledge and skills is accomplished by a combination of demonstrations, information sessions and training delivered through a pluralistic innovation system. Seeing is believing and demonstration can be instrumental in changing attitudes. Farmer field schools, participatory research programs and demonstration sites can build awareness of new technologies and methods and their benefits. Demonstration research sites on livestock nutrition and fertilizer use in crop production would be particularly valuable. This can be done cost-effectively using collaborative research with commercial producers. This collaborative approach would allow similar participatory research activities to be undertaken in different regions to build up relevant information for different agro-climate zones and to reach a great number of industry participants. Radio, television and internet should be incorporated into the demonstration activities to maximize the sharing of research results.

202. The extension system should support a pluralistic innovation approach. Government, research institutes, academic institutions, the private sector and producer organizations all have a role to play in identifying needs, developing programs and providing extension services to primary producers. Delivery approaches should include demonstration sites, participatory research, hands on training and study tours. Internet and multi-media platforms should be used to make service delivery cost effective. The MIA is promoting exchanges with other countries in order to establish demonstration sites in Mongolia. In Tov and Selenge, a cooperation program the German Ministry of Agriculture is demonstrating wheat, vegetable and potatoes production. They are also looking to Holland for the design of winter greenhouses, which they will tender using the Chingas bond. Other potential demonstrations include cooperation and direct investment into green housing tomatoes, cucumbers, fruits and flowers on up to 20 ha at Ulaanbaatar and 12 ha around aimag centers.

5.8 Cooperatives

203. The GoM is actively promoting the development of cooperatives. Issues facing cooperatives that need to be addressed include: i) small size and lack of true cooperative intent; ii) the lack of collateral and related difficulties in accessing commercial finance; and, iii) the costs associated with VAT applied on member transactions. There is also a lingering lack of trust and unwillingness to invest one's scarce assets in a concept that does not yet have broad-based examples of success. These attitudes are beginning to shift as some of the larger and more established cooperatives are beginning to generate profits and distribute dividends to members. Training has been provided by NAMAC and MIA, but the resources available and training methods used are limited, not building the understanding and skills required.

204. Many coops have only the minimum necessary nine members for registration. Their volumes and profitability are low. Activities are often focused on agriculture production, trade and service. Some are involved in the purchase of wool. Many of these cooperatives may have been formed with the sole purpose of accessing benefits from donor and government programs. Anecdotal evidence suggests this has also occurred in response to the wool subsidy whereby traders have established cooperatives.

205. Most cooperatives lack collateral and are unable to obtain financing through normal channels unless an individual member pledges their personal assets for the group. Without financing, they cannot

invest in productive assets for value added processing or storage for product accumulation. This also constrains their ability to purchase bulk inputs on behalf of their members.

206. Some larger cooperatives could potentially participate in the commodity exchange, but cannot quality without adequate storage facilities. To qualify as brokers on the commodity exchange, cooperatives would need to have accredited storage first and laboratory facilities. They would also need transport.

207. The VAT is applied on cooperatives with sales over MNT 10 million. This floor should be raised for coops. Cooperative members pointed out that there is no added value in the first transaction when the cooperative acquires materials from their members and that applying the tax at this point causes the coops to go into debt. Cooperatives also pointed out issues with the ability to pass on the VAT to customers when these customers are herders who are exempt from VAT.

5.9 Pasture Management Groups and Mechanisms

208. Many projects have supported pasture co-management systems and have facilitated the formation of pasture management groups to lead local pasture management planning and implementation. The success of these programs is uncertain as many groups cease to function or function poorly after the withdrawal of program funding and technical support. In many cases, they revert back to kin-based organizations which still function to some degree, but not at the level of industry and community coordination that was the original intent.

Many pasture management groups were set up in Mongolia to lead local pasture management planning and implementation.

209. Green Gold has identified a number of challenges for pasture management groups that need to be addressed, including:

- groups become inactive after projects are completed
- conflicts between members and non-members over pasture areas/rights and benefit sharing
- herder groups and pasture management groups both need external support to become mobilized and undertake planning activities
- without some source of financing, the groups cannot become sustainable
- groups need marketing capacity
- support and guidance from the local government and an external NGO is an important element of functionality and sustainability.

6 Marketing Systems and Issues

6.1 Livestock and Livestock Products

210. The Agriculture Census of 2011 identified the most common modes of marketing livestock and products by herders and livestock businesses (Table 6.1). Both households (76.8 percent) and businesses (71.6 percent) prefer to market products directly. Businesses (19.7 percent) are much less likely to use middlemen ("changers") to than households (37.2 percent). Business entities (11.8 percent) are twice as likely to sell to other business entities, as are households (5.8 percent) or through other channels (14.8 percent versus 3.5 percent).

Table 6.1: Methods of Product Sale by Animal Husbandry Households and Entities (%)

	Directly to Changers		To Business Entities		Direct to Market		Others	
	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities
Total	**37.2**	**19.7**	**5.8**	**11.8**	**76.8**	**71.6**	**3.5**	**14.8**
West	44.2	27.6	6.1	11.4	77.7	84.8	1.9	6.7
Khangai	34.1	11.0	5.0	7.6	78.6	78.0	3.2	14.4
Central	31.0	23.6	7.4	13.7	77.6	63.4	5.5	16.8
East	44.4	25.6	3.5	20.9	69.2	65.1	3.0	11.6
Ulaanbaatar	26.5	11.3	11.1	10.0	67.8	65.0	10.7	23.8

Source: Agriculture Census 2011

211. The marketing issues identified by livestock households include low prices (61.5 percent), distance from market (47.4 percent), and the number of competitors (13.8 percent), slow sales (11.7 percent) and lack of storage (10.8 percent). Business entities cite the same issues in the same order of priority. However, business entities are more likely to be concerned about the speed of sales (turnover) and storage facilities and less concerned about distance to market and price levels regardless of what region they are in (Table 6.2). Both households (86.3 percent) and business entities (81.3 percent) are price takers (Table 6.3). Ulaanbaatar business entities are the least likely to take a market price (67.5 percent) while western (87.8 percent) and eastern (87.4 percent) households are the most likely to be price takers. Herders are more likely to establish prices mutually agreed upon with the customer (30.5 percent) than business entities (18.5 percent). Businesses are more likely to establish a cost-plus price (9.3 percent) than households (4.6 percent), but a very small proportion does this.

Table 6.2: Marketing Issues of Livestock Households and Businesses by Region (%)

	Total		West		Khangai		Central		East		UB	
	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Slow selling	11.7	15.4	14.0	19.0	9.6	11.9	13.0	14.3	10.8	25.6	10.0	12.5
Less costumers	7.1	7.3	7.9	6.7	6.7	11.0	6.8	3.1	6.1	20.9	12.0	3.8
Many competitor	13.8	15.8	11.3	14.3	13.8	18.6	16.2	16.1	12.3	4.7	28.7	18.8
Cheap price	61.5	51.5	62.5	57.1	62.7	45.8	64.8	58.4	51.0	48.8	51.9	40.0
Deficient of storage and storehouse	10.8	16.4	8.1	14.3	11.0	22.9	13.4	11.8	11.3	18.6	13.4	17.5
Distant from market	47.4	29.6	63.8	50.5	44.1	22.0	30.8	24.2	51.1	23.3	37.9	27.5
Others	3.5	12.0	1.3	5.7	3.3	7.6	5.7	13.0	4.0	16.3	10.8	22.5

Source: Agriculture Census 2011

Table 6.3: Price Setting Methods Used by Livestock Households and Businesses by Region (%)

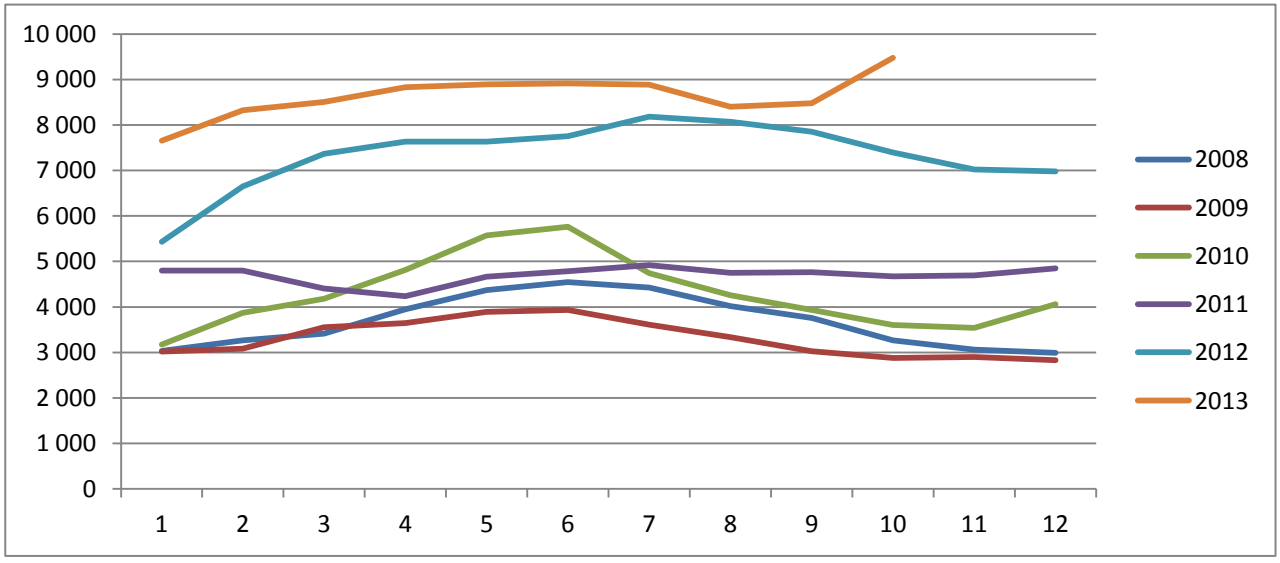
	Total		West		Khangai		Central		East		UB	
	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Adding a benefit on cost	4.6	9.3	7.2	10.5	3.2	6.8	4.2	8.7	4.1	14.0	2.3	10.0
Mutually agreed with costumers	30.5	18.5	31.4	14.3	31.1	20.3	29.6	19.9	28.0	20.9	30.1	17.5
Based on competitors price	9.5	7.9	10.8	13.3	8.7	9.3	9.6	5.6	7.8	7.0	14.5	3.8
Market price	86.3	81.3	87.8	86.7	86.6	83.1	84.8	82.6	87.4	83.7	72.8	67.5
Others	2.1	8.9	1.0	2.9	1.8	5.9	3.6	10.6	1.7	7.0	8.6	18.8

Source: Agriculture Census 2011

212. **Meat:** Slaughter is highly seasonal with the majority occurring between mid-August and November, when animals have put on weight and winter meat supplies are being prepared.[44] Sales of live animals are often driven by the need to raise cash for household expenses (school, medical) or to rationalize the herd in anticipation of a hard winter. The structure of the herding sector suggests that roughly 70 percent of producers are in this category, with decisions driven by immediate household needs, risk avoidance and the desire to invest in future income by increasing herd size. An example of this is the recent lack of market response to recent high meat prices. These prices are beneficial to larger herders with surplus animals who are willing and able to respond with livestock sales, but small herders receiving most of their income from milk and need to use livestock for home consumption, choose not to respond in order to preserve and, eventually, increase their income stream. In the short term, there is little response to historically high meat prices.

213. Consistent with the seasonality of slaughter, meat prices are highly seasonal, as shown in Figure 6.1. Meat is most plentiful in November at the end of the slaughter season and in shortest supply in the early spring with prices. Based on Ulaanbaatar beef prices from 2008 to 2013, prices are 80 percent of the annual average in November and peak June at 112 percent of the annual average.

Figure 6.1: Seasonality in Beef Prices, Ulaanbaatar 2008-2013 by Month



Source: Based on data from NSO and MIA

214. Figure 6.1 also illustrates how, since 2010, meat prices have risen. The average beef price in Ulaanbaatar in 2008 was MNT 3,674/kg, MNT 7,329/kg in 2012 and reached MNT 9,400/kg in 2013. Good quality beef is selling at MNT 10,000-11,000/kg and mutton at up to MNT 6,500/kg. Contributing factors are increasing consumer demand and purchasing power (civil servant salaries have increased 30 percent in five years), greater demand from China (through both formal trade and smuggling) and relatively tighter supplies based on the growth of regional demand centers in the aimags and around mine sites and the decreased tendency of herders to market because of supplementary income source from government and other sources (mining CSR programs, employment, artisanal mining). By

[44] Livestock used to be herded into slaughter plants on summer droving routes, grazing and gaining weight enroute.

comparison, imported frozen chicken sells for between MNT 4,500 and 6,000/kg, spurring substitution by consumers. Table 6.4 shows how the price of meat varies by type and across regions and the share of the price realized by producers.

Table 6.4: Average Price of Meat and Producer Share, By Type and Region, 2010

	Khangai		High Mountain		Steppe		Gobi	
	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)
Horse meat	1,559	58.3	1,800	74.8	2,323	88.3	2,302	79.8
Beef	2,619	68.3	3,000	95.4	2,546	70.3	2,858	66.6
Camel meat	1,800	91.5	-	-	-	-	1,565	75.2
Mutton	2,330	68.9	3,000	99.0	2,193	70.4	2,792	78.4
Goat meat	1,919	66.8	2,500	95.2	1,776	69.8	2,080	72.7
Pork	4,300	91.8	-	-	5,700	-	5,200	-

Source: Agricultural Census

215. Livestock marketing practices affect the productivity of processing plants. Seasonality of production is the first issue. The second is low and inconsistent carcass yield and low meat quality; livestock slaughtered as mature animals have a greater proportion of bone and lower carcass yields. Feeding livestock through the winter to slaughter during the early spring shortages would stabilize supplies to the processors and moderate the season price peaks. A well-managed feeding program would also produce a younger and more standard animal to the slaughterhouse with higher and more consistent carcass yields. This would improve the processing plant efficiency and profitability.

216. **Meat Reserves.** The GoM maintains a policy of holding meat reserves in order to stabilize prices during the year. The Government procures 14,000-18,000 mt annually or 18 percent of meat consumption in Ulaanbaatar, Darkhan and Eredenet from March through July. Meat is released at a set retail price (beef MNT 5,900/kg; mutton MNT 5,750/kg; goat MNT 4,000/kg). This is also a mechanism to provide concessional loans to meat enterprises (ABD Cluster Study). Recently, the GoM contracts private companies to hold meat reserves and pays for storage. The subsidy is MNT 1,000/kg to cover storage for up to seven months from slaughter to late spring. The meat in storage is usually of poor quality.

217. A program was developed with the Bank of Mongolia (BoM) in 2013 to establish a constant price for meat. This would involve investment in large meat storage, supported by credit from the BoM. The agreement was completed but there was insufficient budget to implement it. Such programs interfere with market pricing and discourage investment into improved meat production by either processors or herders. Less distorting methods for offsetting the high cost of food, such income supplements and "food stamps" could more accurately target the segment of the population in need at less cost.

218. **Hides and Skins.** Mongolia commercially processed 8.8 million hides and skins in 2012. Some materials enter from the processing sector but most is collected from herders by traders and company representatives. In 2010, raw product prices ranged from MNT 7,700 for a sheep skin on the Steppe to MNT 20,000 for a horse hide in the Khangai region (Table 6.5). Seasonality is not as severe as for meats, but the main marketing is still the slaughter season in autumn.

Table 6.5: Average Price of Hide and Producer Share, By Type and Region, 2010 ('000 MNT)

	Khangai		High mountain		Steppe		Gobi	
	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)
Horse hide	20.0	90.1	19.0	87.6	10.0	49.3	15.0	69.8
Cattle hide	16.0	92.5	13.0	89.0	13.1	91.6	15.0	93.8
Camel hide	12.5	95.4	-	-	-	-	12.7	74.0
Sheep skin	7.7	97.5	8.8	89.8	6.0	96.8	9.6	98.0
Goat hide	14.3	75.3	16.5	82.5	13.0	76.5	15.0	71.4

Source: Agricultural Census

219. **Dairy Marketing.** Milk production is also very seasonal with 80 percent being produced between May and September when milk quality declines quickly in the absence of a functioning collection and cooling system. This creates a seasonal surplus of milk which, combined with quality issues, creates a price slump during summer sales, limiting the income potential of farmers. With a low input system based on more traditional herd management, winter production is greatly reduced. Issues in sanitation lead to contamination of raw milk to the extent that cannot be used for UHT milk and must be powdered. Pricing is not based on standard quality indicators such as fat and protein. The result is a low value product at the farm gate. The average price of milk and the producers' share for different types of milk in different regions is given in Table 6.6.

Table 6.6: Average Price of Milk and Producer Share, By Type and Region, 2010 (MNT)

	Khangai		High Mountain		Steppe		Gobi	
	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)	MNT/kg	Producer Share (%)
Horse	1,100	54.0	1,430	63.9	1,500	75.0	-	-
Cow	712	55.2	965	67.7	858	72.2	1,201	63.0
Camel	1,033	46.8	2,361	86.7		-	1,878	94.2
Sheep/Goat	596	49.0	1,108	75.0		27.7	1,829	94.0

Source: Agricultural Census

220. Half (52 percent) of the 458 million litres of milk produced is consumed in the home or converted to traditional dairy products. About 48 percent (220 million litres) enters the market and of this, 47 percent (73 million litres) is sold directly to Ulaanbaatar consumers. A total of 43 million litres, or about 9-10 percent of the total milk produced in the country, is pasteurized under factory conditions. An additional 4,700 mt of milk powder is imported and reconstituted to 47 million litres of milk annually.

221. Dairy products consumed in urban areas are primarily imported (70 percent). Ulaanbaatar represents 40% of the national milk demand. It is served by supermarkets, large food markets which sell 165 million litres annually made up of 41 million litres of pasteurized million, 73 million litres of unprocessed fresh milk and 51 million litres of imported milk.[45]

[45] Oyu Tolgoi, 2013.

6.2 Crop Marketing Systems and Issues

222. Farmers keep some harvest for seed and their own processing and food usage, but the majority is sold, ranging from 77 percent of oil seed crops (e.g., canola) to 57 percent of potatoes (Table 6.7). Potato growers hold back 16 percent of their harvest for seed; grain producers hold 9 percent and vegetable producers only 1 percent. On-farm use for family consumption is high, at 31 percent for vegetables, 19 percent for potatoes and 11 percent for grains.

Table 6.7: Products of Crop Industry by Usage Purpose (mt and %)

Crop	Total harvest	Kept For seed	Used by themselves		Sold	Others
			Processing	Food		
Grain	457,209.8	41,550.5 (9%)	26,697.0 (6%)	23,283.0 (5%)	33,1679.0	34,000.4 (7%)
Potato	223,317.7	35,497.8 (16%)	1,158.0 (1%)	41,161.9 (18%)	127,880.0	17,619.9 (8%)
Vegetables	109 658.3	1,576.7 (1%)	6,211.3 (6%)	27,446.0 (25%)	69,612.5 (63%)	4,811.8 (4%)
Forage	42,354.8		9,539.2 (23%)		28,847.2 (68%)	3,968.4 (9%)
Technical plants	6,617.5		268.9 (4%)		5,091.1 (77%)	1,257.5 (19%)

Source: Agriculture Census 2011

223. The Agriculture Census of 2011 investigated the marketing practices of households and business entities involved in crop production. Most households directly market their crops (58 percent) or sell them to changers (26 percent). They were least likely sell to a business entity (7 percent). Crop producers registered as businesses (primarily mechanized cereal producers) tend to be larger and commercial. They are more likely to market their crops directly (64 percent) to flour mills or to sell to other businesses (34 percent).

224. Potato and vegetable producers in the central zone typically bring their produce to Ulaanbaatar to sell to middle men (Table 6.8). Interviewees reported that a farmer may sell his potatoes at about MNT 200/kg to the middle man who sells to retail for MNT 300-400. Retailers then sell at MNT 600-800/kg. In May 2013, wholesale price of potatoes was MNT 150-180/kg while production costs were MNT 300/kg. As a result, some producers cut back on production.

Table 6.8: Methods of Product Sale by Crop Producing Households and Entities, by Region (%)

	Directly to changers		Business entities		Direct to market		Others	
	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities
Total	**25.8**	**22.9**	**6.8**	**33.5**	**57.9**	**63.9**	**28.4**	**14.8**
West	44.6	40.2	8.0	20.7	69.5	75.3	10.2	8.2
Khangai	21.1	27.3	8.8	42.6	54.1	62.4	31.2	13.8
Central	26.4	15.0	5.6	40.1	63.0	63.0	24.8	13.3
East	34.9	22.9	7.9	41.7	49.8	54.2	26.6	12.5
Ulaanbaatar	8.2	16.9	4.6	14.8	42.3	50.8	52.7	36.5

Source: Agriculture Census 2011

225. Marketing issues for households are low prices and the number of competitors (Table 6.9). For businesses, the top issues are low prices and the slowness of sales. Storage did not rank in the top three issues in any region. Rather, the issue seems centered around the atomistic nature of many small producers competing with each other to drive prices down. Collaborative marketing, especially for potato and vegetable producers, would decrease marketing costs and give producers greater market power.

Since 2010, with support of the government, some private operators and larger farmers have constructed higher quality underground storage with ventilation.

226. Most crop producers are price takers with 80 percent of business entities and 68 percent of households taking market prices. Negotiating an agreed upon price with customers is used by 32 percent of business entities and 24 percent of households. Only 13 percent of business entities and 5 percent of households use cost-plus pricing (Table 6.10).

227. The amount of on-farm storage for potatoes and vegetables has increased but it is of rudimentary root cellar style construction with limited or no ventilation and no ability to provide separate storage conditions for different types of crops. This perpetuates the practice of selling product into harvest time gluts at low prices. Since 2010, with support of the government, some private operators and larger farmers have constructed higher quality underground storage with ventilation. These storage facilities average 1,000 mt capacities and there is now a 10,000 mt storage capacity of this type.

228. Similarly, there is limited good quality on-farm storage for grains and farmers sell directly to flour mills. Total storage capacity is 280,000 mt of which 70,000 is government owned and 210,000 is privately owned by flour mills. Currently, the GoM pays MNT 100,000/mt for wheat delivered to domestic flour mills and Crop Production Support Fund. Future plans are to move wheat pricing out of government to the commodity exchange.

Table 6.9: Marketing Issues of Crop Producing Households and Businesses by Region (%)

	Total		West		Khangai		Central		East		UB	
	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Slow selling	20.0	39.5	31.1	36.4	16.7	40.4	22.1	45.6	19.5	50.0	8.9	15.3
Less costumers	10.2	16.6	16.8	26.1	8.7	15.6	7.6	14.4	12.6	20.8	12.0	7.9
Many competitor	26.5	31.0	30.6	32.1	22.0	35.5	29.1	30.0	20.3	20.8	25.4	29.1
Cheap price	47.1	54.4	48.2	45.1	42.7	52.8	58.0	63.9	31.6	43.8	31.1	36.0
Deficient of storage and storehouse	19.7	25.8	22.3	28.8	22.7	30.5	19.0	24.7	23.5	31.3	12.3	16.4
Distant from market	18.3	23.6	28.8	42.7	16.0	25.9	18.5	16.6	21.3	20.8	9.0	14.3
Others	22.2	8.3	6.3	4.9	24.8	5.3	20.9	6.7	21.4	6.3	38.1	27.0

Source: Agriculture Census 2011

Table 6.10: Price Setting Methods Used by Crop Producing Households and Businesses by Region (%)

	Total		West		Khangai		Central		East		UB	
	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities	House-holds	Business Entities
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Adding a benefit on cost	5.4	12.8	12.4	16.0	4.2	16.3	4.2	9.4	4.0	9.4	3.6	13.8
Mutually agreed with costumers	23.5	31.6	27.9	36.4	21.0	32.3	26.4	32.6	21.8	32.6	16.5	14.8
Based on competitors price	15.6	19.4	18.3	23.4	14.0	23.4	18.0	18.6	13.2	18.6	10.1	10.6
Market price	68.2	79.9	79.6	75.0	67.4	81.9	72.7	86.3	67.1	86.3	46.9	60.8
Others	21.2	8.2	5.8	4.6	23.6	6.7	20.1	6.1	18.8	6.1	37.2	27.0

Source: Agriculture Census 2011

229. Average prices for crop products in different zones are provided in Table 6.11. Vegetable prices tend to be highest on the steppe where the market influence of Ulaanbaatar is present and in the Gobi where the influence of mining companies is evident.

Table 6.11: Market Price of Vegetables by Region, 2010 (MNT/kg)

Crop	Khangai	High Mountain	Steppe	Gobi
Potato, kg	557	358	554	770
Cabbage, kg	610	648	753	790
Turnip, kg	550	528	995	829
Carrots, kg	607	477	985	740
Onion, kg	870	500	1,363	1,263
Garlic, kg	1,390	800	1,000	1,000
Cucumber, kg	1,309	1,000	1,257	838
Tomato, kg	1,477	591	1,958	1,700
Watermelon, kg	487	572	900	872

Source: Agriculture Census 2011

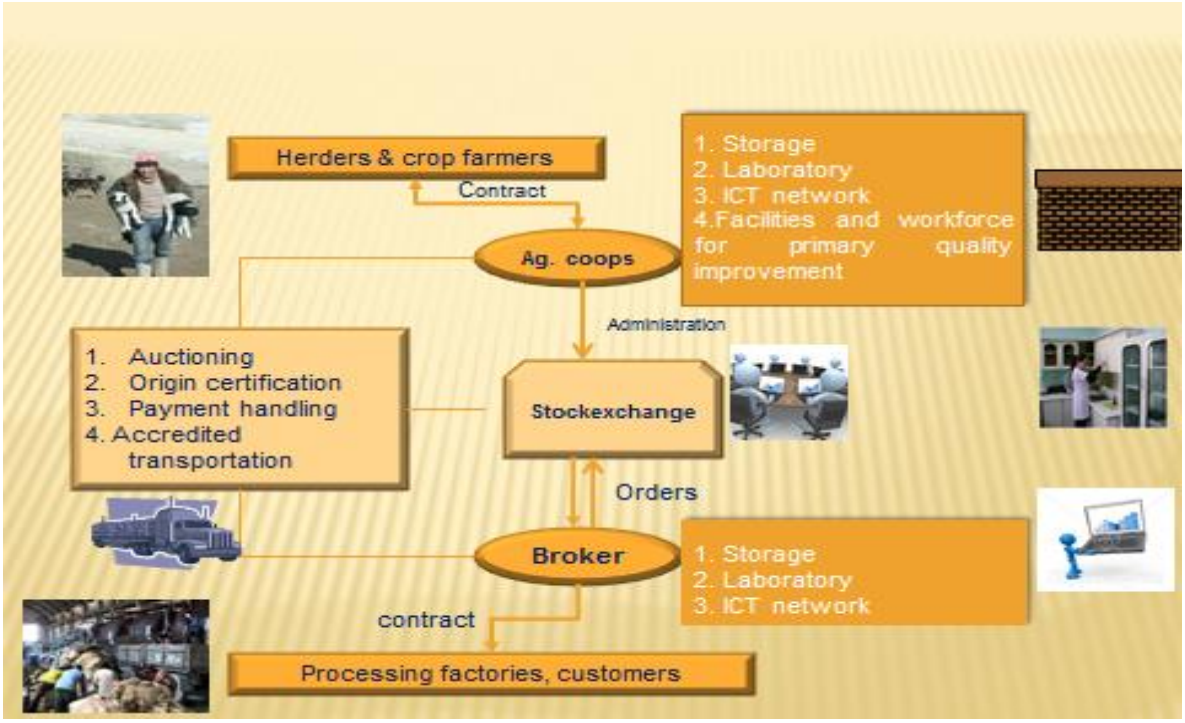
230. Developing direct sales from growers to consumers would allow potato and vegetable producers to capture more of the market price. Likewise, the sale of branded products to supermarkets would give farmers better marketing power. Additional storage facilities would provide growers with more options in the timing of their sales and the ability to sell at higher prices later in the season. However, while the government is supporting growers to organization coops, farmers want to work independently.

6.3 Commodity Exchange, Auction and Related Subsidies

231. Sheep and camel wool subsidies were initially introduced in 2011, as discussed in section 2.2. Herders selling their raw commodity (e.g. greasy wool) can sell through four channels and be issued an official invoice that is used to collect the wool subsidy: 1) direct sales to a domestic processor; 2) direct sales to a domestic dealer; 3) direct sales to a company; and, 4) sales through the commodity auction. If a foreign company buys the product, the primary producer will not receive an official invoice and will not be eligible for the subsidy. An official sales invoice can only be issued by a designated agent, broker or processor, or through their representative at the soum. The government assesses the subsidy amounts due between September 15 and October 15 and start dispersing funds through the individual Human Development Fund (HDF) accounts (registered herder accounts) from November 15.[46] In 2014, producers will get subsidies for wool and hides and skins only if they are cooperatives members. The organization of the commodity exchange system is illustrated in Figure 6.2.

[46] The HDF was established by law in 2009, replacing the Mongolian Development Fund. The purpose of the fund is to accumulate revenues from the mining sector for economic and human development.

Figure 6.2: Function of the Agricultural Stock Exchange



232. While the Agriculture Commodity Exchange and related designation of model cooperatives as brokers is intended to strengthen the market power of producers, secure raw product for processors and improve market efficiency, through its operation, it pre-empts direct contracting between processors and producers and the development of effective value chains based on the precise quality requirements of the end market. Particularly challenging is the payment of subsidies that are more than three times the market price of the commodity. Producers have no incentive to improve quality and processors then become locked into manufacturing low-quality end products because of the quality of their raw materials. If the Agricultural Exchange is going to support the future productivity and competitiveness of the agriculture sector, it needs to support quality-based pricing and allow the flexibility for direct contracting between processors and producers based on product specific raw material specifications.

6.4 Grading and Price-Quality Relationships

233. Marketing systems do not provide for adequate price differentiation based on enforced quality standards for meat (carcass characteristics), milk (fat, protein and hygiene), wheat (protein, moisture and screenings) and fibers (diameter). With no price differentiation, producers are making a rational financial decision to sell into the greatest possible volume of low quality product at the market price. Stakeholders reported a variety of issues on grading for different commodities including:

i) Grades and standards do not match international criteria and therefore do not improve the ease of marketing. Harmonization with international standards should be perused to facilitate international sales.

ii) Processors and producers are following different standards which lead to disputes. Stakeholders reported that the Flour Producers Association provides standards for quality of grain which may not match the Mongolian Standards regarding moisture, gluten, weight and

other specification. There are debates over the moisture and contamination levels that are sources of disputes between producers and flour mills.

6.5 Food Safety and Quality

234. Food safety systems need to be strengthened along the entire supply chain beginning with OFFS, through processing and distribution to the end consumer. Currently, the system is incomplete. Farmers have little knowledge of applying food safety concepts on farm (bio-security, herd health, safe product handling, etc.), food collection systems are incomplete (i.e. milk collection), very few processors have HACCP or other voluntary compliance systems, markets lack hygienic food handling and storage systems. Consumer awareness of food safety standards, processes and issues is also lacking.

235. A recent FAO mission to Mongolia on Food Safety laid out a number of issues which need to be resolved.[47] These include i) a fragmented system with more than 30 functions divided between 10 organizations; ii) absence of clear food safety policy, objectives or goals; iii) artificial separation between technical institutions and inspection body; iv) advisory and regulatory functions are not consistently separated; and, v) inefficient use of multiple laboratory facilities. The FAO has recommended a four level system that would address: 1) food safety regulations and guidelines, 2) risk management issues in the food chain; 3) inspection and enforcement; and, 4) training, studies and other support work.

236. Food safety capacity must be developed at the policy level, institutional level and the individual level. The development of food safety law, policy and regulation should be consistent with the Codex Alimentarius as it is the global framework for food safety regulation and standard on which international market access is based.[48] Laboratories will need to be strengthened and perhaps rationalized to eliminate duplication and inefficiencies. Training needs to be provided to inspectors, food industry workers and to farmers so that they understand food safety concepts, regulations and systems and how these affect their day-to-day work.

237. OFFS must begin with the awareness and skills of herders and farmers, supported by improved prices for safe products. Investment into better on-farm handling and storage is also required. Herd health programs are needed to control TB and Brucellosis and other livestock diseases. Better cow-care and milking systems are needed to control bacteria and contamination in milk. Producers also need to understand the safe handling and application of agricultural chemicals and livestock medications and understand and respect withdrawal periods prior to sale. Introducing herd health programs and Good Agricultural Practices (GAP) will help strengthen OFFS. Donor support could assist the MIA to introduce GAP and similar standards programs along with their supporting databases and information systems.

[47] Ezzeddine Boutrif, FAO Consultant – Food Safety Management, "Organization and Management of National Food Safety/Control System in Mongolia", FAO 2013

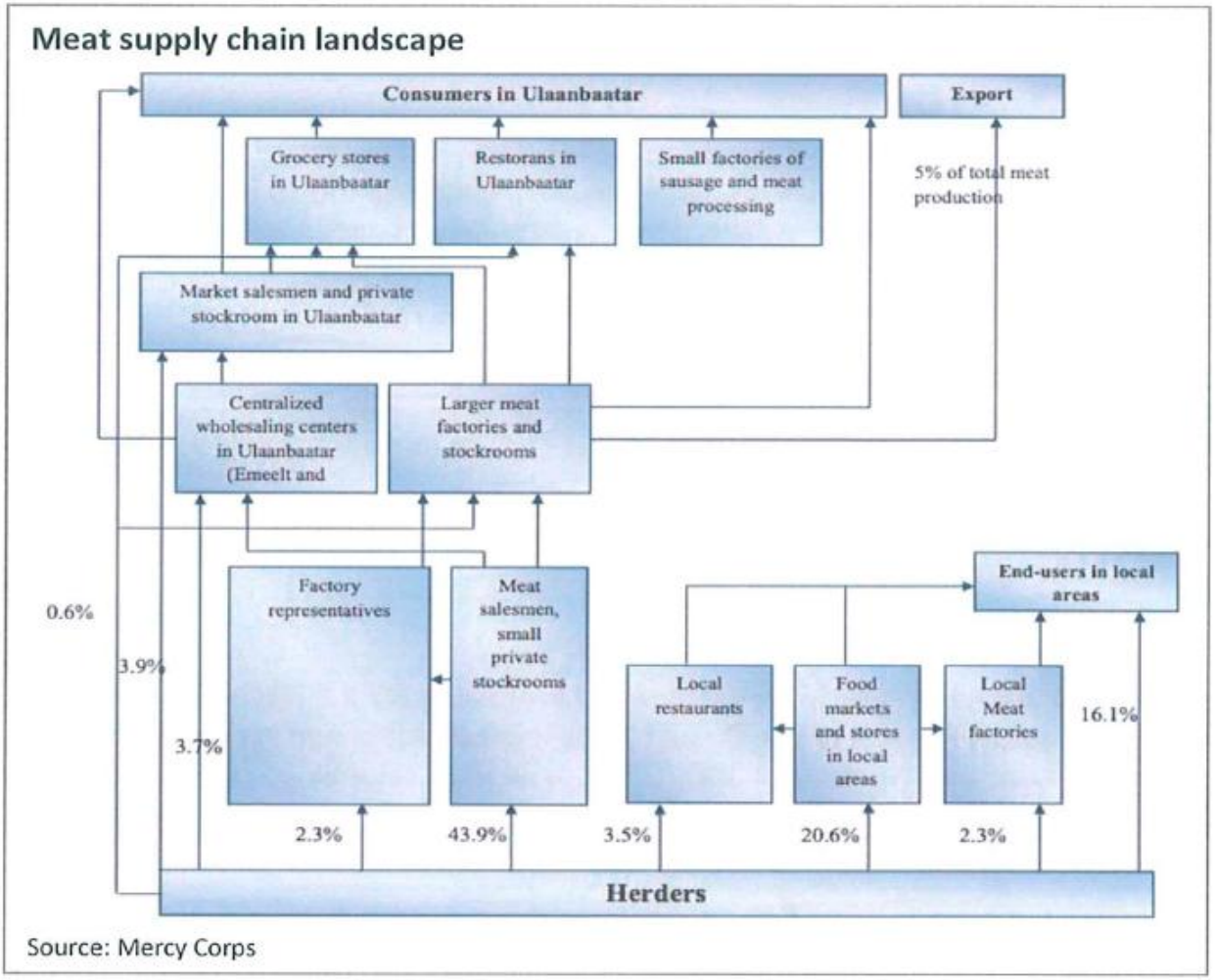
[48] The Codex Alimentarius Commission, established by FAO and WHO in 1963 develops harmonised international food standards, guidelines and codes of practice to protect the health of the consumers and ensure fair practices in the food trade. The Commission also promotes coordination of all food standards work undertaken by international governmental and non-governmental organization (http://www.codexalimentarius.org).

7 Processing and Value Added

7.1 Meat

238. Total annual meat production in Mongolia is 220,400 mt, consisting of 123,600 mt mutton and goat meat, 59,700 mt of beef, and 400 mt of pork. Total slaughter of 8.4 million extensive livestock in 2012 represents 20 percent of the national herd. The participants in the meat supply chain include producers (herders), sales and logistics (middle men or changers), processing (various packing plants), storage (primarily private), secondary processing, sales and marketing and the consumer (Oyu Tolgoi 2013). The supply chain illustrated in Figure 7.1 is consistent with marketing activities in western and eastern Mongolia where herders sell 44 percent of their product to small meat dealers (changers), 21 percent to local food markets and 16 percent directly to local end-users. Only 2 percent is sold directly to factory representatives while 4 percent is sold directly to central wholesalers and 4 percent to salesmen and private stockrooms in Ulaanbaatar. The changers sell to larger factories or wholesalers.

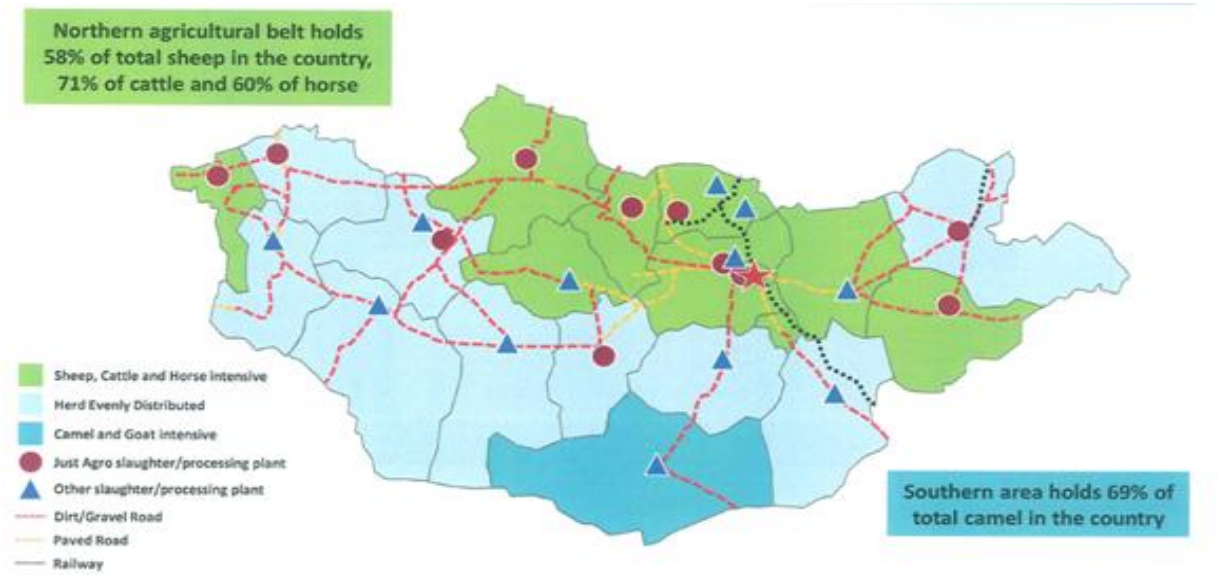
Figure 7.1: Meat Supply Chain



239. Only 25,000 mt (12 percent) of meat is currently produced in slaughter houses with veterinary inspection while 178,000 mt (88 percent) of slaughter is done informally. The main products are whole and half carcasses for the retail meat trade. Only a limited amount of value-added cuts are prepared for the export market. Processed meats, mainly sausage, are produced for the domestic market.

240. There are now 36 slaughter houses with a total capacity of 147,000 mt per year.[49] Figure 7.2 illustrates how the location of slaughter houses is linked to the location of livestock and most are in the northern zone of the country and close to the larger urban centers of Ulaanbaatar, Darkhan and Erdenet (Oyu Tolgoi 2013). The JUST Company, now bankrupt, owns 11 plants across the county with 26 percent of the processing capacity. The remaining large processors are Max Market and Max Impex. Numerous small meat processing factories have been established over the past decade. These tend to be smaller enterprise often in local markets around the country. The largest are Makh Impex, Khatan suikh and Khaankhuns. (Oyu Tolgoi 2013).

Figure 7.2: Slaughter House Locations



Source :(Oyu Tolgoi 2013)

241. Mongolia has storage capacity for 40,000 mt of meat of which 30 percent is with Just Agro, 40 percent with Makh Impex and smaller amounts in Darkhan (10 percent) and Erdenet (5 percent). The remainder is found in small quantities around the country. Sales and marketing to end-consumers is through local food markets (bazaar style with the largest being Kuchit Shonkhor, Narantuul, Makh Market), supermarkets and specialty meat stores.[50] Within Ulaanbaatar, 50 percent of meat is sold to end-consumers through retail bazaars and 30 percent through supermarkets and meat shops. 10 percent is consumed as sausage and through public catering and 10 percent goes into private storage.

242. The ADB completed a study on potential cluster development in Mongolia in 2012 and did a comparison of the costs and value-added by various market participants (Table 7.1). Traders had relatively few costs and high returns (MNT 875/kg or 18 percent of the sale price), earning an average

[49] Oyu Tolgoi, 2013
[50] ibid

salary of MNT 500,000/month. Meat retailers selling in the bazaar outlets were able to sell approximately 50 kg per day. They are motivated by rent and salary expenses, limited cold storage and a shortage of working capital to turn over product quickly. Their net profits were MNT 325 or 5.4 percent of their retail price. Processers have the highest cost structure and net 5.0 percent profit on their sale price. Shops selling meat from formal processors have the smallest profit margin on final sales price (3.6 percent). Exporters are able to buy larger volumes of livestock at lower prices and have lower costs than processors for the domestic markets. Their final profit is 16 percent of the final sale price, similar to traders. The greatest value added and salary contribution is made by domestic processors followed by exporters.[51]

Table 7.1: Meat Value Chain Analysis (Mutton) (MNT/kg)

Item	Trader	Retailer (Bazaar/ informal)	Processor	Retailers (Shops/ formal)	Exporters
Purchase	3,600	5,000	5,000	8,000	3,000
Sale	5,000	6,000	8,000	9,000	4,500
Gross markup	**1,400**	**1,000**	**3,000**	**1,000**	**1,500**
Gross markup %	*39%*	*20%*	*60%*	*13%*	*50%*
Intermediate Consumption	525	242	1200	200	250
Salary	0	433	1400	475	550
Total Costs	**525**	**675**	**2,600**	**675**	**800**
Profit	**875**	**325**	**400**	**325**	**700**
Total Value Added	**875**	**758**	**1,800**	**800**	**1,250**
Profit % of Sale Price	17.5%	5.4%	5.0%	3.6%	15.6%
Profit % of Value Added	100%	43%	22%	41%	56%
Profit % of Intermediate Consumption.	167%	134%	33%	163%	280%
Profit % of Total Costs	167%	48%	15%	48%	88%

Based on ADB Cluster Study

243. The low productivity of extensive livestock affects the productivity of the processing plant. Seasonality of production is the first issue. Most slaughterhouses operate on a seasonal basis, usually for four months in the late summer and fall, the traditional period of cattle slaughter. The length of slaughter and capacity utilization is further constrained by a lack of operating capital, especially for regional slaughterhouses. The significant price increases in the past two years have heightened this issue, especially for smaller plants. As a result, slaughterhouses are running at very low percentage of capacity.[52] In the extreme, plants are unable to fulfil their obligations to clients.[53] This instability in operations caused by the shortage of operating funds has a ripple effect throughout the value chain.

244. The second issue is low and inconsistent carcass yield and low meat quality. Feeding livestock through the winter to slaughter during the early spring shortages would stabilize supplies to the processors and moderate the season price peaks. A well-managed feeding program would also produce

[51] ADB cluster study, 2012
[52] *Estimates from other studies ranged between 12% and 30%*
[53] ADB cluster study, 2012

a younger and more standard animal to the slaughterhouse with higher and more consistent carcass yields. This would improve their efficiency and profitability.

245. Processor operations are constrained by the lack of a coherent marketing system for livestock. The plants with financial capacity can purchases through representatives in all aimags and truck animals into the plant. Little or no contracting between plants and livestock producers exists and no price differentials are offered for quality. Livestock are purchased on a per head basis, priced by certain size categories, giving producers no incentive for better quality. Livestock auctions would allow for more competitive and transparent pricing based on the quality of livestock.

246. Given that atomistic nature of livestock production, there are few individual producers or representative groups with which to contract. Fully functioning producer coops could fill this need. This same atomistic nature of the primary sector give undue market power to processers so that they have no impetus to provide contracts.

247. There is also a need to update meat processing equipment and methods. Butchering techniques are simple and outdated. Carcasses are halved or quartered with little other value added. The value of the carcass is not optimized by differentiating high and low valued cuts and prices. Similarly, by-products are underutilized. Hygiene standards are low and poorly enforced. Only one slaughterhouse (JUST, Ulaanbaatar) had achieved HACCP certification in 2012. Some others use ISO 14001 and ISO 22000 international standards.

There is also a need to update meat processing equipment and methods.

248. Some slaughter plants have developed parallel meat processing plants producing sausage and cooked meat products. If adequate meat cooling facilities are available, the processing plants can operate on nearly a year-round basis, providing stable cash flow to the plant and steady work for the employees. A large integrated meat slaughter and processing facility with a capacity of 350 large animals or 1,500 sheep per day with a processing plant with capacity of 20 mt of meat and 1 mt of sausage per day can employ 150 people nearly year round.

7.2 Hides and Skins

249. More than 58 companies are engaged in the leather processing industry. There are a small number of large processing plants in Mongolia with the largest being Mongol Chevre and Darkhan Nekhii. Procurement is cash based. Larger processors work through agents in the aimags. The recent ADB Agriculture Sector Development Program[54] provided funding for three leather plants, based on strict assessment of environmental risks and investments into environmental waste management

[54] ADB Agriculture Sector Development Program

systems. These plants have new technology for hide splitting and processing to the wet blue and wet white stages. Assistance in equipment selection was provided by European firms seeking them as suppliers.

250. IFAD reported that some plants are working on establishing their own supply chains, including a network of agents, price differentiation for quality, veterinary services and herder training in raw product handling. If hides and skins are brought under the commodity exchange and subsidies are extended to the raw materials, the efforts of the processors to develop value chains may be undermined.[55]

251. Darkhan Nekhii, one of the ADB supported plants, processes cow, sheep and goat skins. They process 300,000 cow hides annually. From 200,000 pieces they manufacture shoes, boots, coats and uniforms for the domestic market through their own stores (three in Ulaanbaatar and two in Darkhan) and distributors in 12 aimags. 10,000 to 12,000 leather coats are sold annually. An average long coat will sell for US$400 priced based on a 30 percent markup over the cost of production. Felt is also manufactured from the shearing of sheep skins. 100,000 hides and skins are exported at the wet blue and wet white stage to Italy and Spain. They have recently added the crust process and will be soon be exporting cowhides processed to this finished stage. Wet blue cow hides are valued at 30-32 Euros per hidelanded in Italy or Spain. The firm employs 300 people in five sections of the plant, including: i) processing small animal skins; ii) processing large animals hides; sewing factory; shoe factory; and, the felt factory. The plant operates on a “zero-waste” with product pieces they are unable to use sold to local small leather works companies.

252. Raw materials issues stem from the poor health status of Mongolian livestock. Hides are damaged by parasites resulting in a high percentage of wastage. IFAD reports that the producer share of hides and skins is only 50 percent of the factory gate price, which deters them from purchasing veterinary services or other inputs.[56] This contributes to the poor quality of the raw product. Handling of the raw product by herders also damages quality.

7.3 Fiber and Fiber Products

253. **Cashmere**. Mongolia, with an annual production of 6,000 to 7,000 mt, is the second largest cashmere producer after China (9,000 mt). One third of Mongolia’s cashmere is processed domestically while the other two thirds are shipped raw or with some primary washing and dehairing to China. In China it is blended with higher quality Chinese cashmere.

A herder is selling cashmere to a trader. Mongolia is the second largest cashmere producer after China.

[55] IFAD Project Design Document, Annex 2
[56] IFAD Project Design Document, Annex 2

254. Herders sell to Mongolian traders who, in turn, sell to Chinese traders. Alternatively, cashmere may be sold to Chinese-invested cashmere processors who then ship the semi-processed product to China. (ABD Cluster Study - Graph 4.2.6). In recent years, 60 to 80 percent of Mongolia's cashmere has been marketed to China through these channels, which generates the least possible benefit to Mongolia. The Chinese procurement is supported through soft, sometimes interest free, loans from the Chinese government. Only a minority of cashmere remains in Mongolia for processing and sale as finished product.

255. The ADB cluster study evaluated the cashmere value chain. The processing steps include (i) washing and dehairing; (ii) spinning and dyeing, and (iii) knitting. The study estimated that the total value added through the three stages of processing is MNT 121,000/kg, of which 46 percent is generated during the knitting stage (Table 7.2). With cashmere flowing over the border to Chinese, this value is lost to Mongolia along with the potential contribution to local employment.

Table 7.2: Cashmere Value Chain, Mongolia (MNT/kg)

CASHMERE VALUE CHAIN 2012	Trader	Cashmere Processors				Retailer
		Washing	Spinning	Knitting	Total	
Purchase	48,000	110,000	162,000	220,000	137,000	300,000
Sale	50,000	135,000	220,000	300,000	300,000	360,000
Gross markup	**2,000**	**25,000**	**58,000**	**80,000**	**163,000**	**60,000**
Gross markup %	*4%*	*23%*	*36%*	*36%*	*119%*	*20%*
Intermediate Consumption	500	9,000	9,000	24,000	42,000	15,000
Salary		10,000	38,000	31,000	79,000	30,000
Total Costs	**500**	**19,000**	**47,000**	**55,000**	**121,000**	**45,000**
Profit	**1,500**	**6,000**	**11,000**	**25,000**	**42,000**	**15,000**
Total Value Added	**1,500**	**16,000**	**49,000**	**56,000**	**121,000**	**45,000**
Profit % of Sale Price	3.0%	4.4%	5.0%	8.3%	14.0%	4.2%
Profit % of Value Added	100%	38%	22%	45%	35%	33%
Profit % of Intermediate Consumption	300%	67%	122%	104%	100%	100%
Profit % of Total Costs	300%	32%	23%	45%	35%	33%
Product loss		55%	17%			
KG in to 1 KG out based on 3 sweaters per kg of yarn.		2.2	1.2			

Source – modified from ADB Cluster Study

256. During the 2010 and 2011 season, the GoM provided soft loans to Mongolian processors (wool and cashmere) to support local procurement. The government planned to issue MNT 150 billion in government bonds of which 100 billion was intended for processors, 25 billion for woolen goods, and 25 billion on payment to herders. Terms were 7-8 percent interest for up to one year. This did increase the proportion of fiber staying in Mongolia, but the government was unable to continue supporting the program for financial reasons. The GoM intends to invest MNT 95 million from Chingis Bond into new

cashmere technology. Proposals were received from approximately 55 entities but approvals have yet to be made.

257. The ADB Agriculture Sector Development Program has worked with local cashmere processors to develop the Mongolia Noble Fabric Brand. The concept is to develop a recognized and patented brand which can be marketed internationally. The Brand is now developed but, to be patented, the World Intellectual Property Organization (WIPO) requires that an agency be established in Mongolia as the manager of the brand. The responsibility to create this agency falls under the GoM. The GoM intention is to establish a PPP between the GoM and the Mongolian Wool and Cashmere Producers Association.

258. **Wool (sheep and camel)**. Annual wool production is 20,000 mt, primarily sheep wool but also including camel wool. Yak wool is beginning to be used commercially by some processors and is marketed as a specialty Mongolian product. Since the implementation of the wool subsidy for sheep and camel wool, 18,000 mt are being utilized by domestic processors while 6,000 mt are exported to China as washed wool. Carpet factories use 25 percent, felt makers 30 percent and 35 percent is used for other woven products. 250 small-scale wool processors exist across Mongolia, of which 150 are herder cooperatives. One privately-owned medium-sized plant at Zoodmot in Tov aiming, employs 200 staff and plans to expand to 600 staff as they expand from washing and spinning to fabric making.

259. Government policy is to support the decentralization of the wool processing industry at the level of wool washing and dehairing. To support the government plan for domestic wool processing, the Mongol School Uniform Program was launched in 2013. The intent is to replace the 90 percent of school uniforms now imported, predominantly from China, with domestically produced items. The program involved 50 wool processing SMEs and 70 sewing enterprises. At the current time, there are inadequate spinning and textile manufacturers in Mongolia so wool is being exported (to Korea) and reimported as fabric for uniform production. In 2013, 70 percent of primary school uniforms were made in Mongolia. The target in future years is to produce 100 percent of primary and secondary school uniforms with 80 percent Mongolian material content and then move into the production of other public service uniforms. Ultimately, the Government hopes that Mongolia will be able to export manufactured apparel in the way that the domestic carpet industry has been able to establish an export market. It was not indicated whether or not any economic feasibility or cost-benefit analysis was done on the School Uniform program and whether or not Mongolia can achieve comparative advantage against China's garment industry.

260. The government programs in the wool sector have sharply altered the flow of product through the supply and value chains. Previously, the supply chain was similar to that of cashmere, with most products leaving in raw or semi-processed form to China. There was no use of formal wool supply contracts signed with wool suppliers at the soum level. Linkages between enterprises within the supply chain were weak. Ensuring a reliable supply of raw product was a constraint to processing. Under the new marketing and subsidy scheme for wool, domestic processors have relatively easy access to a supply of raw materials. In Gobi-Sumber, bulk sales directly to the aimag wool processor represent 80 percent of sales. Traditional processing at home would represent 15 percent of production and receive no subsidy. Sales to uncertified processors that cannot issue a certified invoice for the subsidy payment would not receive more than 5 percent of the total production available. No wool is leaves the aimag at this time.

261. Processors can also purchase raw product through the commodity exchange. Many prefer to maintain their collection system with contracted suppliers and have registered representatives who can issue the official invoices qualifying herders for the government wool subsidy.

262. **Product Quality and Value Chain Benefits.** Raw product quality is an increasing issue for processors. The average micron of cashmere diameter has increased to more than 15.8 microns. Altai Cashmere had established a goat breeding program in Bayankhongor and began developing a value chain and selection program for fine cashmere, with technical assistance provided by the ADB Agriculture Sector Development Program. With subsequent changes in company management, the project was abandoned.

263. Similar issues face the wool industry. Mongolia produces coarse wool suitable for carpets. 94 percent of Mongolian wool is coarse, 4 percent is semi-course and only 1 percent is fine or semi-fine and suitable for garment production.[57] The low percentage of textile quality wool limits the potential of domestic weaving and garment factories. To increase the percentage of fine wool available, herders will need to invest in improved genetics which, in turn, requires public sector support for the establishment of breeding programs and facilities. Some processors are interested in importing Australian sheep (Merino) for their fine wool qualities. Others are hesitant to import unadapted foreign animals and are interested in selecting better genetics from within the Mongolian breeds.

264. Processors cited the need for herders to have better skills in product handling (combing, sorting, cleaning) and marketing at the farm gate level. Processors have noted that raw material issues can also include wool contaminated by mud, manure and urine from those areas where sheep are fenced. These are all issues which can be resolved through better management and product handling at the farm level.

265. The “Value Chain Development of Textile Products” project conducted by the World Bank and VSO identified grading and certification to be a catalyst for increasing benefits at each stage of the value chain. Grading information is not easily available to herders and leaves them disadvantaged in price negotiations. While grades and related price differentials could consolidate the development of the value chain, training and information to herders is needed to increase awareness of the benefits of improved quality and how to achieve quality enhancements. The project found that providing training and equipment for home production of woolen and cashmere goods improved herder’s market position.

266. The current wool pricing system combined with the subsidy of MNT 2,000/kg provides producers the economic incentive to produce maximum quantity with no regard for quality. Given the nature of the raw product, research is ongoing regarding potential use as an insulation material for housing (“Eco-Wool”). This work is being done with Japanese researchers and some prototypes have been developed.

267. **Processing.** Total capacity for fibre processing is 20,000 mt of washed wool and cashmere, 4,500 tons of dehaired cashere, 900 tons of yarn and 1,200,000 pieces of garments per year[58]. There are more than 50 large-scale companies, 48 of which are in Ulaanbaatar. These include 12 comprehensive companies dealing in washing, spinning and garment making. Another 22 focus on basic washing and dehairing. There are more than 20 textile companies that buy yarn to make textiles and garments which

[57] IFAD Project Design Document, Annex 2
[58] ADB Cluster Study, 2012

are destined for both the domestic and export markets. The largest cashmere processors are Gobi Corporation with a capacity of 1,200 mt of cashmere and 700,000 knitted garments, Buyan LLC with a capacity of 1,000 tons of cashmere and 500,000 garments, Eermel JSC (1,000 mt of cashmere and 300,000 garments) and Goyo LLC (500 mt and 250,000). The largest wool processors include Erdenet Carpet, Ulaanbaatar Carpets JSC (2,000 mt of wool washing and 100 mt of wool spinning) and Mongol Nekhmel JSC (1,000 mt washing, 30 mt spinning).[59]

268. Because of financing constraints, only 30 percent of the capacity is utilized.[60] While the very largest processors have their own sources of financing, smaller processors are unable to get adequate operating funds through regular commercial lending. Companies also struggle with out of date equipment which is prone to breakdown. The ADB cluster study reported that the number of large comprehensive companies calls for very large investments into any one plant to update processing equipment and improve efficiencies and recommended that a cluster of separate entities for washing and dehairing, spinning and knitting would make investment in technology and equipment more manageable.

269. Management expertise is an issue within processors. There is frequent turnover in management and the lack of stable, long-range planning. In the face of high interest rates and unstable government policy, many companies are focused on short-term profits and trading rather than having a longer-term focus and commitment to enter and be competitive in international markets. The organization of companies and logistics can also constrain operations. In regional centers where the factory is located at the soum level, lack of employees can be an issue.

270. There has been a history of little collaboration between processors and this hampers their ability to access international markets. Recently, the ADB Agriculture Sector Development Program has worked with the industry on the development of the Mongolian Noble Fiber Standard with the World Intellectual Property Organization (WIPO). The purpose of the brand is to improve the quality standard of raw materials and develop international niche markets in partnership with well-established international brands. This program is successfully attracting attention from international companies, but more work is required by the GoM to establish a legal entity to be a brand management agency to work with all stakeholders. Mongolian companies are also adopting ISO 14001 and ISO 22000 international standards.

7.4 Milk and Milk Products

271. Prior to transition, Mongolia had a milk industry with a capacity of 200 mt of milk per day processing approximately 20 percent of the country's milk production. There were 36 mechanized dairy farms ranging in farm size from 200 to 1,200 cows and a total of more than 20,000 dairy cows. These farms and the collection system collapsed in the early 1990s and the country returned to a more traditional form of milk production and distribution. Beginning in 1999, the Government supported the dairy industry with the White Revolution dairy development program. Concurrently, the FAO supported the MILK project from 2005-2009. These programs assisted milk processors (80) to to produce pasteurized milk, yogurt, cream, cheese and ice cream. The MILK project also helped establish the Milk Training Centre in Ulaanbaatar.

[59] ibid
[60] ibid

272. Table 7.3 provides the key indicators of milk production from 2006 to 2012. The proportion of processed (i.e. pasteurized milk) was only 1.4 percent in 2006. Since then it has increased to 9.3 percent. Milk processors are still reliant on imported milk powder to guarantee their production. Liquid UHT milk is also imported. As urban populations and demand for processed milk increases, these imports continue to rise. The import of milk powder more than quadrupled since 2006, reaching 3,511 mt in 2011. In 2012, Mongolia imported 758,000 liters of liquid milk (UHT) and 4,700 mt of milk powder (88 percent New Zealand, 10 percent China).[61]

Table 7.3: Key Indicators of Milk Production (2006-2011)

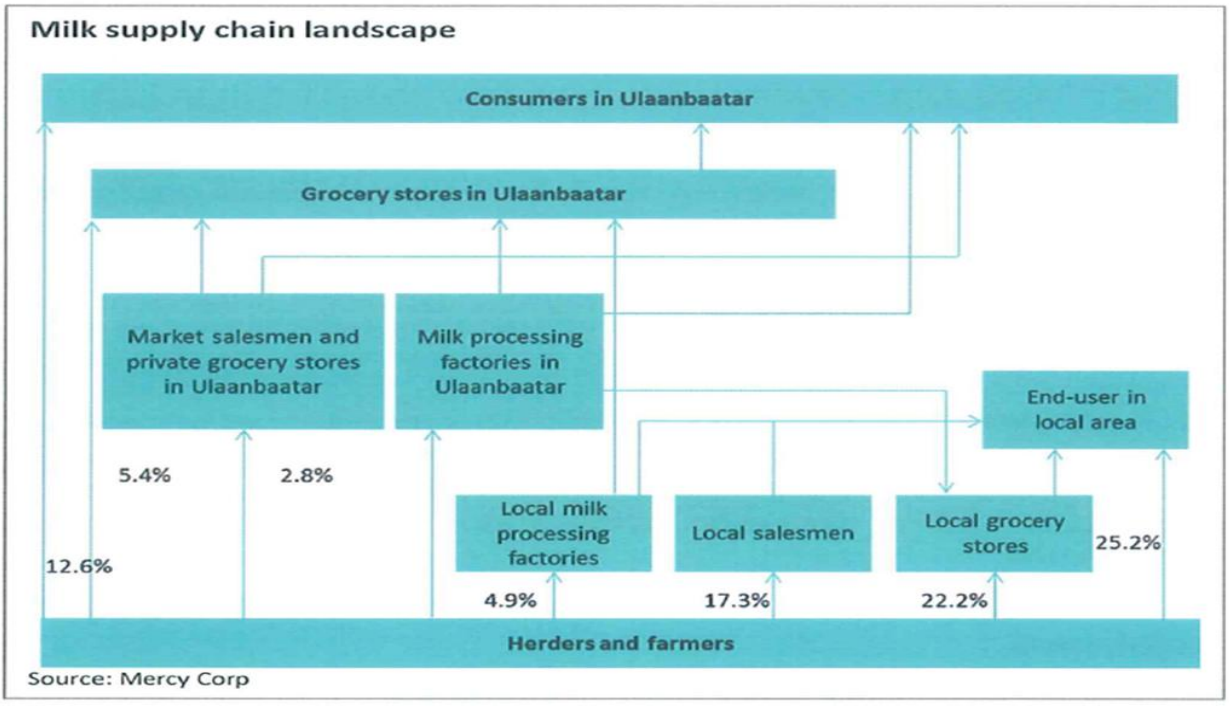
	Units	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Total livestock population	'000	34,802.9	40,263.8	43,288.5	44,023.9	32,729.5	36,335.8	40,920.9
Total milk production	Mill L	450.1	465.6	457.4	493.7	338.4	458.6	
Processed milk	Mill L	6.2	10.4	17.3	24.8	33.8	42.7	
Percentage of milk processed		1.4	2.2	3.8	5.0	10.0	9.3	
Imports:								
Milk import	Mill L	16.8	30.7	20.4	17.6	28.9	36.9	
Milk powder	Mt	803	802	6,065	1,792	2,748	3,511	4,700
Butter	mt	104.6	114.5	77.1	88	107	101.4	

Source – unpublished dairy report

273. Mongolia now has 105 milk plants and workshops across the country processing milk and making dairy products. Total processing capacity is more than 232 mt per day or 64.6 million mt annually.[62] There are 11 plants with a capacity greater than 10 mt/day, four plants capacity of processing 5.0 to 10 mt/day and 10 small plants with capacity of 1.0 to 5.0. At the micro-level of 50 to 1,000 liters per day, there are 80 plants, the majority (54) which make ice cream. The small processors doing 100-300 litres per day in soum and aimag centers draw from 30-50 dairy farms for supplies. There are also more than 80 herder and farmer groups processing milk using traditional methods[63]. Three companies (Suu JSC, MonFresh LLC and APU JSC) hold 70 to 80 percent of the milk market (Oyu Tolgoi 2013). SUU JSC currently uses 55 mt of milk in the summer and 15-20 mt during the winter for an annual total of 70-80 mt. Other milk processing units include APU, Bitavit, Teso LLCs who import milk powder, reconstitute it and distribute in Tetra Packs. Total processing capacity is underutilized by 120 million litres per year. Figure 7.3 illustrates the supply chain for milk.

[61] Oyu Tolgoi, pages 5 and 6.
[62] Tsetsgee, unpublished dairy report
[63] ibid

Figure 7.3: Milk Supply Chain



274. Dairy companies purchase 30 percent (66 million litres) of Mongolian fresh milk. The milk collection system is underdeveloped with only 30 milk collection spots in the central provinces of Tuv, Selenge, Darkhan, Khentii and Ulaanbaatar. SUU JSC has a number of cooling units and collects from 23 points in the summer and less than 10 in the winter. Only SUU has milk transporters. MonFresh currently reconstitutes milk but has an ambition to have a fresh supply chain, has selected collection centres with lab and cooling and are beginning to produce some fresh milk.

275. OFFS programs are limited and hygiene issues exist along the entire supply chain. The level of bacteria and contaminants in the milk is high enough that processors cannot use fresh Mongolian milk for UHT products. Nearly half (44 percent) of the milk production in UB is done informally without quality control mechanisms.[64] The Government has established 74 standards for the industry including 21 product standards. These address standards for raw milk (five species), fermented milk (yogurt, airag, etc), high protein milk products (cheese, curds) and fatty milk products (cream, butter, preserved milk etc).[65] The challenge is a general lack of knowledge of how to apply the standards of the Food Law on farm and within a working milk plant. Practical training and improvements to physical plant are required to overcome the hygiene issues.

276. Due to the lack of a complete, cooled milk collection system and the level of contamination and bacterial loads in fresh milk, processors still use reconstituted milk powder in their plants. Logistics and road conditions limit the collection and transport zone for fresh milk to 10 km around any collection point, further decreasing the ability to use local milk for processing.[66] The Government of China is providing a soft loan (2 percent for 20 yrs) that includes cooling centers (50 at 5 mt) and trucks. Contracting is now being done and Installation should begin in late 2014. Current powder capacity

[64] Oyu Tolgoi p 13
[65] Tsetsgee, unpublished dairy report
[66] Oyu Tolgoi p6

includes Suu (Danish technology with larger capacity) and a smaller plant in Selenge (Chinese equipment). A facility has also been built in Darkhan for which a proposal for equipment finance has been submitted to the MIA.

277. Because herders cannot get their milk product to market in fresh form, it is converted to yogurt, dry curd, traditional cheeses, airag and other traditional products. While demand for these traditional products is strong, they are produced in a traditional manner without a hygienic system. There is a general gap in knowledge of how to implement the Food Law and its hygiene requirements as they apply to milk.

Because herders cannot get their milk product to market in fresh form, it is converted to yogurt, dry curd, traditional cheeses, airag and other traditional products.

278. Dairy has been identified as a strategic commodity and is supported through the NFSP. Various stimuli have been provided including, but not limited to: i) Value Added Tax (VAT) exemption for SME tools and equipment (to 31 December 2012); ii) VAT exemption for milk and milk products manufactured from domestically purchased milk; and, iii) 50 percent income tax exemption for the income generated from milk production. Financial support to dairy investments has included financial support to herder groups and processors for investments and soft loans through SME development funds. Under the commodity exchange, the GoM is considering economic price stimuli to herders who market milk to domestic processors. Larger investments have been made since 2011 including soft loans for MNT 4.6 billion to 16 citizens and enterprises for intensive dairy farming and MNT 6.5 billion to 17 milk processers.

7.5 Milling and Crushing

279. **Milling**. Government soft loans have been provided to roughly 40 flour mills in Darkhan-Uul, Hovsgol, Bulgan and Selenge to upgrade facilities and purchase raw materials. In order to stabilize rising food prices, the mills using these loans are required to supply first grade flour at a wholesale price not more than MNT 550/kg and a retail price not more than MNT 650/kg.

280. The mills are now in a better position to pay for raw product in a timely fashion. However, some cite that there are times that market demand cannot be met because they cannot finance the raw product. Operating capital is needed to purchase wheat and and long-term investment capital is needed in order to build storage capacity. A large Chinese loan to Mongolia will be used for the purchase of tractors and grain storage including storage of 19,000 mt in four or five locations. These facilities will be owned by private mills and by the SFCF for seed and commodity storage.

281. Competition is primarily from domestic mills. Foreign product competes only in the premium grade which usually comes from Russia and Kazakstan. Mongolian mills are interested in finding

improved wheat varieties for high quality flour production. A future risk to the mills in a decline in raw product quality because of declining soil fertility and its impact on the protein levels and over quality of locally grown wheat. Some future exports could exist, but the instability of surpluses may prevent any stable export markets being developed.

282. Grinding 150 mt of flour per day, a modern plant can employ 110 full-time staff on a year-round basis. Further processing is done by over 800 domestic bakeries. The issues facing flour mills have changed in recent years. Wheat production practices have improved and the quality of wheat coming to the mill is of better quality. Additionally, the standards set for dockage have motivated farmers to clean on farm to avoid price discounts at the mill. For some mills, the lack of drying facilities limits what product they are able to purchase and store.

283. **Crushing**. Canola/rapeseed has been exported to China but primary production has reached the level to attach investment into processing. The Mongolian Golden Oil company has a plant operating in Darkhan. The plant takes raw oil, filters it and bottles it for domestic sale. They have a capacity of 60,000 mt. They are planning to open their own crushing plant and have applied for government financing. Delger International is setting up a crushing factory in Bayangol at the former fodder plant. They are looking for farmers growing good varieties of canola. This plant may be a part of the MIA-Germany joint project in agriculture. Related to this, 20 mt of Raffull Rapeseed have been distributed to farmers on contract for production.

284. The opening of these crushing facilities will provide a value-added oil product for human consumption. Mongolian demand for vegetable oil is estimate at 25,000 l. It will also provide a substantial amount of high quality canola meal for use in the intensive livestock industry. Using an estimated canola production amount of 30,000 mt at yield rates of 60 percent canola meal, a total of 18,000 mt of high protein meal could be produced.

7.6 Livestock Feeds

285. Mongolia imports 70 to 90 mt/day of corn and some concentrated feeds and vitamins for use on intensive farms. Livestock feeds can utilize grains and oilseeds, fodder crops and crop by-product. Higher levels of wheat and other crop production have increased the availability of by-products for the livestock feed industry. Bran is produced at a rate of approximately 23 percent of the weight of wheat going into a mill. In 2005, the total potential bran production in Mongolia from the milling of domestic wheat would have been approximately 17,400 mt while in 2012 it could have reached 107,000 mt. With the growth of the wheat sector, Mongolia exported exported 22,000 mt of bran to China in 2012.

286. The continued diversification of crop production and the emergence of crop rotations will further increase the raw material for livestock feeds. The new canola crushing facilities above can provide 18,000 mt of high protein (36 percent) meal for use in livestock feeds at Mongolia's current levels of canola production.

287. This supply of raw product has been factor in the emergence of new feed mills and fodder manufacturers across the country. There are now 38 feed mills across Mongolia with an average capacity of 9.9 mt/day. Most are located in the central region close to the majority of raw feed resources. However, there are also mills in the eastern region, the khangai and the west. Altan Taria

owns the main commercial feed mill in Ulaanbaatar, where they produce chicken feed, swine feeds and beef/dairy supplements. A summary of the feed mills in each region is provided in Table 7.4.

Table 7.4: Feed Mills in Mongolia, 2009

Region	Total	Average Capacity (mt/day)
Central	22	8.30
Khangai	4	5.00
East	5	18.00
West	2	15.00
Ulaanbaatar	5	9.00

Source: MOFALI statistics

288. Altantaria produces compound feed and have renewed equipment and producing for poultry and dairy cattle. Large farms have their own mills and there are smaller mills in the countryside. Therefore, the actual total capacity is larger than is reported in official statistics.

7.7 Potato, Vegetable and Small Fruit Processing

289. There are a number of medium sized vegetable processors already producing pickles and canned salads. At this time, there are no processing facilities for potatoes, even though Mongolia is now producing a surplus. Feasibility studies should be conducted on potato processing including producing starch, frozen French fries and other potato products.

290. Home processing of vegetables (pickles, jams, and jellies) is popular for home consumption and local sale. This work is carried out primarily by women. Donor programs have supported the growth of these small scale enterprises. Access to packing material (jars and lids) is difficult. Very few brand names exist and quality control does not exist. Marketing of fresh vegetables has been neglected by most development agents, but a danger of seasonal market gluts exists.[67]

291. There are approximately 15 small and medium enterprises processing small fruits and berries into juices, jams and liquor[68]. Local urban demand is strong and exports have also been established. Consumers find them attractive because they are perceived as being ecological. Originally, supplies were purchased from wild stocks picked by hand by individual sellers. To stabilize supply, processors are now planting their own orchards (0.5 – 3 ha). Some processors want to establish their own farms to secure their supply. Some are exploring contract production with groups of farmers.[69]

292. There are sea buckthorn processors in Ulaanbaatar and western Mongolia producing high concentrate juice and other products. Of these, 10 processors have capacity between 10 and 100 mt annually. Shar Doctor has an annual capacity of 1500 mt and must import to supplement local supply. Vitifit imports concentrate from Russia to make juice, wine, and vitamins (Monos Company) cosmetics. All processors have difficulty financing raw material purchases. The industry also needs transportation, storage and additional processing capacities for extracts and specialty products. The cold chain is very important for handling the crop. Storage is also emerging as a need. Additionally, farmers and

[67] IFAD
[68] ibid
[69] ibid

processors are not well linked. To relieve this constraint, the MIA is working with Shar Doctor to improve market linkages.

293. The sea buckthorn market must become export oriented as the domestic market is not sufficient to absorb the production capacity. Domestic demand is for children, public entities (schools, military, and prisons) and mining companies. Some product is exported to Japan as 100 percent concentrate. The Sea Buckthorn Association is planning to promote the ecological aspects of sea buckthorn for competitive advantage. The farm gate price is MNT 2,800/kg or 3,000 to 3,500 to processors while small markets sell at 6,000. During swine flu, the price rose to 10,000 because of its perceived medicinal benefits. Extracts earn much more. Oil from the seeds is used in cosmetics and sells at MNT 25,000/100 ml.

294. A risk facing the Mongolian sea buckthorn industry is the growth of production in China, where sea buckthorn is being planted as an economic windbreak as part of land conservation efforts. China has planted 1.5 million hectares in the Gobi region along the Yellow River basin and will distribute an additional RMB 5 billion in grants for planting against desertification.[70] This could have a negative impact on prices in the future. One processor in western Mongolia stopped buying local sea buckthorn and started importing from China. To protect their young industry, sea buckthorn producers are looking for import protection. Given that 70 percent of Mongolia's land is degraded to some degree, they are also seeking opportunities to link domestic sea buckthorn production into anti-desertification program, as China has done. In this aspect, they are promoting the use of sea buckthorn along the Tuul river basin to the Ministry of Environment and Green Development.

7.8 Common Issues

295. The key issues facing the processing sector are: i) financing; ii) outdated plant and equipment; iii) management capacity and stability; iv) raw material quality and seasonality of supply; and, competition from Chinese buyers, who are said to operate using soft or even free financing from the Government of China. While new agricultural processors have emerged in all regions, most (80 percent) are small scale. Their capacity is chronically under underutilized because of raw material constraints and limited access to financing. Supply chains are under-developed with too many inefficient stages all contributing to high retail prices. Middlemen, though serving an important market function, take high margins in most commodity markets while producers remain price takers. Most producers sell directly to changers at discounted prices. There is little or no contracting between processors and producers and no price-quality relationships in price establishment. Industry stakeholders reported a lack of competition, oligarchy and possible collusion in procurement and pricing. Stakeholders interviewed during this study identified these key issues and others facing the processing sector (Table 7.5).

Table 7.5: Stakeholder Issues Identification – Processing

Processing Constraints
• Quality of equipment in use. • Adequate volumes to secure stable export markets. • Excess capacity because of seasonality of supply (meat and dairy). • Storage for raw materials and finished products.

[70] Interview with Nasaanjargal

Processing Constraints
• Low and inconsistent quality and yield of raw product (fiber micron measures, parasite damage to hides/skins, sanitation of milk, carcass size and yield of meat, quality of wheat). • Finance for purchase of raw materials and upgrading plant and equipment. Neighboring countries are providing soft loans and discounts. • Dairy – Incomplete collection system. Knowledge of how to implement the food law. • Most processing is very small scale (80%)

296. New investments in plant and equipment are being made and leaders in each segment are emerging but there remains a distinct lack of high quality value added processing and new product development that can give Mongolian processers a competitive edge. The ADB cluster study identified several potential new products including canned meats, canned offal, industrially processed pet foods, packaged raw meat cuts, meat jerkies, cashmere garments, cashmere textiles, sea buckthorn based foods, beauty products and medicines. The ADB study also found that greater levels of collaboration facilitated through sector clusters would have multiple benefits and significant impacts on the GDP. Potential increases in the GDP of the Western region (currently MNT 455.9 billion) were forecast at 17 percent, while the Eastern (currently MNT 344.2 billion), Central region (currently MNT 1,191.6 billion) and Khangai regions (currently MNT 1,846.6 billion) would increase by 11 percent, 9 percent and 8 percent, respectively.

297. A major risk facing the sector in the future is a further decline in competitiveness in the face of mining-driven currency appreciation, or “Dutch Disease”. Improving productivity and competitiveness requires new products and methods supported by investment in plant and. All processers need to be able to source stable, less seasonal, supplies of consistent quality raw products. Meat processors need higher and more consistent carcass sizes and meat yields. Hides and skin processors would have higher productivity if there was less damage from parasites. Dairy processors need stable supplies of sanitary milk. Management needs to be improved and the sector needs to embrace a quality-based approach by adopting internationally recognized product quality, food safety standards and animal health protocols.

298. These issues combine to make the sector run under capacity, producing high cost and uncompetitive low quality products. Extending business development support and providing investment and operating financing would assist these small business to improve their processes and equipment and become more competitive. Other approaches that would assist smaller units with marketing and purchasing functions would be the development of clusters.

Mongolia should be competitive in meat production because of its natural endowment of pasture resources and livestock population.

8 Competitiveness and Potentials

8.1 Competitiveness, Key Issues and Actions

a. Livestock Production and Meat Processing

299. Mongolia should be competitive in meat production because of its natural endowment of pasture resources and livestock population. Competitiveness is impaired, however, by inefficiencies throughout the value chain including consistent product quality issues including hygiene and animal health issues, low levels of productivity and quality in the raw product. Issues begin at animal production:

- Land and pasture – is plentiful and relatively inexpensive, but increasingly degraded and decreasing in productivity year to year.
- Forage supply – regularly inadequate to maintain optimum production and consistent quality raw product to processors and frequently inadequate to secure winter survival.
- Feed grains – inadequate supply to provide secure source of supplementary feed stuffs for either maintenance or fattening programs.
- Water supply – in some areas is inadequate due to inadequate wells and in other areas competing uses from mining jeopardize the quantity and/or quality of water available. The long-term availability of water related to climate change impacts is uncertain.
- Genetics – local breeds are hardy but breeding programs and nucleus herds are not adequately maintained. Opportunities to improve productivity through crossbreeding have not been capitalized upon.
- Herd health – is generally inadequate at the household level in terms of controlling both productive diseases, hygiene issues related to food safety and the control of infectious diseases. Veterinary programs lack the human, physical and monetary resources to adequately address the control of infection disease or to support comprehensive herd health programs.
- Management – While Mongolia has thousands of years' experience in livestock production, many current herders do not have adequate knowledge, experience, resources or access to information to practice good management in the areas of production, marketing and farm financial management.
- Supportive applied research and extension for technology transfer – the research an extension system is out of date and has inadequate resources to either carry out applied research on the

broad range of topics where productivity improvements are needed or to effectively distribute that knowledge to primary industry.

- Market development – physical markets, transportation, logistics and information all need development. Requirements include adequate cold chains, standards, quality-based pricing and inspections.
- The credit market is limited, especially for small enterprises, and labor costs are rising.
- Production and market risks are high and there are limited mechanisms for risk management.

300. The ADB estimated that Mongolia should be able to further process 80,000 to 90,000 mt of carcass weight meat into 50,000 to 60,000 mt of meat cuts for value-added export. It was estimated that the replacement of whole carcass exports with processed meat will increase value-added 3-5 times. Several constraints to achieving this were indicted in the ADB cluster study:

- Raw product issues including disease, low carcass yields carcass/meat quality and the seasonality of raw product supply.
- Seasonality in slaughter leads to underutilization of capacity and the inability to invest in new technology. The seasonality of the business also keeps employment on a season basis and limits the sectors' contribution to the job market.
- There are too many links in the value chain which adds cost at each stage and creates high retail prices for consumers. The costs at each level are exacerbated by inefficiencies and economic rent taking. In this system both the consumer and the primary producer are poorly served.
- Market infrastructure is inadequate from livestock sales facilities to transport, storage, distribution and retail outlets.
- There is no clear price-quality linkage in the system and no contracting available to provide transparency and stability in pricing at each stage. The standards used are out of date and do not reflect a differentiated carcass. The Meat Association has proposed new grades.
- Insufficient amount of value-added processing for both the domestic and export market limiting the total contribution of the sector to GDP and employment. There is a need for innovation and new product development.
- Outdated and inadequate processing equipment and techniques. Butchering techniques are limited to carcass and some semi-primal cuts (halves and quarters). The value of the carcass is not optimized for either domestic or export markets. Byproducts are underutilized.
- Need for vocational training on slaughtering, meat handling, hygiene, food safety standards and processes.
- Food safety is compromised at all stages along the value chain from the farm to the processing plant and the retail outlet. The Standards Management Authority is responsible for all standards in Mongolia. New meat hygiene standards have been proposed and may be approved in the first quarter of 2014.
- Insufficient financing (investment and operating) contributes to the seasonality of production, the underutilization of capacity and limits the potential sources of raw product directly adding

to the costs of production.

- There is a lack of cross linkages and collaboration in the system that could provide for improved efficiencies in transportation logistics and other factors. Collaboration between meat processing factory, veterinary, bank, finance, customs and special inspection agency is deficient. Rather than collectively seeking export markets, processors undercut each other and underprice Mongolian products.
- Export opportunities are limited by the health status of Mongolian livestock, tax, tariff and other border issues, butchering and packaging methods that are not adequate for export markets and inadequate financing.

301. Once health status is improved, the Meat Association sees an opportunity to identify 90 percent of Mongolian meat as "natural" and brand it as Mongolian pastureland meat (clean, ecological, pure, not penned, moving freely, drinking clean water). Meat branded under this program would be slaughtered in small plants with all of the standards for inspection, health, cutting and packaging. This would need certification based point of origin. Points of origin have already approved by government. This approach would benefit from an economic and technical feasibility study to determine if the potential price increases for such a branded product could cover the additional costs of localized processing and to determine the details of certification and market access issues.

302. The Meat Association has been formulating strategies for sector development which would optimize existing processing capacity first and develop regional clusters before looking at any additional plant capacity. In contrast, the MIA plans to open slaughterhouse facilities in every soum. Some aimag governments, such as Umnugovi, are also investing in slaughterhouses and taking a majority ownership position. This kind of planning at cross-purposes should be avoided and one strategic and well research approach based on a solid technical and economic feasibility analysis should be pursued.

b. Hides and Skins

303. Mongolia has a comparative advantage in the production of hides and skins. Recent improvements to processing facilities have improved product quality and production efficiencies. Africa, formerly a competitor, has slowed exports and buyers are seeking product from Mongolia. Competitiveness issues for processors include:

- Market access. Entering export markets requires knowledge and compliance with standards for garment measures and sizes, the completion of export paperwork which can be difficult to assemble and the payment of import taxes, especially in Russia.
- Under-capacity. Operating capacity is only between 10 and 40 percent of total capacity (FinCentre, 2011).
- Raw product damaged by parasites and preliminary handling by herders.
- Lack of financing.
- Environment impact and cost of waste management systems. Processers would like to consider less environmentally hazardous processing methods, but these are high cost alternatives.

304. During the stakeholder interviews, the following recommendations for government action were put forward:

- Negotiate better trade terms with Russia and China. Both are WTO members and should adhere to WTO rules governing trade.
- Establish herd health programs to control parasites for better animal growth and the improvement hide and skins quality.
- Investigate new avenues for providing affordable financing to the processing sector.

c. Fibers

305. Mongolia should have a comparative advantage in wool and wool products, especially yak and camel wool which can be marketed as exotic fibers. The ADB Agriculture Sector Development Program project found that there was no difficulty in increasing the sales of Mongolian carpets as greater quantities were produced. After receiving investment support through the ADB, the sales of Erdenet Carpet increased 26 percent and production capacity 36 percent. The MIA is developing an Action Plan 2014-2018 for the diversification of the wool processing industry. The planning meeting "Sheep Wool and the Future" held in October 2013 identified woven fabrics and insulation materials as new ways to add value. Insulation materials can be produced from the more than 10,000 mt of wool currently wasted in factories. The meeting also identified raw product quality, the lack of a skilled labour force and the need for new market opportunities as bottlenecks for overall product quality and value-added.

306. Mongolian cashmere should also have a comparative advantage and be competitive in international markets, but Mongolia's final cashmere product is 25 percent to 40 percent higher in cost than Chinese products (ADB cluster study and individual interviews). Factors affecting the cost structure and competitiveness include the limited supply and cost of financing in Mongolia, the soft financing provided from Chinese government to their buyers, the state of technology and costs associated with frequent breakdowns, management skills and labor costs. The ADB estimates that cluster development could decrease costs and support more value-added production, improving profitability by 150 to 200 percent (ADB).

307. In the light of overgrazing issues and environmental damage considered to be linked to the high population of goats, the ADB cluster study considered what impact of a smaller goat herd on the cashmere processing industry. Even though total cashmere output would decrease, the potential remains to increase the total amount of cashmere processing in Mongolia. If the goat herd were decreased to 10 million head but production (2,700 to 3,000 mt) were kept in Mongolia for processing rather than being exported as raw product to China, domestic output could increase by 50 percent (ADB Cluster Study).

d. Dairy

308. Mongolia has a natural and comparative advantage in the production of milk and milk products and should be competitive in the domestic and international markets. However, at the current time, Mongolian milk is a highly seasonal product with serious hygiene issues. This combined with and because of the lack of collection and handling infrastructure limits its marketability for producers and its usefulness for processors.

309. The greatest constraint facing the Mongolian milk sector is the lack of a year round adequate supply of hygienic fresh milk. This is cause by a combination of the lack of a collection system, poor OFFS standards and traditional production systems. Smaller processors face issues with infrastructure, utilities

and transportation. The sector also faces a shortage of trained people at all levels to from management, through processing and on-farm production and handling. All of these factors contribute to the quality and food safety concerns that are of increasing importance to Mongolian consumers and a barrier to any future exports from Mongolia.

310. Becoming price competitive will require increasing and stabilizing the supply of hygienic fresh milk so that local processors can make full use of their capacity. Remaining competitive if Mongolia's currency appreciates in the future will require continued investments into milk processing facilities, milk collection systems and on-farm productivity improvements. To build value chain capacity and competitiveness in the dairy sector, the GoM should undertake the following activities, many of which can be supported through and are indicated in the NLP:

- Milk pricing and marketing: Introduce quality based pricing mechanism for milk (fat).
- Milk processing: Upgrade milk processing technologies, equipment and skills for various scale of processing operations with an emphasis on cost-effective, competitive models. Expand the hygienic, commercial production of traditional milk products. Increase domestic capacity to produce milk powder so that seasonal supply can be stabilized.
- Milk collection: Improve and expand the milk collection and cooling system to decrease milk transportation costs and spoilage. Emphasize the ability to incorporate small holders into the system. Various investment models could be considered including private, cooperative driven, public or a PPP.
- Milk production: Decrease the impact of seasonality in milk supply and price at the level of farm production through feeds and feeding, genetics and breeding management that will allow for year round milk production. Carry out applied research programs to determine the most profitable breeding and feeding programs under Mongolian conditions and determine the actual costs of production and the optimum farm size.
- Food Safety: Strengthen food safety in the milk sector beginning with OFFS through delivery to the end consumer.
- Farmer capacity: Increase the knowledge and skills of farmers in all aspects of dairy production and marketing including OFFS through training supported by new R&D. Improve market access and power for dairy farmers through the promotion of dairy cooperatives and associations that are capable of undertaking production, marketing and advocacy roles.
- Industry development: Support improved collaboration within the industry and integration with various input and service providers by supporting dairy cluster development. Work to reduce barriers to trade, including import tariffs on equipment, animals, raw materials and other inputs. Continue to development and strengthen the policy framework and tax regime supporting and directing the development of the industry.
- Finance: Introduce new and innovative credit and contracting schemes to allow the expansion and development of small, medium and large scale operations.

8.2 Potential Productivity Levels and Output

311. Mongolia has the potential to increase productivity in all of its primary agriculture production. Various projects conducted over the past 20 years by donors and government have demonstrated, on a

pilot scale, improved approaches to resource management and production. Private investment and more commercial approaches to primary agriculture are emerging and, to a small degree, these new methods are beginning to be replicated. Replicating and scaling up these demonstrated approaches could have significant impact on the viability and competitiveness of the sector.

312. To examine what potential productivity might be possible in Mongolia and what impact that could have on agriculture's contribution to GDP, some key productivity indicators have been gathered and compared to international benchmarks (Table 8.1). The "current Mongolia" and "best Mongolia" values are taken from the 2012 NSO statistics, various reports and interviews. Many of the "best Mongolia" indicators are based on the performance achieved under pilot projects and leading commercial operations. The international comparison is the average indicator from a country considered comparable for each individual crop or livestock subsector. In some cases, these international standards have already been achieved in Mongolia under best management practices.

313. In estimating the total potential production increases, the first level of increase would be to have the average Mongolian production rise to what is currently being produced under the best management in Mongolia within the medium-term. These better levels of productivity have proven possible, but are still considerably lower than international comparison. In many cases, the best crop yields achieved in Mongolia are still only 50 percent of the potential. Increasing production level to that of the international comparison values would be a long-term, generational change.

314. **Extensive Livestock.** The greatest advances in productivity will come through improved nutrition resulting in decreased winter mortality, higher reproductive rates and improved growth efficiency. Feeding programs to increase the annual rate of offtake and average carcass sizes would not just increase the volume and total output of slaughter, but would improve carcass quality and consistency. The benefit would accrue to both primary producers and processors.

315. **Dairy**. Improved feeding with accompanying improvements in breeding management could both boost daily production rates and lengthen the lactation period. Total milk production per cow per lactation within the existing semi-intensive dairy industry could increase from 2,500 to 6,000 l/lactation. Adding improved breeds to better feeding and management could boost milk yields by an additional 3,000 l/lactation in the most intensive operations.

316. **Wheat**. Grain producers have increased wheat yields to 1.5 mt/ha. Additional yield increases are possible with improved soil management techniques, improved weed control and new seeds and improvements in production management. New wheat varieties from PSARTI could increase yield by an additional 13 percent to 56 percent over 2012 average yields. This would near the average dry land yields in western Canada which are 2.7 mt/ha for wheat, 3.4 mt/ha for barley and 1.4 mt/ha for canola.

317. **Potatoes**. Potato producers have increased productivity but, at 15 mt/ha, average yields are still considerably lower than commercial yields (30-40 mt/ha) by the best growers in Mongolia and other countries. Under irrigated conditions in Saskatchewan, Canada, 30 to 65 mt/ha are achievable. Under the best commercial applications in Mongolia, yields in this range have been achieved.

318. **Vegetables.** Vegetable production is constrained by old seed and lack of mechanization and has the opportunity perhaps double or triple yields from 12.5 mt/ha achieved in 2012 to levels achieved in

similar conditions in other countries. In Alberta, Canada, with similar growing conditions, dry land carrot yields are 37 mt/ha and irrigated yields are 52 mt/ha.

Table 8.1: Current and Potential Productivity Levels

Productivity Factor	Units	Current Mongolian Production 2012	Best Mongolian Production 2012	International Target
Livestock Productivity				
• Young animals survival /breeding female	%	70% (ave 2009-12) Mortality: 30%	85% (2012) Mortality: 15%	95% Mortality: 5%
Mutton				Australia
• Breeding females in herd.		Sheep 46%; Goats 45%		60%
• Age at first breeding				7 mo (Cda)
• lambing rate	%			180% (Cda)
• Weaning percentage				120-150 % (Cda)
• offtake	% herd	20%	24% (est)	27%
• age at slaughter	Mo			6-8 mo (Cda)
• slaughter weight	Kg	45	50	50 kg (Cda)
• carcass weight	kg	16	20 (estimate)	23 (Cda) 30 (US)
Beef				Canada
• Breeding females in herd.		41%		48%
• Age at first breeding		*24 mo*		15 mo (300 kg)
• conception/calving rate	%	*50%*		85-95%
• weaning percentage				90%
• weaning weight (6 mo)	kg			200-300 kg
• offtake	% herd	18%		30%
• age at slaughter	Mo.	36 -48	18-24	14 months
• slaughter weight	Kg	315	350	590
• carcass weight	Kg	118		371
Milk (intensified)				Various
• lactation period	days	150-200	200-250	300
• production	l/day	7.5 to 10	20	30
• annual production	l/lac	2500	6000	9000
Crop Productivity				
Wheat yield				Canada
• yield	Mt/ha	1.6	2.0 – 2.5 (PSARTI)	2.7
• seeding rate	Kg/ha	160-180	140	110-120
Potato yield	Mt/ha			Canada
• yield	Mt/ha	15	30	49 unirrigated 65 irrigated
Carrot yield (proxy for vegetables)	Mt/ha	12.5 all vegetables	20 All vegetables	37 unirrigated 52 irrigated
Fodder yield (barley/oats)	Mt/ha	3.3	4.5 pre-transition	6-8 barley or oats
Hay yields				Montana
• unirrigated alfalfa	Mt/ha			3.3
• irrigated alfalfa	Mt/ha			8.9
Pasture Productivity				
Pasture yields		-26% from pre-transition	pre-transition levels	pre-transition levels

319. A partial analysis of potential productivity was completed, focusing on the main crops, milk and meat, primarily mutton and beef. The analysis uses 2012 production levels as the baseline. Medium

term and long-term improvement scenarios were established using some of the key indicators provided in Table 8.1. Sufficient land is allocated to wheat, potatoes and vegetables in the medium and long-term projections to ensure self-sufficiency as the population grows from 2.87 million in 2012 to 3.6 million in 2030 and 4.3 million in 2050 (Table 8.2).

Table 8.2: Mongolian Self-sufficiency Levels to 2050 based on Current Rates of Consumption

Self-Sufficiency Targets	2012	Sufficiency	2030	2050
Population (million)	2.9		3.6	4.3
Wheat (mt)	465,300	100%	581,220	697,139
Potatoes (mt)	245,900	133%	231,089	277,178
Vegetables (mt)	98,750	55%	224,275	269,005
Milk (mill litres)	458	114%	503	603
Meat (mt)*	231,609	100%	289,310	347,010

** based on SDC forecast of 2015 demand being 80 kg/capita*

320. The crop and livestock production assumptions for the analysis were:

- Crop productivity
  - Using MIA targets for land utilization, total cropping area was increased over time to 780,000 ha of arable land of which 80,000 irrigated. For dry land crops, a 30 percent fallow rotation was assumed in the medium-term and long-term productions.
  - Enough area was allocated to wheat, potatoes and vegetables to ensure self-sufficiency. The remaining area was allocated to oilseeds (canola), other cereal grains (barley, oats) and nitrogen-fixing forage crops with a focus primarily on the production of livestock feeds.
  - Irrigated area is focused on high value crops including seed grains, canola, potatoes, vegetables, small fruits and high quality alfalfa for dairy consumption.
  - Milling and crushing rates for wheat and canola were based on international standards
  - Sea buckthorn was introduced according to the government's plan for sea buckthorn production
  - Alfalfa is included on a four year rotation on irrigated land. On unirrigated land, nitrogen-fixing forages are introduced in a five year rotation.
- Dairy productivity
  - Productivity increases stem from improved feeding and management.
  - Cow numbers are increased until they consume 50 percent of available feed grains and high quality forages produced by the crop sector. Numbers are estimated using a basic ration of 1.68 mt of feed grains and 3.99 mt of high quality alfalfa over a 300 day lactation.
  - In the initial time period (current practice), the existing number of semi-intensive and intensive dairy cattle (27,000) exceeds the amount of available feed grains and high quality forages available, which is consistent with the actual situation of inadequate cow nutrition.
- Extensive livestock productivity
  - Pasture capacity returns to pre-transition levels (now down 26 percent) and the national herd is reduced to 29.4 million head and stabilized.
  - Productivity increases result from increased pasture productivity and feed availability per animal, increased supplementary feeds from the crop sector and new investment and improved skills in feeding, breeding, health and management.

- Pork production
  - Pork production is increased based on using 50 percent of the available feed grains and 50 percent of the available canola meal. Pigs are fed an average ration of 75 percent barley and 25 percent canola meal over a growth range from 20 to 100 kg.

321. The crop projection results are shown in Table 8.3. In the medium term, total production increases by 74 percent from 893,024 mt to 1,555,820 mt while the available feedstuffs including wheat bran, other cereals (barley, oats), canola meal and high quality nitrogen-fixing forages (alfalfa, field peas, etc.) increase from 179,955 mt to 538,243 mt. In the long term, total production increases to 2,312,075 mt and feedstuffs more than quadruple to 962,208 mt.

Table 8.3: Crop Sector Productivity and Output Potential

Crops	Current Production 2012				Medium Term - 2030 (Best 2012 Yields plus Increased Irrigation)				Long Term 2050 (International Benchmarks, Irrigation and Area)			
	Rates	Area	Yield	Output (MT)	Rates	Area	Yield	Output (MT)	Rates	Area	Yield	Output (MT)
Total Arable Land		651,300				651,300				780,000		
Irrigated		**52,000**				**80,000**				**80,000**		
Dryland		599,300				571,300				700,000		
o/w Dryland in fallow	37%	219,500			30%	171,390			30%	210,000		
Total Seeded Dryland		**327,800**			**100%**	**399,910**			**100%**	**490,000**		
Total Seeded Area		**379,800**				**479,910**				**570,000**		
Seeded Dryland	**100.0%**	**327,800**			**100.0%**	**399,910**			**100.0%**	**490,000**		
Wheat	83.9%	275,155	1.52	419,011	70.0%	279,937	2.00	559,874	55.0%	269,500	2.50	673,750
Other Cereals	2.2%	7,287	1.67	12,161	10.0%	39,991	2.00	79,982	10.0%	49,000	3.50	171,500
Canola/technical crops	10.3%	33,904	0.80	27,123	10.0%	39,991	1.00	39,991	15.0%	73,500	1.75	128,625
Forage/N fixing	2.7%	8,827	1.00	8,827	10.0%	39,991	3.00	119,973	20.0%	98,000	3.50	343,000
Potatoes	0.8%	2,627	10.00	26,271	0.0%	-	20.00	-	0.0%	-		-
Vegetables	0.0%	-		-	0.0%	-		-	0.0%	-		-
Small fruits	0.0%	-		-	0.0%	-		-	0.0%	-		-
Irrigated (based on 2010)	**100.0%**	**52,000**			**100.0%**	**80,000**			**100.0%**	**80,000**		
Wheat	44.5%	23,145	2.00	46,289	6.0%	4,800	5.00	24,000	5.0%	4,000	7.00	28,000
Other Cereals	1.2%	613	3.00	1,839	15.0%	12,000	4.00	48,000	16.0%	12,800	4.00	51,200
Canola/technical crops	2.3%	1,196	3.50	4,186	25.0%	20,000	3.00	60,000	25.0%	20,000	4.00	80,000
Forage/N fixing (alfalfa)	9.6%	4,973	6.00	29,838	25.0%	20,000	6.00	120,000	25.0%	20,000	8.00	160,000
Potatoes	27.3%	14,173	15.50	219,629	10.0%	8,000	30.00	240,000	6.5%	5,200	55.00	286,000
Vegetables	15.2%	7,900	12.50	98,750	14.0%	11,200	20.00	224,000	7.5%	6,000	45.00	270,000
Small fruits	0.0%			-	5.0%	4,000	10.00	40,000	15.0%	12,000	10.00	120,000
Total Production												
Wheat		298,300		465,300		284,737		583,874		273,500		701,750
Other Cereals		7,900		14,000		51,991		127,982		61,800		222,700
Canola/technical crops		35,100		31,309		59,991		99,991		93,500		208,625
Forage/N fixing		13,800		38,665		59,991		239,973		118,000		503,000
Potatoes		16,800		245,900		8,000		240,000		5,200		286,000
Vegetables		7,900		98,750		11,200		224,000		6,000		270,000
Small fruits		-		-		4,000		40,000		12,000		120,000
Total Area and Output		**379,800**		**893,924**		**479,910**		**1,555,820**		**570,000**		**2,312,075**
Percentage Increase		**100%**		**100%**		**126%**		**174%**		**150%**		**259%**
Available Feedstuffs (MT)												
Wheat Bran	Milling ratio:		23%	107,019			23%	134,291			23%	161,403
Other Cereals				14,000				127,982				222,700
Canola Meal	Crush rate:		36%	11,271			36%	35,997			36%	75,105
Fodder/Forage				38,665				239,973				503,000
Total		379,800		170,955		479,910		538,243		570,000		962,208
Percentage Increase		**100%**		**100%**		**126%**		**315%**		**150%**		**563%**

322. The increased availability of high quality feedstuffs is the basis for the expansion and improved productivity of the dairy and pork industries. To model the potential production increases the available feedstuffs were allocated across dairy, pork and meat animal feeding in the following manner:

- 50 percent of the available feed grains and 50 percent of high quality forage (alfalfa) was used by the dairy industry. To calculate the number of milking cows this could support, a simple ration of 5.6 kg of grain and 13.3 kg of forage per day was used. Over a 300 day lactation period, each cow would consume 1.68 mt of grain and 3.99 mt of forage.
- 50 percent of the available feed grains and 50 percent of the available canola meal was used by the swine industry. Research in Canada has shown that swine rations can comprise of 25 percent canola meal. The basic ration used in the calculations consisted of 75 percent feed grains and 25 percent canola meal over a 100 day feeding period in which the pigs gain 80 kg, growing from 20 kg weaners to 100 kg finishers. Daily intake is 2.5 kg and total consumption over the feeding period is 188 kg feed grains and 63 kg of canola meal per hog. Carcass yield is 78 percent.
- 50 percent of the high quality forage and 100 percent of the wheat bran is utilized in semi-intensive meat animal feeding with the intention of maintaining weight through the winter and keeping animals off fragile early spring pastures. The total number of SU that could be fed is calculated assuming that animals are feed 2.5 percent of their body weight per day for a 150 day feeding period. For a 60 kg sheep, the feeding rate is 1.5 kg/day or 225 kg over a winter.

323. Using these assumptions, 50 percent of the available canola meal is unused, but could be utilized by the poultry layer industry. This utilization has not been modeled. Table 8.4 summarizes the feedstuff allocations, feed usages and maximum animal capacities used in the modeling.

324. Based on these assumptions, Mongolia could maintain a herd of 30,000 intensively fed dairy cattle in the moderate production or medium-term scenario and up to 63,000 in the high production, long-term scenario. Swine numbers could increase to nearly 300,000 in the medium term and nearly 600,000 in the long-term scenarios. The estimated number of SU that could benefit from winter feeding is 1.1 million in the medium term projection and 1.8 million in the long-term scenario.

Table 8.4: Total Potential Livestock Given the Available Feedstuffs (Limiting Factor is Bolded)

Dairy - # of milking cows	**% used**					**Current**	**M-Term**	**L-Term**
Other Cereals	50%	1.68	mt/lac.	Max number of cows		**4,167**	38,090	66,280
Fodder/forage	50%	3.99	mt/lac.	Max number of cows		4,845	**30,072**	**63,033**
Pigs (100 day feeding period; canola meal makes 25% of ration)								
Other cereals (barley)	50%	0.188	mt/head	Max number of pigs		**37,269**	340,705	**592,856**
Canola meal	50%	0.063	mt/head	Max number of pigs		90,017	**287,484**	599,818
Total				**Total number of S.U.**		**127,287**	**628,189**	**1,192,674**
Semi-Intensive Livestock - maintain weight and save spring pasture						**Current**	**M-Term**	**L-Term**
Wheat bran	100%	0.23	mt/hd	Max number of S.U.		475,640	596,849	717,344
Fodder/forage	50%	0.23	mt/hd	Max number of S.U.		85,922	533,273	1,117,778
Total				**Total number of S.U.**		**561,562**	**1,130,122**	**1,835,122**

325. Increased feed availability would have very positive impacts on milk production. Table 8.5 shows the potential increase in milk production given higher levels of available feedstuffs. Although the total number of milking cows is only marginally higher than the existing number in the medium term, the total production could increase by 30 percent to 596 million liters with 93 million liters available for

export. In the long-term scenario, production could increase 86 percent to 851 mill liters. At this level, there would be 247 million liters available for export.

326. Table 8.6 provides and estimate of the potential meat production and output possible with greater availability of livestock feeds. Extensive livestock numbers are decreased to 29 million head over the forecast period. This is near the pre-transition level numbers and closer to the carrying capacity of 69.2 million SU estimated by the Mongolian Research Institute of Animal Husbandry (RIAH)[71]. Decreasing the pressure on pastures, improving supplemental feeds and other improvements in breeding, health and management are assumed to contribute to productivity increases as indicated in Table 8.1.

327. Pork production could increase dramatically because of the high feeding efficiency of swine. Pork production is only 400 MT at the current time. If the industry could utilize local feed grains and canola meal, production could increase to 22,424 MT in the medium term and reach 46,243 MT in the long-term. In the model, meat production from the extensive livestock sector is forecast to increase from 220,000 mt in 2012 to 268,744 in the medium term and 208,499 in the long term. The improvements in productivity and the development of the pork industry offset the decreased number of animals. In the medium term scenario, total meat production would increase 32 percent to 291,168 mt. This is roughly self-sufficiency at the projected population in 2030. In the long-term scenario, meat production increases 61 percent to 354,742 MT and a small surplus of 7,732 mt is produced.

[71] "Carrying Capacity Dynamics, Livestock Commercialisation, and Land Degradation In Mongolia's Free Market Era", Ton Dietz, Enkh-Amgalan, Tumur Erdenechuluun, Sebastiaan Hess, Final version PREM Paper IVM Vrije Universiteit Amsterdam; 2005

Table 8.5: Potential Dairy Productivity and Output

Dairy	Current - 2012					Medium Term - 2030					Long Term - 2050				
	# Head	Lactation (d)	Litres / day	Litres /lactation	Output (Mill L)	# Head	Lactation (d)	Litres / day	Litres /lactation	Output (Mill L)	# Head	Lactation (d)	Litres / day	Litres /lactation	Output (Mill L)
Purebred/High Yield	500	200	20.00	4,000	2	5,072	300	30.00	9,000	46	20,565	300	30.00	9,000	185
Crossbred/Med Yield	27,000	150	7.50	1,125	30	25,000	250	20.00	5,000	125	40,000	300	20.00	6,000	240
Subtotal	**27,500**				**32**	**30,072**				**171**	**60,565**				**425**
Other	828,000	200	2.57	514	426	828,000	200	2.57	514	426	828,000	200	2.57	514	426
Total animals and output	**855,500**				**458**	**858,072**				**596**	**888,565**				**851**
Percentage Increase					**100%**					**130%**					**186%**
Self-sufficiency					458					503					603
Surplus (mill litres)					**0**					**93**					**247**

Table 8.6: Potential Meat Productivity and Output

Meat Production	Current					Best Mongolian					International Benchmark				
Extensive	Herd Size	Offtake % (Begin Year)	Slaughter #	Carcass Yield	Output (MT)	Herd Size	Offtake %	Slaughter #	Carcass Yield	Output (MT)	Herd Size	Offtake %	Slaughter #	Carcass Yield	Output (MT)
Total Number	40,920,915	23%	8,365,003			34,828,653		8,668,393			29,444,721		8,272,145		
Sheep	18,141,359	23%	3,679,554	16	59,594	15,420,155	25%	3,855,039	20	77,101	13,415,535	27%	3,622,194	23	83,310
Goat	17,558,672	25%	3,952,019	16	64,006	14,924,871	25%	3,731,218	20	74,624	12,000,000	27%	3,240,000	23	74,520
Cattle	2,584,621	20%	469,881	127	59,700	2,196,928	25%	549,232	150	82,385	2,000,000	30%	600,000	200	120,000
Horses	2,330,428	11%	238,311	*130*	30,980	1,980,864	11%	217,895	*140*	30,505	1,723,352	11%	189,569	*140*	26,540
Camel	305,835	9%	25,238	*227*	5,720	305,835	9%	27,525	*150*	4,129	305,835	9%	27,525	*150*	4,129
Pork (finishers)				*78*	400			287,484	*78*	22,424			592,856	*78*	46,243
Total MT Produced					**220,400**					**291,168**					**354,742**
Percentage Increase					**100%**					**132%**					**161%**
Self-sufficiency					231,609					289,310					347,010
Surplus (mill litres)					- **11,209**					**1,858**					**7,732**

328. A second scenario of meat production was modelled whereby extensive livestock numbers were not reduced from their 2012 levels (Table 8.7). In this scenario, total meat production increases 53 percent in the medium-term scenario to a level of 289,310 MT. This produces a surplus of 48,555 MT. In the long-term scenario, total production increases 108 percent to 347,010 MT and a surplus of 112,038 MT is available for export.

Table 8.7: Meat Production at Stable Livestock Numbers (MT)

	Current 2012	Medium-Term 2030	Long-Term 2050
Total MT Produced	220,400	337,865	463,035
Percentage Increase	100%	153%	210%
Self-sufficiency	231,609	289,310	347,010
Surplus (mill mt)	-11,209	48,555	116,025

329. Achieving the suggested productivity improvements at a stable herd size of 40 million would require much higher levels of supplementary feeding across the entire livestock sector and rigorous pasture management. The partial analysis undertaken in this report does not indicate sufficient increases in feedstuff production from the crop sector to support supplementary feeding of such a high number of animals. It would likely require investments into pasture rehabilitation, increased natural hay production, the rehabilitation of abandoned land, much improved pasture management and other measures, including significant improvements in genetics and animal health. Without these investments into the preservation and improvement of pasture resources, Mongolia risks collapse of the natural resource base that supports the livestock sector.

8.3 Profitability

330. The low levels of productivity in Mongolian agriculture have a negative impact on the profitability of enterprises. For the main agricultural commodities of wheat, milk and meat, the potential returns under the three levels of productivity discussed in Section 8.2 have been estimated. Where current models or information were not available, previous analysis are referenced. This analysis uses only a few models collected and updated from previous and current project work in Mongolia and cannot fully represent the huge range of profitability that exists between regions, farming systems, farmer characteristics and management, price variability, seasonality, and other factors. This type of agricultural economic analysis is not systematically available in Mongolia. Capacity building within the Ministry of Agriculture to conduct this type of analysis on a regular basis would provide valuable information for policy development and evaluation, investment planning, agricultural lending and competitiveness analysis.

a. Wheat Production

331. The 2002 ABD Crop Production PPTA research showed that improved yields and the introduction of chemical fallow or mixed fallow (herbicide with light tillage) generated net profits at prices of US$ 125/mt in Mongolia.[72] The price of No. 1 Hard Red Winter Wheat FOB the Gulf of Mexico peaked at US$

[72] ABD Crop Production PPTA, 2002

440/mt in March 2008 and is forecast by the IMF to range between US$ 253/mt and US$ 259/mt between 2014 and 2016.[73] These prices correlate strongly with Mongolian prices. While government subsidies have catalyzed investment in the sector, at current prices and yields, the sector should be providing positive economic and financial returns.

332. Using current prices, the profitability of wheat production on a 1,500 ha farm was modeled at three levels of productivity associated with three types of production practices: i) low productivity of 1 mt/ha associated with conventional plowing and the use of poor quality seed; ii) medium level productivity of 2 mt/ha associated with the best current practices that incorporate decreased tillage, the use of chemical fallow and improved seed; and, iii) high levels of productivity associated with the use of zero tillage methods and best quality seed. This profitability analysis is provided in Table 8.8. The related financial indicators are provided in Table 8.9. These scenarios do not include the government subsidy payment in order to review the actual profitability of non-subsidized production. Operating interest has also been excluded as it is not generally available to the industry.

333. Under the low productivity model, yields are estimated to be only 1 mt/ha. This is based on the fact that most grain in Mongolia is produced by the relatively small number of farms that are using improved production methods. While the average yield in 2012 was 1.5 mt/ha this would reflect a few high-producing farms with yields closer to 2 mt/ha and many small farms with yields in the range of 1 mt/ha. Under the low productivity model, total variable costs per ha are US$151 or $167/mt of grain sold. The breakeven yield from the combine is .85 mt/ha. The gross margin $60/ha. A small profit of $19/ha is achieved and the return on investment after tax is 4 percent.

334. Under the medium productivity scenario, the average yield is assumed to be 2 mt/ha. At this level, variable costs of production are $244/ha or $132/mt of grain sold. This value reflects the actual costs of production provided by farmers interviewed. The gross margin is $186/ha. Because of much higher equipment investments, the total cost of production per ha is $348, or $189/mt of grain sold. Net profit is $69/ha and the return on investment is 8 percent.

335. Under the high productivity scenario, yield reaches an average of 2.7 mt/ha. Total variable costs are $366/ha or $144/mt of grain sold. The gross margin is $226/ha. Total costs of production is $474/ha and net profit is $100/ha. Return on investment increases to 10 percent.

[73] IMF World Economic Outlook, October 2013

Table 8.8: Wheat Profitability under Three Production Systems

Net Returns per Hectare		Current 2012 Conventional	Best Current Production	High Productivty
Farm Revenues			**$/ha**	
Wheat	$/ha	210.28	429.42	591.92
Screenings	$/ha	-	-	-
Total Revenue from Crop Sales	**$/ha**	**210.28**	**429.42**	**591.92**
Variable Inputs (including summerfallow)				
Seed cost, including treatment	$/ha	56.98	77.05	85.64
Fertilizer				
Chemical nitrogen cost	$/ha	*5.76*	*57.65*	*115.29*
Biological nitrogen cost	$/ha	-	-	-
Total fertilizer cost	$/ha	5.76	57.65	115.29
Herbicide/pesticides/fungacides	$/ha	0.00	20.00	70.00
Fuel and lubricants	$/ha	52.02	37.35	28.62
Grain cleaning	$/ha	2.73	5.45	7.36
Trucking (cleaned wheat)	$/ha	19.00	38.00	52.38
Seasonal labour	$/ha	14.12	8.07	6.72
Subtotal: Input and labour costs	**$/ha**	**150.60**	**243.56**	**366.01**
Operating interest	$/ha	-	-	-
TOTAL VARIABLE COSTS	**$/ha**	**150.60**	**243.56**	**366.01**
Total Variable Cost/mt sold:	$/mt	**166.87**	**132.15**	**144.08**
GROSS MARGIN:	**$/ha**	**59.68**	**185.86**	**225.91**
FIXED COSTS:				
Land tax (0.50/year for 2 years)	$/ha	1.00	1.00	1.00
Land rental	$/ha	-	-	-
Depreciation				
On equipment	$/ha	3.60	29.37	30.95
On buildings	$/ha	-	3.81	6.39
Total Depreciation	$/ha	3.60	33.18	37.34
Repair and maintenance	$/ha			
On equipment	$/ha	2.70	22.02	23.21
On buildings	$/ha	-	2.54	4.26
Total Repairs and Maintainance	$/ha	2.70	24.57	27.47
Financing Costs (interest payments)	$/ha			
Equipment	$/ha	-	20.12	13.89
Buildings	$/ha	-	3.69	6.18
Land	$/ha	30.58	21.84	21.84
Total financing costs	$/ha	30.58	45.65	41.91
TOTAL FIXED COSTS:	$/ha	**37.88**	**104.40**	**107.72**
TOTAL COST OF PRODUCTION:	$/ha	**188.49**	**347.96**	**473.74**
Total Cost of Production/mt sold:	$/mt	**208.85**	**188.80**	**186.48**
PROFIT BEFORE TAX:	$/ha	**21.80**	**81.46**	**118.18**
Taxes	$/ha	**3.27**	**12.22**	**17.73**
NET PROFIT AFTER TAX:	$/ha	**18.53**	**69.24**	**100.45**

Table 8.9: Wheat Production Financial Indicators

Finanical Indicators	Unit	Conventional	Mixed fallow	Chem fallow
Farm Size:	ha	1,500	1,500	1,500
Seeded Hectares:	ha	750	1,050	1,050
Yield	mt/ha	1.0	2.0	2.7
Variable Costs/MT	$/mt	167	132	144
Total Costs/MT	$/mt	209	189	186
Net Return (after tax) per hectare:	$	18.53	69.24	100.45
Shut down point (Variable Costs):				
Clean Yield to cover variable costs (shut down point)	mt/ha	0.65	1.05	1.57
Uncleaned Yield to cover variable costs (shut down)	mt/ha	0.68	1.10	1.62
Breakeven yields (Full Costs):				
Breakeven - after one cleaning (wheat sales only)	mt/ha	0.81	1.49	2.03
Breakeven - from combine (wheat sales only)	mt/ha	0.85	1.57	2.10
Investment Requirements:				
Total investment	$	790,500	1,346,000	1,461,000
Investment/ha (total area)	$/ha	527	897	974
Return on Investment:				
Return on Total Investment, after tax:	%	4%	8%	10%
Return on Cash Investment, after tax:	%	4%	8%	10%

b. Milk

336. The "Study on Development Potentials of the Intensification of Selected Livestock Production Scenarios in City Districts in Mongolia"[74] found that larger dairy farms with 33 cows on average were profitable in 2006. This is consistent with the trend of growing dairy farm size and the average dairy size of 31 cows per farm in 2012. For these farms, the gross margin per cow was MNT 126,658 with profit before herd build-up of MNT 10,286/cow and profit after herd build-up of MNT 104,981/cow.

337. The study also looked at the difference between extensive and intensive dairy production, using an average production of 1,700 l/cow as the differentiating level of production. The gross margin per cow on intensive farms was MNT 238,590 with a positive profit of MNT 43,155/cow before herd build-up. Including the value of herd build-up, the profit per cow was MNT 139,465. By comparison, the profitability of extensive dairy production was much lower. Although the gross margin per cow was MNT 248,542, the profit before herd build-up was only MNT 831/cow and the profit after herd build-up was MNT 2,416.

338. The study found that the profitability of milk production can be improved by improving feeding programs and the quality of feed, especially where this would allow the farm to market more milk during the winter, when prices are highest. In the scenario of winter feeding, the base case was considered 12 kg of hay/day producing 1 kg of milk. By supplementing the forage intake with 2 kg of wheat milling byproducts, production was predicted to increase to 4.5 kg/day. The profitability under these two scenarios was a loss of 30 MT/cow/day under the low production scenario and a profit of MNT 1,285/cow/day under the high production scenario.

[74] MoFA, SDC, UNDP, "Study on Development Potentials of the Intensification of Selected Livestock Production Scenarios in City Districts in Mongolia", 2007

339. The study concluded that dairy production can be profitable both under an integrated crop-dairy scenario where the farm produces its own feedstuffs and in situations where purchased fodder is used. Being able to produce milk during the winter was cited as a key element in improving the profitability of dairies. This requires feeding and changes in breeding and cow management. They cited reluctance on the part of farmers to pay for feed as part of the causes of poor profitability. Farmer-focused research, demonstrations and training would support improved uptake of improved dairy feeding and management programs.

c. Beef and Mutton

340. The livestock intensification study also examined the profitability of intensive beef and mutton production through feedlots and crop-livestock integration. The objectives of the feeding program were to increase weight gain, improve carcass quality and to time the sale of livestock into the seasonal price peak in late winter and early spring. Under the market conditions in 2007, their study showed that intensive fattening was only profitable if linked to the season price increases over winter. The use of silage in the feeding rations had a positive impact on profitability.

341. For a livestock producer, strategic fattening programs were determined to have several benefits, including the reduction of grazing pressure on pastures, increased income because of the greater number of animals that sold annually, and the provision of a better end product. The livestock intensification study recommended a number of herd intensification strategies, including early lambing and calving coupled with supplementary feeding of mother and offspring in the late winter so that young animals are better able to utilize pastures. The livestock intensification study estimated that the use of targeted supplementary feeding to increase offtake rates would allow herders to decrease their sheep herd by 20 percent and their cattle herd by 30 percent when young animals are sold after only one summer on pasture.

342. Given the meat price increases that have occurred since the livestock intensification study was completed in 2007, the profitability and optimum strategies for sheep and cattle fattening should be re-examined. To support this aspect of the livestock sector, Mongolian research institutes should establish long-term research programs into optimum feeding systems for Mongolian livestock under commercial conditions. These programs should track economic indicators including feed conversion rations, average daily gains, carcass quality and profitability for different livestock genetics under various feeding regimes and animal age groups.

d. Extensive Livestock

343. The FAO/WB LAMP project worked with a small group of herders in Tosontsengel soum of Khuvsgal aimag in 2013 to introduce recordkeeping systems. A case study on profitability was developed for a commercial herd of 700 animals which included 270 sheep (39 percent), 330 goats (47 percent), 65 cattle (9 percent) and 35 horses (5 percent). The total number of breeding females was 361. The household consisted of four adults working in the herding business (two men and two women) and a total of 24 people (13 adults and 11 children) supported by the enterprise, including family members in Ulaanbaatar who received meat. The case study includes most production costs, but does not include

the cost of combing cashmere which might not have been identified by the herder or may have been done on a barter basis. All of the herders in the area did some type of winter feeding at an average cost of MNT 2,000/SU.

344. Table 8.10 provides the income, expenses and profits of the case study herd. At this scale, total gross income (cash and in-kind) is MNT 48 million with 42 percent coming from the sale of live animals and 18 percent coming from cashmere. The value of wool and the wool subsidy is insignificant (<1 percent). It was not indicated in the case study why the subsidies received did not correlate to the total volume of wool sold. Home consumption of meat and milk represents 29 percent of income. Expenses are MNT 3.3 million of which livestock feed represent 41 percent, vet and medicine 22 percent and fixed costs 37 percent. Profit is MNT 45.0 million or 125,000 per breeding female. The profit for each of the four adults managing the herd is MNT 926,000/month. By comparison, the NSO reported in 2013 that the average salary of employed Mongolians was MNT 631,000/month, ranging from MNT 1,486,100/month in the mining sector and MNT 902,000/month in LLCs to just MNT 168,000/month for workers in cooperatives.[75]

Table 8.10: Profitability of a 700 Head Commercial Livestock Herd

Item	Unit	No. Units	Unit Value	Value	%
Income					
Sheep - home consumption	head	30	100,000	3,000,000	
Goats - home consumption	head	20	70,000	1,400,000	
Cattle - home consumption	head	10	700,000	7,000,000	
Horse - home consumption	head	1	800,000	800,000	
Milk - home consumption	litres	2,025	900	1,822,500	
Subtotal - inkind				**14,022,500**	29%
Cash					
Wool cash	kg	300	500	150,000	0.3%
Wool subsidy	kg	70	2,000	140,000	0.3%
Cashmere	kg	122	70,000	8,540,000	18%
Live goats	head	70	90,000	6,300,000	13%
Live sheep	head	100	90,000	9,000,000	19%
Live cattle	head	7	700,000	4,900,000	10%
Live horses	head	6	700,000	4,200,000	9%
Meat	0	0	0	0	0%
Milk	0	0	0	0	0%
Yoghurt	0	0	0	0	0%
Sheep hide	hide	30	10,000	300,000	1%
Goat hide	hide	20	20,000	400,000	1%
Cattle hide	hide	10	32,000	320,000	1%
Horse hide	hide	1	50,000	50,000	0%
Subtotal - cash income				**34,300,000**	71%

[75] UB Post, Friday, September 20th, 2013

Item	Unit	No. Units	Unit Value	Value	%
Total Income				**48,322,500**	**100%**
Variable Costs					
Feed					
Hay making	tonnes	30	33,333	1,000,000	
Bran	40 kg sacks	10	10,000	100,000	
Grain fodder	tonnes	1	250,000	250,000	
Subtotal - feed				**1,350,000**	41%
Vet Services					
Vaccination	LS	0	0	0	
Spraying ext parasite	head	600	100	60,000	
Dipping	head	600	450	270,000	
Medicines					
Ivomec	litre	1	80,000	80,000	
Deworming albendazole	litre	8	15,000	120,000	
Selenium	time	2	25,000	50,000	
Mulrivitamin	time	1	50,000	50,000	
Antibiotics	LS	1	100,000	100,000	
Subtotal - vet & medicine				**730,000**	22%
Livestock					
Ram/bucks	head	barter		0	
Subtotal - variable				**2,080,000**	63%
Fixed Costs					
Fuel	LS	1	700,000	700,000	
Livestock Insurance	0	0	0	0	
Vehicle maintenance	LS	1	300,000	300,000	
Tax vehicles	LS	1	200,000	200,000	
Subtotal - fixed				**1,200,000**	37%
Total Expenses				**3,280,000**	**100%**
PROFIT				**45,042,500**	
Profit per breeding female (361)				124,771	
No. Labour days (4 people)				1,460	
Profit/labour day				30,851	
Monthly Profit/Worker				938,385	
Monthly profit/household member				156,398	
Monthly Profit/Worker (US$ @ MNT 1,600/USD)				$586	

Source: LAMP project, 2014

345. The FAO/WB case was modified to estimate the profitability of a 200 head herd, which represented the average herd size nationally. The number of household members was reduced to eight. Annual offtake from the herd was based on 2012 national average (sheep 24 percent, goats 25 percent, cattle 20 percent, horse 11 percent) including home consumption. This significantly decreased the

number of animals available for commercial sale. Table 8.11 shows the impact on profitability. Total income decreased to MNT 10.2 million of which home consumption represented 47 percent. Cashmere contributed 24 percent of total income followed by the sale of live animals (23 percent). Wool and the wool subsidy (in this case assumed to be received on each kg of wool sold) contributed only 2.3 percent of income. Total expenses were MNT 1.1 million and profit declined to MNT 9.1 million. Profitabilty per breeding female decreased to MNT 88,000 and the daily profit earned per worker declined to MNT 6,226 or MNT 189,364/month. The average profit per household member was only MNT 95,000.

346. Cash-based income and profitability was significantly lower. Cash income was MNT 5.4 million and profits on a cash-only basis were MNT 4.4 million, or MNT 42,000 per breeding female. Daily cash earnings of the four workers declined to MNT 2,980 and the cash generated per household member was only MNT 45,000 or US$57 or just under $2 per person per day. This illustrates the very low incomes generated in a typical herding household and the high degree of vulnerability to poverty.

Table 8.11: Profitability of a 200 Head Commercial Livestock Herd

Item	Unit	No. Units	Unit Value	Value	%
Income					
Sheep - home consumption	head	9.0	100,000	900,000	
Goats - home consumption	head	6.0	70,000	420,000	
Cattle - home consumption	head	3.0	700,000	2,100,000	
Horse - home consumption	head	1.0	800,000	800,000	
Milk - home consumption	litres	577	900	519,413	
Subtotal - inkind				**4,739,413**	47%
Cash					
Wool cash	kg	86	500	42,750	0.4%
Wool subsidy	kg	86	2,000	171,000	1.7%
Cashmere	kg	35	70,000	2,433,900	24%
Live goats	head	18	90,000	1,576,125	15%
Live sheep	head	10	90,000	864,432	8%
Live cattle	head	0	700,000	0	0%
Live horses	head	0	700,000	0	0%
Meat	0	0	0	0	0%
Milk	0	0	0	0	0%
Yoghurt	0	0	0	0	0%
Sheep hide	hide	10	10,000	100,000	1%
Goat hide	hide	6	20,000	114,000	1%
Cattle hide	hide	3	32,000	91,200	1%
Horse hide	hide	1	50,000	50,000	0%
Subtotal - cash income				**5,443,407**	53%
Total Income				**10,182,820**	**100%**
Variable Costs					
Feed					

Item	Unit	No. Units	Unit Value	Value	%
Hay making	tonnes	10	33,333	333,333	
Bran	40 kg sacks	3	10,000	33,333	
Grain fodder	tonnes	0.3	250,000	83,333	
Subtotal - feed				**450,000**	41%
Vet Services					
Vaccination	LS	0	0	0	
Spraying ext parasite	head	200	100	20,000	
Dipping	head	200	450	90,000	
Medicines					
Ivomec	litre	0	80,000	26,667	
Deworming albendazole	litre	3	15,000	40,000	
Selenium	time	1	25,000	16,667	
Multivitamin	time	0	50,000	16,667	
Antibiotics	LS	0	100,000	33,333	
Subtotal - vet & medicine				**243,333**	22%
Livestock					
Ram/bucks	head	barter		0	
Subtotal - variable				**693,333**	63%
Fixed Costs					
Fuel	LS	0.3	700,000	233,333	
Livestock Insurance	0	0.0	0	0	
Vehicle maintenance	LS	0.3	300,000	100,000	
Tax vehicles	LS	0.3	200,000	66,667	
Subtotal - fixed				**400,000**	37%
Total Expenses				**1,093,333**	**100%**
PROFIT				**9,089,486**	
Profit per breeding female (120)				88,346	
No. Labour days (4 people)				1,460	
Profit/labour day				6,226	
Monthly Profit/Worker				189,364	
Monthly profit/household member				94,682	
Monthly Profit/Worker (USD @ MNT 1,600/USD)				118	

Source: Adapted from LAMP project, 2014

8.4 Comparative Advantage and Potential Markets

347. Strategically identifying domestic and export markets should be based on a combination of factors including:

a) potential production and surpluses in light of feed resources, resource sustainability and future population growth;

b) competitiveness under current conditions and recognizing the risk of currency appreciation and Dutch Disease which could accompany mining sector growth;

c) export readiness and, d) market access issues. Given these challenges, a multi-prong approach to market development is recommended.

348. All of these actions would begin immediately, but the realization of their potential would be seen over the short, medium and long-term:

- **Immediate Import Replacement.** There is an immediate opportunities for import replacement of low to medium quality items consumed by the general population, such as vegetables, small fruits and berries, powder milk and vegetable oil. This may require some processing investment to expand the capacity for domestic milk powder production and vegetable oil processing. Some feedstuffs (corn) currently imported can be replaced by domestic barley production while local canola meal can by used for high quality protein in livestock feeds.

- **Medium Term Import Replacement.** Develop the product quality, consistency, packaging and distribution systems needed to access the high quality/high valued markets for mine caterers, restaurants and the middle and upper class. These products include high quality meat and fluid milk products as well as a wide variety of standard quality vegetables. Various processed food products would fit into this category. Achieving the standards, consistency and volumes for these markets will help build export readiness. Spun fibers would fit in this category.

- **Medium Term Domestic Market Development and Import Replacement.** The local feed industry is emerging with the intensification and commercialization of the livestock sector. This sector can be supported in its growth with investment and human resource development related to feed manufacturing and ration formulation. High protein feedstuffs can be replaced with rapeseed and other feed crops as diversification expands. In the medium term, the textile/fabric industry may also develop.

- **Immediate to Medium Term Export Market Development.** More efforts on trade negotiations and collaboration between exporters would help expand export markets. Given the current health status of Mongolian meat products, a focus on regional markets where sanitary standards can be met should be considered. Development of export markets for fibers and textiles/woven goods especially specialized fibers such as yak and camel wool could continue. Various types of support services for existing firms entering or expanding their export markets should be provided.

- **Long Term Export Development.** Expanded markets for medium and high quality meat and dairy products that meet international animal health and food safety standards can be developed. In all product classes, increased value-added processing needs to be developed to ensure long-term competitiveness given the risk of currency appreciation and Dutch Disease that can accompany the extractive sector development.

349. China and Russia provide the greatest export market potential owing to their size, proximity, and established trading relationships. The growing urbanized middle class of China is shifting the structure of the Chinese diet with more and higher quality food being consumed including dairy, meat and wheat products. Increased meat consumption is associated with a greater need for feed grains. Per capita meat consumption is projected to reach 52 kg by 2020. While domestic pork and chicken production will keep pace, beef and mutton imports are expected to grow. Imports of wheat and barley are also expected to increase. China intends to loosen import restrictions for meat in the face of high levels of demand and food safety concerns that have results from smuggling around the current high quotas and tariffs.[76] Russia presents similar opportunities and Mongolia is currently negotiating reduces tariffs and quarantine requirements. Establishing stable access to both of these markets requires that the Government of Mongolia negotiate trade agreements with favorable quota and tariffs levels and that health standards of Mongolian food products be addressed so that Mongolian food processing facilities and products can meet the sanitary and phytosanitory requirements of the importers.

a. Import Replacement and Value-Added Processing

350. Mongolia has immediate opportunities for import replacement. Based on 2012 import levels and current world prices of five key commodities (milk powder, vegetables, vegetable oil, fruit and livestock feed), the annual value of import replacement would be US$ 73 million (Table 8.12).

Table 8.12: Import Replacement Value, Key Commodities

Commodity	Imports (MT)	% Replaced or % Growth	Market Price (MNT/MT)	Market Price (US$/MT)	Total Value (US$ Mill)
Whole Milk Powder	4,692	100%		4,800	22.5
Vegetables	40,000	100%	700,000	438	17.5
Vegetable Oil	5,970	100%		1,000	6.0
Fruits (sea buckthorn)	15,251	25%	3,000,000	1,875	7.1
Livestock Feed (corn)	50,000	100%		4,000	20.0
Total					73.1

Source: NSO

351. **Fresh Milk, Milk Powder and Butter.** The dairy sector should be developed using a cluster approach to promote efficiencies in marketing, cost sharing on collection infrastructure and joint benefits for farmers and processors from investments into R&D. Dairy development will stimulate

[76] globalmeatnews 7 Oct 2014 www.globalmeatnews.com

demand for livestock feeds, with immediate benefits to the crop sector by providing the cash market incentive required to introduce new crops. Related benefits could spin out to the intensive livestock sector and the extensive livestock production.

352. Mongolian milk processors currently import 50 percent of their raw products, primarily in the form of powdered milk which they reconstitute, package and sell. Given the estimated annual need of Ulaanbaatar for 163.1 million liters of milk annually (447 mt/day) the potential import replacement for this demand center alone is 82 million liters annually or 224 mt/day).[77] This will require expansion of milk powdering capacity domestically. Butter is now imported and could be replaced by local production once hygiene concerns are addressed. Long-life traditional dairy products (milk products, cheese, sour cream etc.) have a growing demand and can be developed and sold across the country. This can be linked to developing regional traditional product brands. Small-scale producers need training in hygienic production methods which would be best delivered within the producers own plants or similar scale ones.

353. Table 8.13 gives the total volume of dairy imports along with the main country of origin for 2012. Powdered milk represented 57 percent of milk product imports by weight. Valued at the 2012 international market price of approximately $3 USD/kg, the value of import replacement, for powdered milk alone would be US$ 14.1 million/year.

Table 8.13: Dairy Imports, 2012

Milk Product	Total Volume		Main Countries of Origin in 2012					
		2012	Country	Volume	Country	Volume	Country	Volume
Milk (packaged UHT)	kg	729,595	China	649,192	Russia	18,282	Poland	15,840
Condensed milk	kg	1,379,976	Ukraine	847,657	Russia	293,989	Malaysia	238,294
Powdered Milk	kg	4,692,215	New Zeland	4,259,475	Ireland	250,000	Korea	77,383
Yogurt	kg	822,719						
Butter	kg	108,292	New Zeland	85,056	Russia	10,858	France	6,494
Cheese and Quark	kg	493,433	Russia	164,626	Germany	152,066	Austria	68,376
Total:		8,226,230	-	6,006,006	-	725,195	-	406,387

Source: NSO

354. **Potatoes and Vegetables.** Mongolia currently produces roughly 60 percent of its own vegetable requirements. A simple estimate of the value of import replacement for vegetables at current consumption levels is $17.5 million annually, based on 40,000 mt of imports at an average price of MNT 700/kg ($0.44/kg).

355. There are opportunities to increase vegetable production for import replacement. Although it will likely be difficult to be competitive against leafy greens from China, Mongolia may have a competitive advantage in root vegetables and cold crops such as onions, carrots, turnips, and cabbage. Green housing has increased and the introduction of new solar greenhouses with heat-trapping partial walls is proving effective in increasing productivity. These may enable Mongolia to capture a portion of the leafy green market – a potentially important direction for crop diversification.

[77] Unpublished dairy report

356. To capitalize on these market opportunities, the vegetable sector should be scaled up and small-holders supported to become larger, fulltime commercial growers. Small producers do not earn enough income to meet household needs and they often do not have other income sources. Five hectares is considered the minimum size at which a vegetable grower is commercially viable. Within Bayangol soum, the local government supports small vegetable producers with soft loans on repayment conditions of 1 percent /month using the Borro Gold Soum Development Fund. Similar local investment approaches could be used in other locations.

357. The mine catering segment offers domestic opportunities for vegetables. Companies are often willing to procure locally but cannot secure adequate volumes or quality standards to allow them to do so. In 2010, discussions with a large food caterer in Ulaanbaatar determined that of the 42 types of fruit and vegetables they currently purchased, 29 are already grown in Mongolia, but only 10 are purchased by them because of volume and quality issues.[78] The common needs of these buyers are:

- Larger volume to make purchasing practical
- Extended availability during the year
- Higher quality of the product in terms of consistency of ripeness and size
- Improved varieties for flavor, handling in commercial kitchens and storage life
- More diversified product
- Improved food safety standards
- Improved packaging for storage and transportation (crates and refrigeration).

358. **Small Fruits and Berries:** Mongolian consumption of fruit is still very low, with good opportunity for growth. Mongolian domestic small fruits and berries (sea buckthorn, black current, raspberry, and strawberry) should target a portion of this market. Fresh fruit imports were 15,250,893 kg in 2012. If 25 percent were replaced by domestically grown small fruits and berries at an average retail price of MNT 3,000/kg, the total annual value would be US$7.1 million/year.

359. **Vegetable Oil (Canola Oil):** In 2012, Mongolia imported 5,970 mt of vegetable oil. Canola/rapeseed production in Mongolia increased to 70,000 ha in 2013 and, with crushing capacity coming on stream, Mongolia could be self-sufficient in the immediate future. The annual value of this replacement would be US$6.0 million.

360. **Livestock Feed Production:** Livestock feeds, mainly corn, are imported for the intensive livestock industry and for poultry in particular. In 2012, estimated consumption of corn by poultry and pigs was 50,000 mt. Valued at $400/MT; these imports cost US$20.0 million per year. While Mongolia does not produce corn at this time, wheat and barley can be substituted for corn in livestock rations.

b. Exports

361. Mongolia needs to improve its competiveness and export readiness to be able to enter and remain in international markets. While many market opportunities exist, there is often not a secure

78 Mongolian Agricultural Market Report, Agriteam Canada Consulting, July 2010.

enough surplus, of a standard quality to maintain an export market. These become "one off" sales. For example, in 2012, the contract to export 100,000 mt of wheat to China was cancelled because of quality issues. Government and industry must work together to overcome these basic readiness issues before significant, sustainable growth in export markets will occur.

362. **Fibers:** Mongolia already holds 20 percent of the world cashmere market. There is room to improve the quality through breeding programs and to increase value-added with more local processing. Mongolian cost of production is significantly higher than China, so competitiveness will be dependent on lowering total product cost.

363. Mongolia can increase the quality of its sheep wool products by strengthening breeding programs focused on fine wool sheep. This would support the GoM plans to support the development of spinning and weaving industries. The ADB Agriculture Sector Development Program found that there was good demand for Mongolian carpets and that firms had no issues selling their additional production after plant and equipment were upgraded.

364. Mongolia has a definite advantage in the production of camel and yak wool, which are considered exotic fibers. Improvements in processing and design of camel wool over the past 10 years have improved the quality and variety of products. In 2008, the "Gobi desert camel wool" was given a geographical indication, or trademark by the Mongolian government. Firms undertaking all of the processing steps within Mongolia can use label along with their own company logo. Yak wool is now being developed as an exotic fiber in high value markets. Current volumes are small and will need to be increased to ensure stable supplies and access to markets.

365. **Potatoes**: Fresh potato exports are difficult because of transport costs, product damage and the fact that Mongolia rests between China and Russia, the first and second largest producers of potatoes in the world. Mongolia has the potential to produce large volumes of quality potatoes, but developing export markets may need to be linked to the development of processing. Market and feasibility studies are required in this area.

366. **Meat:** Growing incomes in Russia and Asia, especially in China, will increase the demand for meat and provide an export opportunity for Mongolia as total trade in meat expands. Growth in meat exports is expected to average 2.2 percent annually to 2021 (Table 8.14). Mongolia has animal health issues that make it difficult to export into Europe and other western markets, but there is an opportunity to focus on some regional markets where food safety standards are less stringent and do not act as non-tariff barriers to trade as an interim measure. Mongolia's geography increases transportation costs and impedes the opportunity to sell low-valued meat carcasses and deboned meat except in its direct geographic zone (Russia, Central Asia, and China) until transport, financing and packaging costs are reduced.[79]

[79] GoM/UNDP report on Max Impex privatization

367. Russia offers the most immediate opportunity based on the long historical trading relationships and ease of transport by rail into Siberia.[80] Russia's own policies to stimulate domestic meat production will result in total Russian imports remaining at about 1 million mt annually (USDA). Because of proximity, Mongolia should be able to place product competitively with competing imports from the EU and South America if health and processing standards and be achieved and maintained. In recent negotiations, Russia agreed to send inspection teams to Mongolia and meat import licensing and quotas will be granted "if meat products' health and safety assurances meet criteria." Russia is also planning to establish a Russian Trade Agency in Ulaanbaatar with a permanent representative responsible for veterinary quarantine issues. Along with this, Russia will assist Mongolia by providing F&M disease vaccines.[81] China is also an important target market. Total beef imports are predicted to reach 1.7 mt by 2018 (20 percent of supply).[82]

368. Middle Eastern markets that are expected to grow could become target markets for Mongolian meat products. Rapidly growing populations in the Middle East and growing incomes in Asia are projected to account for 22 percent of the increase in world beef trade through 2021 (USDA to 2021). These new markets can be approached with high value-added meat products such as fresh mutton to the Middle East and fresh horsemeat to Japan. Value-added boneless meat can be sold fresh or frozen, but needs to be portioned and packed according to international standards which will require technology upgrading and training in butchering.

369. Mongolia can add value and marketability to its meat products by modernizing butchering and packaging methods that will allow for the sale of boxed primal cuts rather than carcasses. Breaking down the carcass into separate cuts allows for market segmentation and price differentiation. This allows for the total value of the carcass to be maximized. Sales of specific products and by products can be made to a number of different markets including the general domestic market, domestic niche markets (mining, restaurants) and a range of export markets depending on the specific demands of each country. The pet food market is also a possible area for development, with large market in China. Trade in pet food requires the same level of animal health standards as other products.

370. The ADB Cluster Study estimated the value of increased imports. Achieving 50,000 to 60,000 mt of exports a year were valued at US$ 132.8 million dollars annually based on an export price of US$ 3/kg. This volume is 50 percent of what the Mongolian Meat Processors Association estimated was the total possible meat exports for 2010.

371. More study needs to be made of the real potential export volumes available from Mongolia over the medium to long-term. Domestic population growth and the need to better manage livestock numbers may limit the actual amount of meat and meat products available for export.

[80] ADB Agriculture Sector Strategy Study, 2002
[81] infomongolia 10 oct 2014
[82] globalmeatnews 28 april 2014 www.globalmeatnews.com

Table 8.14: Beef Trade Long-Term Projections ('000 mt)

Table 14. Beef trade long-term projections

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
						Imports, thousand metric tons, carcass weight						
Importers												
Japan	721	805	825	854	867	873	875	875	883	888	892	900
South Korea	366	460	485	498	503	513	529	542	559	578	597	617
Taiwan	130	125	125	133	138	141	144	147	150	153	156	159
Philippines	138	145	150	154	157	160	163	166	170	173	176	179
Other Asia	671	782	855	931	980	1,019	1,057	1,097	1,133	1,170	1,211	1,256
European Union[1]	437	370	375	373	371	369	368	366	364	362	360	359
Russia	1,020	1,050	1,060	1,057	1,000	977	986	1,003	1,014	1,024	1,031	1,034
Other Europe	62	68	70	72	73	74	75	75	76	76	76	77
Egypt	260	270	290	302	310	316	323	328	331	333	336	340
Other N. Africa & M. East	920	892	944	1,011	1,060	1,099	1,138	1,175	1,207	1,242	1,276	1,311
Mexico	296	296	308	368	412	425	440	456	489	525	566	599
Canada	243	275	260	262	263	264	270	276	281	285	287	289
United States	1,042	920	948	1,111	1,293	1,345	1,365	1,390	1,417	1,446	1,475	1,504
Major importers	6,306	6,459	6,695	7,126	7,426	7,576	7,732	7,896	8,073	8,254	8,439	8,623
						Exports, thousand metric tons, carcass weight						
Exporters												
Australia	1,368	1,250	1,240	1,260	1,292	1,309	1,313	1,321	1,333	1,338	1,343	1,347
New Zealand	530	501	484	503	522	532	533	533	536	539	544	550
Asia	988	1,182	1,332	1,420	1,508	1,587	1,672	1,755	1,821	1,890	1,962	2,031
European Union[1]	337	475	465	456	449	427	415	419	418	417	417	418
Argentina	298	260	300	273	259	262	266	273	289	299	309	320
Brazil	1,558	1,325	1,298	1,423	1,592	1,654	1,710	1,760	1,806	1,863	1,917	1,971
Canada	523	415	400	404	408	404	402	398	400	405	410	413
United States	1,043	1,254	1,259	1,225	1,236	1,262	1,293	1,321	1,349	1,376	1,404	1,432
Major exporters	6,645	6,662	6,778	6,963	7,266	7,437	7,604	7,780	7,951	8,126	8,304	8,481

1/ Covers EU-27, excludes intra-EU trade.
The projections were completed in November 2011.

Source: USDA Agricutlural Projections to 2021

372. **Milk.** The consumption of milk in Asia reached 260 million mt in 2007 while net imports rose to 19 million mt. In the next decade, milk imports are forecast to grow 30 percent as consumption continues to grow. According to the Food and Agriculture Organization East and Northeast Asia will need to import more than 100 billion kg of liquid milk equivalent (LME) by 2015. (FAO).[83] Production and processing constraints currently preclude Mongolia from capturing this market. In the long-term, this regional market could provide a strong opportunity for Mongolian milk exports.

373. The partial analysis of feed stuff availability and potential dairy production indicates that there is ample opportunity to develop excess supply for export. The development of an efficient and profitable dairy industry based on integration with the crop sector for intensive feeding should be pursued. This can be the base for a cluster development. The benefits of developing the dairy sector will have direct benefits to the urban population and spin off benefits to other agriculture sectors through the development of markets for feeds and diversified crop production.

374. **Sea Buckthorn.** Over the next five years, Mongolian Sea buckthorn production will come on stream. If a full range of high valued processed products are developed and successfully marketed, there is significant potential for export earnings. The ABD cluster study estimated that annual exports could be US$87.5 million per year from the sale of Sea buckthorn derivative products such as pure juices, multivitamin pills, wine and other cosmetic and nutritional products. They estimated that one mt of raw fruit could yield MNT 20 million worth of end products.

375. **Grains.** Regional markets in China, Japan and South Korea provide export opportunities for canola, malt barley and buckwheat. China is the world's largest importer of malt barley and imports are projected to rise despite their growing domestic production of malt barley.[84] The challenge for Mongolia is to produce an adequate volume of these crops to secure market access. If barley production is linked into the development of the dairy industry, the supply base will be established for a segment of malt barley.

376. **Processed food and beverage.** Mongolian vodka and beer have recently received top honors in international competitions. Major beverage manufactures are introducing the quality assurance programs and packaging required being able to develop the international markets for Mongolian beverages. Processors need a steady supply of raw product. In 2012, the government cancelled sale of wheat to alcoholic beverage producers because of the depletion of national reserves of wheat. Mongolia exports of vodka dropped drastically as a result.

[83] FAO dairy comsumption projections

[84] USAID, Swiss Agency for Development and Cooperation (SDC), MercyCorps, "Barley Value Chain Assesment Report. Final Report", May, 2008.

9 Conclusions and Recommendations

9.1 Recommendations

377. Mongolia's continued transition impacts the production and marketing of agricultural products and the level of employment and quality of livelihoods within the sector. To ensure productivity and sustainable livelihoods into the future, policy and programs need to respond to these continuing changes. Mongolia must first ensure the sustainability of its natural resource base including soils, water, and pasture. In addition, Mongolia should move away from the bulk production of low quality commodities and work in a strategic and coordinated way to develop high quality, cost-competitive value-added products. The first indications of Dutch Disease have already become evident in agricultural labor costs and the declining competitiveness of products in international markets.

378. Productivity issues can be addressed at three levels of capacity building. First is the enabling environment. At this overarching level, the government has a leading role to play in providing a cohesive and stable policy environment that will support a market-based system. Second, constraints and inefficiencies must be removed at the organizational level. Finally, capacity must be built with individuals in the system to effectively carry out production, marketing and management functions.

a. Transition from a command economy to an integrated, globalized market economy

379. **Establishing a complete and stable enabling environment**. The incomplete and unstable legal and policy framework forces short-term planning and opportunistic investment plans by primary producers and processors. Policy recommendations on specific technical areas are provided in the following sections. At the overarching level of providing an enabling environment, the Government should:

- Eliminate market distorting policies and programs and reallocate their budget to cash transfer programs that are "de-coupled" from production and therefore do not distort prices and resource allocation. Mexico's PROCAMPA and OPORTUNIDADES programs are useful examples for Mongolia. De-coupled income stabilization programs have also been used in the EU, US, Turkey and other countries. These programs can be implemented using conditionalities for introducing improved management practices. Where commodity specific programs are run, programs should reinforce price-quality relationships.
- Ensure that strategic national agriculture programs are maintained under the implementation of the IBL, including the mandate and operating capacities of the VABUs and the continued implementation of localized pasture management and emergency preparedness programs.
- Protect the natural resource base by completing the policy and regulatory framework for land tenure, pasture management and the resolution of conflicts over land use using a mixture of incentives for good management and disincentives for overgrazing.
- Invest in research and extension to disseminate appropriate technology innovation to Mongolian producers and processors.
- Continue to strengthen and broaden risk management systems to create a more secure investment environment. Ensure that the LEWS program is adequately funded and operational at NAMHEM.

- Strengthen the institutional capacity of the MOA and other agencies to monitor, evaluate and enforce programs.

PROCAMPA and OPORTUNIDADES of Mexico

PROCAMPA and OPORTUNITADES are de-coupled cash transfer programs that improve the welfare of recipient households and induce investment in productive activities by providing financial liquidity to rural households. PROCAMPO provides cash to producers for potential losses due to the North American Free Trade Agreement and is a central component of Mexican agricultural policy. OPORTUNIDADES is a central component of Mexican social policy and provides cash to poor households conditional on human capital investment (health and education), thus breaking the intergenerational transfer of poverty by improving the health and education of children and increasing their labor mobility. Conditionalities connected with eligibility for these types of programs could be used in Mongolia to promote improved agricultural practices such as greater pasture conservation (use of appropriate stocking rates and/or maintaining a certain level of biomass) and winter preparedness (preparation and storage of a certain amount of forage per sheep unit) in the livestock sector and improved soil and water conservation in the crop sector.

380. **Support poverty alleviation and labour transition.** Promote the ability of the rural population to fully engage in economic activities by addressing the structural issues of rural poverty through the provision of social services, social safety nets, and job retraining. At a more sustainable national herd size and with commercially viable herd sizes (currently 300 to 500 animals), many fewer families will be supported by the herding sector. Exit strategies are needed. Employment and business opportunities would support the long-term viability of rural communities and help to slow the migration of households to Ulaanbaatar. The OPORTUNIDADES program from Mexico and the community driven development program KALAHI CIDSS program in the Philippines may provide good models. These concepts and could be integrated into or complementary to the existing IBL and LDF programs at the soum level. By defining the eligibility requirements, the benefits of the program can be targeted at low income households and help to eliminate the capture of benefits by larger herders and other high income households.

- Develop exit strategies from herding including job retraining and small business development programs.
- Develop targeted social welfare programs for older and more vulnerable households.
- Provide safety nets for health and education.

KALAHI CIDSS – Community driven development in the Philippines

The program provides block grants to poor communities to invest in public goods such as water systems, health stations, schools, roads and bridges. Participatory sub-project planning and implementation is used to create the Community Empowerment Activity Cycle (CEAC). Communities select from a menu of eligible sub-projects. The grants received are paid on a per capita basis factored for the level of poverty. Communities are guaranteed four rounds of funding. Sensitivity to gender and marginal groups and establishing broad partnerships to build governance capacity in associated organizations enhance success.

381. **Market systems and infrastructure.** Supply chains are under-developed with too many inefficient stages contributing to high retail prices. Industry stakeholders reported a lack of competition, oligarchy and possible collusion in procurement and pricing.

- Strengthen market institutions and oversight.
- Make public investments in market infrastructure including roads, electricity, water, connectivity, market outlets, storage and basic transportation and cold chains for perishable products and roads and facilitate private investment directly or in PPPs as appropriate.
- Continue to improve logistics infrastructure and services (customs, telecommunications, shipping infrastructure etc.) to strengthen linkages between input and output markets and support competitive shipments of goods from Mongolia.
- Improve market information systems.
- Review the Agricultural Commodity Exchange system and its impact on direct contracting between processors and producers based on product specific raw material specifications.

382. **Grading systems and facilities.** Marketing systems should establish clear and reliable price differentiation based on enforced quality standards that will meet the needs of industry and provide the incentive for herders to improve product quality. Being able to source the specific quality standards required by the processor would decrease transaction costs and improve efficiencies.

- Government (MIA, Mongolian Agency for Standardization and Metrology) should work in partnership with industry to develop new grades, standards and pricing systems that will meet the needs of Mongolian agriculture into the future.
- Develop local grading facilities to give herders the incentive to improve their products (notably fibers including cashmere and wool).
- Develop inspection and compliance systems (HACCP, ISO etc.).
- Provide industry training (farm and off-farm).

383. **International market access.** International market access is constrained by the lack of negotiated trade arrangement with other countries. The World Bank Ease of Doing Business Index 2015 ranks Mongolia at 72 out of 189 countries assessed. This places Mongolia above their regional East Asia/Pacific peers (92) and China 90, but behind Russia (62), Poland (32), Japan (29) and Korea (5). While it is relatively easy to establish a business in Mongolia, the country lags behind its peers in trading across borders, on which they are ranked 173 in the world. Notably, twice as much documentation is needed compared to peer countries and three times as much as in OECD countries. The number of days to export (44) or import (45) is strongly impacted by the 23 days it takes to complete export and import documentation.

- The Ministry of Foreign Affairs and the Ministry of Finance need to provide trade services to enhance market access, negotiate trade agreements, build export readiness and provide favorable investment and taxation programs.
- Create an export development policy to facilitate linkages to foreign markets.
- Provide export finance guarantees to remove payment risk for exporters.
- Help Mongolian exporters understand and negotiate the logistics and paperwork associated with accessing international markets.

384. **Avoiding Dutch Disease.** The Government of Mongolia can pro-actively take measures to offset the risk of Dutch Disease by using a portion of extractive industry revenue inflows to support the development of competitive, value-added industries, building those that demonstrate or have the potential to demonstrate technological innovation, productivity growth, above average incomes, environmental sustainability and export intensity. The investment in human capital is a central element of preventing Dutch Disease. In a study of three successful models (Norway, Indonesia and Botswana), it was found that prudent financial management and the avoidance of borrowing by government plus investments into research and education, especially offshore, were successful.[85] Canada, traditionally an exporter of resources, developed a diversified, value-added economy. In light of the current growth in raw material exports and the appreciation of the Canadian dollar, the Canadian Centre for Policy Alternatives (CCPA)[86] recommended a number of sector strategies to avoid Dutch Disease. For Mongolia, these could include:

- Establishing an Agriculture Sector Development Council that would represent a cross-section of stakeholders including federal and provincial governments, labour, industry, business, universities, colleges, research institutes and financial institutions and help to guide program development.
- Supporting value-added production and investment. Development strategies should maximize the potential for value-added production, innovation and environmental sustainability and be supported through investment tax credits and other funding mechanisms.
- Investing in research and skills development, including applied agricultural research, development and extension services.
- Formalizing trade policies and securing trade agreements.

b. Transformation from a low-income, rural agricultural nation to middle-income urban market economy led by mining.

385. **Strengthening the domestic food supply chain.** With more than 50 percent of Mongolians now living in urban settlements, the domestic food supply chain is changing. Increasingly affluent consumers in urban areas demand greater variety, quality, and convenience in their food, sparking the emergence of supermarkets, convenience stores, and fast food restaurants. Efficiency within the domestic supply chain will be a major determinant in whether or not Mongolian food products are able to compete with imported items within wealthy urban markets. Consumers furthermore will not pay for quality differences if they are not easily and reliably discernable. Supermarkets and fast food chains can play a leading role in introducing new retail procurement logistics, inventory management and quality standards and, in turn, stimulate the commercialization and modernization of farms. In Mongolia, the mine catering service can also provide this demand-driven development of the food supply chain and logistics. This will improve support job creation and infrastructure development, strengthen supply chains and keep prices competitive.

- Promote investment and modernization of the supermarket segment of food retailing.

[85] GURBANOV, Sarvar and MERKEL, Edward, Avoiding the Dutch Disease: A Comparative Study of Three Successful Countries, Journal of Qafqaz University, November 29, 2010.
[86] Canadian Centre for Policy Alternatives, "A Cure for Dutch Disease Active Sector Strateiges for Canada's Economy", Techncial Paper, March 2012.

- Invest in transportation and logistics along the length of the supply chain including road infrastructure, transportation and storage facilities, the availability and ability to analyze timely market information and other elements.
- Promote the development of wholesale markets and warehousing owned by the private sector or producer cooperatives, particularly for potatoes and vegetables.
- Promote standardization and predictable procedures within the food supply chain through development of production certification and labelling standards that can reliably indicate premium products.
- Utilize the private standards on food grading and safety used by supermarkets, fast food outlets, hotels and mine catering companies in the domestic food market as a catalyst for introducing and building quality improvements from raw materials through processed food products.
- Strengthen inspection, monitoring and reporting systems.

Rubliovskiy Retail – Belarus

The IFC has supported investment and transformation in the food retail sector in Belarus. IFC provided $26 Mill in finance, technical advice, strengthening of logistics, support for environmental, social and labor policies, and assistance to design and insurance program. Rubliovskiy is the main distributor of global brands, but focusses on locally-sourced agriculture products and suppliers.

386. **Food safety and quality.** Food safety is a public health issue and a determinant in the marketability of Mongolian agro-food products both domestically and abroad. As incomes rise, Mongolians will increasingly demand safe food. Currently, the poor hygiene standards of Mongolian food products make them a low-quality, low-value product. Improving food safety systems and product quality would help to expand markets and improve sales and price levels.

- Adopt the four-level system recommended by FAO that would address: 1) food safety regulations and guidelines, 2) risk management issues in the food chain; 3) inspection and enforcement; and, 4) training, studies and other support work.
- Ensure the implemention of food safety law, policy and regulation consistent with the Codex Alimentarius that is the global framework for food safety regulation and standard on which international market access is based.
- Make public investments in the inspection system.
- Provide technical assistance and credit for upgrading technology and processes in private sector food companies to adopt HACCP, Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP) as well as traceback systems.
- Introduce OFFS systems to ensure the quality and safety of raw materials.
- Provide training and technical support to actors throughout the food system so that they understand the requirements of the food safety laws and regulations and how to properly apply them within their own facilities and farms.

IFC Ukraine Food Safety Project

The project combined short assessments with training to quickly demonstrate results, build a strong consultant base and reach a large number of clients. Engaging local market leaders and using the Global Food Safety Initiative (GFSI) three-module training course for certification, companies are motivated to improve their food safety standards. The levels are "basic" (HACCP, GMPs, GHPs, allergens and traceability), "intermediate" (HACCP, food defense, transport, logistics), and "advanced" (being developed). The shortened format and decreased cost encouraged a great number of companies to upgrade their food safety systems.

c. Evolution from low-input subsistence to intensified, commercial production

387. **Linking primary producers to markets and value-chains:** Strong linkages between agribusiness firms and producers can be achieved through cooperatives, producer associations, and contract farming. Contract farming has been successfully used in many countries to connect smallholder farmers with processors, wholesalers and retailers, particularly in markets for perishable products like milk. The system reduces transaction costs and shares risks between buyers and sellers and improves access to information and assets. Producers are able to increase their productivity and profits because of access to inputs and decreased transaction costs (transportation, marketing) and, to some degree, higher prices. Some studies have shown that farmer's net revenue can increase by up to 100 percent, primarily through cost savings.[87] Contracting can be established between the buyer and individual farmers or with farmer cooperatives.

388. These contracts often involve an "integrator" who provides production inputs (feeds, veterinary services, young stock, technical assistance, etc.) and then purchases the finished product and markets it. The farmer or livestock producer provides the labor and facilities and another other basic inputs required. Contracts can be fee-based (a set amount per animal or by weight) or forward-price contracts (a guaranteed unit price; profit-sharing can be included). Fee-based contracts include specific performance standards regarding feed conversion, minimum live weights, average daily gain or other standards and producers can receive bonuses for surpassing these productivity standards. Forward price contracts advance the production inputs on credit with these costs deducted from the payment at the time the product is delivered. Each type of contact needs to address incentives, penalties, risks and the potential of default.

- Ensure that there are no legal restrictions to the contracting arrangements (i.e. Commodity Exchange).
- Support clear grades and standards that can be used in the contracting agreements.
- Provide information on contract farming and facilitate the linking of farmer groups to firms.
- Collaborate with the firms to provide extension services to the participating farmers.

[87] Pinstrup-Andersen, Per and Cheng, Fuzhi, Editors "Case Studies in Food Policy for Developing Countries. Volume II Domestic Policies for Markets, Production, and Environment" Cornell Univeristy Press Ithaca, New York 2009

- Provide meditation services to both parties when contracts are not fulfilled by one of the parties. Consider the establishment of a nongovernmental mediation board made of up both industry and farmer representatives to review contract conflicts.
- Ensure the enforcement of contracts, including innovative approaches to enforcement such as disseminating information on non-compliance.

Vertical Integration in the Polish Dairy Industry.

After transition, the Polish dairy industry had many poor, small farmers, low yields and quality, and a need for reinvestment and restructuring. In 2001, farms with less than 10 cows produced 75 percent of Poland's milk and less than 60 percent was delivered to dairies. Foreign investment in the dairy sector brought investment capital, technology and know-how, provided working capital to dairy farms and imposed higher grades and quality standards through contract farming. Foreign dairy processers provided farms with feed, seed, fertilizer and other inputs which were paid for by the farmer out of future milk delivery. Investment assistance was provided through leasing of cows and equipment and loans for milk cooling equipment – all paid through future milk deliveries. Dairies also provided guarantees for bank loans to farmers, most at preferential interest rates, allowing farmers access to commercial credit when they had insufficient collateral to qualify on their own. Extension services were provided to raise awareness of quality issues, introduce basic hygiene rules and improve milk handling. The approach was soon copied by domestic dairies. As a result, 76 percent of farmers surveyed had made investments, accessed inputs and improved profitability. By 2000, the percentage of farmers delivering top quality milk had increased from 20 percent to between 79 and 83 percent.

Source: *The Impact of Globalization and Vertical Integration in Agri-Food Porcessing on Local Suppliers: Evidence from the Polish Dairy Sector. Chapter in"The Changing Structure of Food Systems."*

389. **Agricultural inputs.** Primary producers lack sufficient access to productive inputs including livestock genetics, feeds, medications, seeds, equipment and inputs for feed production. Specialized and often small-scale equipment is required.

- Step back from direct provision of inputs and use rebates and other cost offsetting approaches that will not interfere with private sector input supply.
- Encourage private seed multiplication, agricultural inputs and machinery.
- Promote private livestock breeding farms while preserving national breeds through a public genebank.
- Encourage forward contracting between agribusiness firms and primary producers as a means of making inputs available.
- Use PPPs or grant mechanisms to support the start-up of specialized services such as custom equipment operations (custom tillage, spraying, harvesting).

Supporting Agricultural Input Supply in Ukraine IFC provided the Rise company a USD 10 Mill loan and technical assistance to revise its business plan and improve management and governance. Rise sells seeds, fertilizers, crop protection products, agriculture machinery and spare parts to more than 6,500 farms in Ukraine, Russia and Moldova.

390. **Agricultural finance.** Financial services need to be expanded in term of the products offered and the eligibility of small-holders with limited collateral. Mongolian bankers need more detailed information on agricultural productivity, profitability and risks. Dealing with a cooperative rather than

individual small, near-subsistence producers can offer both the financial institution and the cooperative economies of scale and risk mitigation.

- Ensure a strong and enabling legal, regulatory and supervisory framework and avoid any direct government intervention in rural credit markets through interest rate subsidies, credit forgiveness or other measures that would undermine the a sustainable rural finance system.
- Develop a collateral system that recognizes the movable assets of smallholders.
- Provide reliable information on the risks and creditworthiness of producers and cooperatives by ensuring transparent accounting standards, independent accounting firms and credit agencies, an impartial legal system, clear land titles and a reliable process for settling contract disputes.
- Strengthen the knowledge base required for informed and prudent agricultural lending by developing an information base at the MIA on agricultural production and financial performance in Mongolia and providing training to agricultural lenders.
- As agricultural storage and wholesaling expands, support warehouse financing available which collateralizes a producer's inventory while in certified warehouse storage.
- Facilitate financing to support contract farming and out-grower schemes.
- Strengthen agricultural leasing.
- Strengthen credit union management, ability to assess agricultural investments, scale, IT infrastructure, long-term funding for investment lending and risk mitigation.
- Strengthen the role of cooperatives to facilitate credit to emergent and subsistence producers by providing i) more information to both cooperative members and financial institutions on the role and responsibilities of cooperatives in finance, ii) loan guarantees (with clear exit strategies) for qualifying cooperatives as they are in the early stages of capital accumulation and iii) provide subsidies for the adoption of agricultural innovations.
- Provide capacity building to herders, farmers, cooperatives and processors to effectively plan and manage agricultural finance so that they can be creditworthy.
- Provide matching grants for technology adaptation. Explore the possibility of using the World Bank's AgResults initiative, a results-based financial "pull mechanism," to encourage smallholder producers to adopt innovations in production and marketing.

391. **Value-added processing and cluster development.** Increasing the proportion of value-added production in Mongolia's agriculture sector will be an important strategy for improving competitiveness and avoiding the impact of Dutch Disease. Industry clusters have been successfully used in other countries to promote innovation and competitiveness. Clusters bring together processors working as independent firms but benefiting from jointly used input-output markets and other marketing infrastructure and systems.

- Utilize IFC and other funding to stimulate the further development of value added processing, technological renovation, product development, quality assurance and the strengthening of agribusiness management.
- Develop regional agro-processing and local cooperatives with processing capacity to provide off-farm income and employment in rural areas.
- Consider investment into a food or agro-product development center in the medium-term.
- For select commodities with established or potential exports and/or large import replacement opportunities (fibers, meat, milk, sea buckthorn), promote cluster development.

- Conduct strategic planning for cluster development, identify markets and raw material needs, improve raw material quality and work on technology transfer.
- Facilitate collaboration between MIA, the Ministries of Finance, Foreign Affairs and Education, GASI and other groups involved in food safety, grading systems, market information services, R&D, training and extension.
- Facilitate the collaboration of industry leaders to undertake joint activities of mutual benefit related to R&D, logistics and pursuit of export markets.
- Support brand development, ensuring the legal recognition of the brand is in place.
- Promote specialized suppliers of high quality raw product through price differentiation, contracting and input supply arrangements
- Increase support to R&D and extension including the linkage between the two. Consider new funding programs for government-research-industry partnerships.
- Strengthen agriculture and agribusiness programs at universities, colleges, TVET centers and extension programs to provide qualified technical personnel and skilled labor.
- Invest in marketing infrastructure, transportation and logistics such as milk collection and cooling systems, storage and market outlets.

392. **Integration and intensification of crop and livestock production.** Integrating crop and livestock production allows for improved year-round utilization of resources (land, finance, equipment, labor, time), cross-financing of farm activities, provision of inputs between crop and livestock production (organic fertilizer for crops, feeds for livestock), soil conservation through crop residue management, revenue diversification and production and price risk management. Intensification leads to greater levels of productivity and higher net returns to producers.

- Improve land tenure for intensive production to ensure security of buildings and infrastructure.
- Strengthen the regulations that protect crop producers' rights and mitigation processes related to the control of livestock on crop lands.
- Establish a program (including land leases, finance for facilities and stock and practical training) to assist herders to downsize herds and establish semi-intensive or intensive operations.
- Improve feed production, transport, and storage are required to support intensive livestock.
- Improve the availability of specialized equipment, inputs and financing
- Support applied research into feeding and breeding programs and the provision of information and technical support to producers through extension programs.

d. Change in perception from "resources in abundance" to "resources at risk"

393. **Sustainable Resource Management.** Resource management in livestock and crop production, including pasture management, control of animal numbers, soil conservation and the protection of fragile lands will have to be addressed in a number of ways.

- Allow for the leasing of pasture by herder groups. Incorporate seasonal pastures so that rotational grazing patterns can be maintained. Include reciprocal grazing rights and reserve areas for use in drought and dzud emergencies.

- Introduce a grazing fee system as part of the pasture lease that differentiates species so that both the total herd size and the structure of the herd can be controlled.[88] This is in keeping with section 4.4.1.3 of the MLP which states, "Introduce an economic mechanism to link between stocking density and pasture carrying capacity." This approach was piloted under the SLP-II's Livestock Risk Management Fund (LRMF) in four soums.
    - Include grazing fees in land use contracts at the soum level
    - Establish enforcement procedures within the land use contracts
    - Differentiate grazing fees according to the existing degree of overstocking and degree of land degradation, species and location with the highest fees being charged on lands most at risk (fragile lands, peri-urban) and for livestock with the most damaging grazing habits (goats).
    - Monitor carrying capacity and enforce stocking densities.
    - Designate grazing fees revenues for pasture rehabilitation and risk management purposes within the soum.
- Secure water resource rights vis-a-vis mining activities.
- Conserve and rehabilitee crop land. Promote the expanded use of minimum and zero tillage. Introduce soil nutrition programs that will ensure nutrients are replaced at the same rate that they are taken out of the soil through the application of fertilizers (chemical, organic or biological), the management or crop residue and the growing of nitrogen-fixing crops in rotation with wheat. Land use regulation that will allow crop farmers to keep livestock off their fields must be enacted and enforced in order to preserve crop residue for soil enhancement.
- Develop a Payment for Environmental Services (PES) approach to support best practice in environmental management. These approaches can be applied to both livestock and crop production practices. These programs will benefit the rural poor by providing increased cash income, promoting sustainable resource use (and therefore sustainable livelihoods), increased experience with business activities, improved resilience and increased productivity. This approach is included within the Green Development Strategy of the Government of Mongolia and some projects are emerging.
- Base PES and other conditional payments on the achievement of clearly expressed environmental goals such as the adoption of a specific practice (pasture planning, destocking, hay making, forage production) and/or the implied result associated with that practice, such as the increase in biodiversity and/or bio mass.
- Ensure that participants in PES programs have exclusive rights to land use so that cause and effect is clearly delineated for the conditional payments. A clearly recognized legal entity is required to engage in legally established transactions. These could be registered herder groups, NGOs, companies or other legally recognized bodies.
- Use community participation and consultation to shape the program to address both rural livelihoods and environmental management.
- Monitoring is an important element of conditional schemes which can be supported by Mongolia's Ecological Site Descriptions program which rests under the NAMHEM.

[88] Centre for Policy Research, "WHAT IS THE POLICY FOR LIVESTOCK SECTOR REFORM?", Concepts of project proposal to the Government-initiated reform program, published by "Daily News", 4 September 2012.

Payment for Environmental Services (PES)

PES is a conditional payment system, which could include payments for specificed practices, payments for specific ecosystem services, input subsidies, off-take subsidies, one-off grant payments and/or recurring payments for ecosystem services. “Co-investment in land stewardship” is a type PES that pays communities for adopting best practices (e.g. pasture rest and rotation) that will contribute to the desired environmental outome (e.g. improved biodiversity and biomass). In a situation like Mongolia’s, where many subsistence producers are motivated by risk management and avoidance more than short-term profit maximization and where land tenure based on collective action, this approach can be effective in promoting resource management. ***Source:*** *ADB, “Making Grasslands Sustainable in Mongolia”, 2014.*

Table 9.1: Potential PES Approaches for Mongolia

Sources of Financing	Recipients	Approach
Government of Mongolia - Eliminate market distorting programs and subsidies and transfer funds to PES programs - As possible, increase program spending in relation to what other countries spend, from the general budget and method below **International Donors and Programs** - Grant money for program design, capacity development, training, pilot project and pilot project evaluation - World Bank BioCarbon Fund and methodologies for Sustainable Agricultural Land Management (SALM) **Mining Sector** - Tax or environmental fee designated for PES and to be used directly for PES purchases and for research support and capacity building in land rehabilitation and the development of regional seed banks - Voluntary contributions identified as part of environmental management and rehabilitation plans (which might be encouraged through potential tax offsets) **Tourism and other sectors** - User fees - Environmental taxes **International Carbon Market** - Quantification of carbon sequestered using the Verified Carbon Standard would allow groups to sell certified emission reductions.	**Aims of the PES approach:** - Sustainable pasture management - Soil and water conservation in crop production - Rehabilitation of abandoned crop land **Recipient groups:** - Herder groups - Dairy groups - Cooperatives - Communities - Individual farmers (grains, large scale) - Groups (vegetable cooperatives and other) - Soum governments - Companies (mining, agriculture, other) - Partnerships of the above **Modalities** - Direct payments - Market transactions - Co-investment	**Identify successful approaches from previous work in Mongolia** - Review the numerous pasture and soil conservation programs and projects to identify what approaches are successful. **Identify and assess options for PES Modalities** - Identify under what conditions direct payment, market-based payments and or co-investment approaches are most appropriate **Improve the scientific knowledge base** - Conduct targeted research to identify the links between management and environment, possibly incorporating the Ecological Site Description approach. **Link public investment in livestock and grassland management with environmental outcomes** - Revise policy to be support positive environmental outcomes by adding conditionality to funding and removing or revising program elements with perverse environmental impacts. **Learn from pilot actions** - Review existing PES pilots **Ensure community involvement and benefits** - Mainstream community consultation and engagement into program design and implementation

e. Strengthen Institutions and Services

394. **Risk Management**. Risk management systems contribute to a stable investment and operating environment and are important for facilitating investment into new and more productive production. Programs can be organized by government, private or public-private partnerships.

- Strengthen resource management and monitoring systems, including LEWS and local pasture management planning.
- Continue to strengthen and expand the livestock insurance program.
- Introduce crop insurance programs.
- Promote more price risk management tools such as forward contracting between processors and primary producers and/or their representative cooperatives.

395. **Professional and Technical Services.** The Public Expenditure Review reported that support to agriculture is low given its contribution to the economy and recommended more support in a variety of areas. Some of the key areas where capacity building is required include veterinary services, food safety along the entire supply chain beginning with OFFS, through processing and distribution to the end consumer, innovation functions (R&D, education and extension), policy development and strategic planning including investment planning, policy implementation and M&E and inter-agency and donor coordination. In general, capacity building is needed in the areas of:

- Updating mandates and roles of the organizations and, where there are overlapping responsibilities, clarifying relationships between organizations (i.e. MIA and MOE in agricultural research and extension).
- Modernizing and streamlining processes and procedures.
- Improving information systems, databases and linkages to other organizations to improve communication and the timely analysis and sharing if information within the organization and with other groups.
- Improving strategic planning, securing budgets and improving financial management to support the effective operations of organizations.
- Economic and technical feasibility analysis.
- Monitoring and evaluation functions.

f. Provide Capacity Building to Government, NGOs and Private Sector

396. **Cooperatives.** Producer cooperatives can play a powerful role in representing and coalescing herders and farmers in product marketing, procuring inputs and accessing credit. Cooperatives allow producers, through joint actions, to overcome the atomistic nature of their industry and counterbalance the market power of larger market actors. They can be significant players in value chains and contribute to the development of cohesive, marketing systems. For this reason, the GOM is actively promoting the development of cooperatives. To support producer cooperatives to fully take on their roles in agro-product value chains, it is necessary to:

- Continue to strengthen the cooperative law and regulations.
- Ensure coherence between cooperative and other policy regimes including taxation policy especially related to VAT.

- Provide training to cooperative executive to strengthen management and leadership in terms of governance, operational management, capitalization, market orientation and business principles.
- Provide capacity building for cooperative leaders and members in managing financial capital and agricultural loans to improve the credit-worthiness of cooperatives.
- Provide capacity building for members to understand their member rights and obligations and to be motivated to work together for common benefit.
- Support investment in cooperatives by looking at new financing tools and approaches, including loan guarantees, PPP and others.
- Assist in finding markets and linking into value chains.
- Provide subsidies for the adoption of agricultural innovations.

397. **Pasture Management Groups and Mechanisms.** Many projects have supported pasture co-management systems and have facilitated the formation of pasture management groups to lead local pasture management planning and implementation. The success of these programs is uncertain as many groups cease to function or function poorly after the withdrawal of program funding. Government can build pasture management group capacity by:

- Supporting umbrella organizations and local service providers who can deliver training, information and other services.
- Integrating marketing and economic activities into the group structure to provide greater motivation for membership and enhance sustainability.
- A more directive approach could be to link some portion of the IBL and LDF resources to the presence of local pasture management groups and their preparation of annual pasture management plans.

398. **Private Sector**. A critical constraint in the adoption of new production methods is the awareness and willingness (attitude) of producers which stems from a shortage of research and information on how to apply new techniques profitably under Mongolian conditions. Related to this is the weak capability (skills and knowledge) of producers and processors to implement new approaches in their own businesses.

- Individual herders and farmers need to develop new attitudes, skills and knowledge in agricultural production, food safety, marketing and business management.
    - Livestock nutrition and feeding management including the nutritional needs of livestock during different phases of growth and reproduction, pasture management, forage production, hay making and storage, silaging and the use of concentrated feeds.
    - Breeding program management and genetic selection including culling programs.
    - Herd health programs to control TB, Brucellosis and other infectious and production diseases. Cow-care and milking systems to control bacteria and contamination in milk.
    - Safe handling and application of agricultural chemicals and livestock medications including the withdrawal periods required prior to sale.
    - Intensive livestock production including livestock management, nutrition and feeding, health management, breeding, housing and marketing.
    - Conservation tillage, soil nutrition and fertilization, weed and pest control and irrigation management, amongst others, for grains and oilseed production.

  - Intensive vegetable and potato production including variety selection, soil fertility and fertilization methods, weed and pest control (including integrated pest management), irrigation management, improved greenhouse management, harvesting, processing, storage and marketing, amongst others.
  - Farm management, marketing and farm financial management.
- Processors require training in business management, finance, quality control and food safety, new technologies, marketing and export management.

9.2 Role of the Public and Private Sector:

399. The role of government and private sector has often been poorly delineated in Mongolia. The role of government should be to establish the enabling policy environment for sector development, provide the program and technical support required by building institutional capacity in the MIA, veterinary services, food safety, innovation services and others, and to enforce, monitor and evaluate policy implementation. The private sector's role is to carry out investment, production, marketing and the delivery of various commercial services. Producer organizations represent the subsector or industry sector for advocacy, resource management, joint infrastructure development and commercial activities such as procurement, processing and marketing. Table 9.2 summarizes the key actions to be taken, the roles of the public and private sector and areas where joint action and PPPs may be appropriate.

Table 9.2: Public and Private Sector Roles

General Issue	Detailed Issue	Public Role	Private Role	Public-Private Partnerships
Market Orientation				
Price/policy signals promote quantity vs quality product.	Outdated grading systems are not linked to price. Subsidy programs pay by weight vs quality.	Design subsidy programs to encourage quality products. Use less distorting tools.	Industry implements quality-based pricing.	Develop new grades, standards and pricing systems.
Markets are under-developed and limited.	International market access limited by trade barriers, tariffs, health status etc.	Negotiate trade agreements to secure market access	Identification of target markets and product development.	Joint market development programs.
	Domestic markets are underdeveloped.	Market infrastructure and regulation.	Develop markets.	Collaboration with mining companies.
Market infrastructure and systems are incomplete.	Market outlets and storage facilities. Collection and cold chain systems. Market information.	Strategic planning. Public investment into market systems.	Producer associations participate in market information systems.	Joint investment into building market and storage facilities.
Food safety and quality control systems lacking.	Food safety is weak at all stages.	Policy and regulation. Food Safety agency. Support training.	Develop quality control programs in plants and on farm.	Joint gov't/industry awareness and training programs.
Production and Processing				
Incomplete, unstable investment environment.	Land tenure issues discourage resource management and investment. Unstable policy environment encourages short term planning and investment.	Pass necessary law and develop regulation. Identify and revise conflicting laws and regulations.	Investment in new production technologies and quality programs.	
Processing is inefficient, making Mongolian products uncompetitive.	Operating capacity shortages limit the ability to buy/store raw material. Seasonality in materials supply means capacity is underutilized most of the year. Plant and equipment is out of	Assist industry with strategic planning for plant and equipment through business advisory services. Support training programs for management.	New management skills and processes Investment in inputs and machinery, plant	

General Issue	Detailed Issue	Public Role	Private Role	Public-Private Partnerships
	date. Management capacity is limited and unstable.			
Nutrition severely constrains productivity of both livestock and crops and results in high death losses.	Livestock feeds are inadequate. Producers need skills in feeds and feeding.	Support R&D and extension for feeding programs. Support investment in feed production.	Pasture management. Forage production. Feeding programs. Increase offtake.	Pasture co-management.
	Crop production has depleted soil fertility and supplementary fertilization is insufficient.	R&D and extension on fertilization trials. Programs to promote improved soil conservation and fertility.	Investment in soil conservation and fertility.	
Livestock health limits productivity, restricts market access and threatens public health.	Infectious diseases limit exports. Production diseases limit productivity. Milk products have sanitary issues. Hides, skins and fibers are damaged.	Provide investment into livestock health programs. Strengthen veterinary education.	Implementation of on-farm herd health programs.	Development of animal ID and trace-back programs.
Genetics have become outdated.	Genetic resources have dwindled. Livestock producers are not managing livestock breeding adequately.	Public investment for nucleus herds and genetic improvement programs.	Investment into improved breeding animals. On-farm implementation of genetic improvement programs.	Joint research programs in economic traits and breeding programs.
	Plant breeding programs are not keeping pace with the needs of industry.	Increase plant breeding R&D. Exit seed supply.	Commercial seed multiplication.	
Resources are being eroded and sustainable production is endangered.	Grassland degradation caused by overstocking.	Provide secure land tenure. Introduce per head grazing fees and PES programs.	Focus on fewer, more productive animals. Intensify production.	Pasture rehabilitation partnerships and research with industry and mines.
	Soil fertility declining.	Policy and regulation to keep livestock off farm fields	Adopt sustainable production practices. Keep livestock off fields	Land rehabilitation programs with gov't, industry and mines.
	Water conservation and water	Address water issues	Adopt sustainable	Joint investments in

General Issue	Detailed Issue	Public Role	Private Role	Public-Private Partnerships
	access.	caused by the mining sector. Promote water conservation.	production practices (min tillage etc)	irrigation and well drilling.
Industry Coordination, Inputs and Services				
Industry organization	No functioning clusters.	Facilitate clusters.	Improve collaboration between industry members.	Joint R&D and market development programs.
Input market development	Commercial access to inputs (livestock and plant genetics, inputs, machinery) and quality of inputs needs strengthening.	Exit from the input market. Use rebates etc. to lower input and machinery costs.	Provision of inputs through commercial activities.	PPPs to establish input supply service run by coops and private sector.
Financing	Investment and operating capital is scarce, expensive and not tailored to industry needs.	Provide backing to innovative financing systems/products.		Explore opportunities for PPPs.
R&D, Extension and Agriculture education.	Innovation support is not meeting the needs of industry.	Support a pluralistic innovation system.	Provide extension services to raw material suppliers.	Joint R&D programs.

Appendix A. Meeting and Data Requests

Contact Person/Organization	Contact Details/Location	Date, Time	√
Ministry of Industry and Agriculture (MIA) and related government agencies			
CHOI-ISH Lkhasuren, *General Dir., Strategic Planning and Policy Department*	Choi_ish@mofa.gov.mn *Ph. 9915-5518, Ulaanbaatar*	Oct 2, 2013	√
Janboota, Planning and Policy MIA room 603 Policy info, stats and names	(8825-8835) *Ulaanbaatar*	Oct 4, 2013 and various	√
Naraanchuulan, Livestock and Disaster Officer, Livestock Dept.	(9919-0332) *Ulaanbaatar*	Oct 4, 2013	√
Ganibal, Head, Coord'n for Livestock Production Policy Implementation Department	*Ulaanbaatar*	Oct 9, 2013	√
Mr. Gankhuyag, Livestock division	*Ulaanbaatar*	Oct 10, 2013 Nov 21, 2013	√
Renchintsengee, Head - Coord'n for Crop Prod'n Policy Implementation Dept	9909-2390 *Ulaanbaatar*	Oct 10, 2013 Nov 21, 2013	√
Regzedmaa - Senior officer, head of working group on value chains	*Ulaanbaatar*		
Battsetseg, Senior Officer (commodity ex) Room 404 MIA Light Industry	T: 51-263-237 M: 9665-5999 battsetseg@mofa.gov.mn battsetseg@yahoo.com *Ulaanbaatar*	Oct 9, 2013	√
Strategic Policy and Planning Dept Ms Suvdaa, Senior Policy Officer (Commodity Exchange)	*Ulaanbaatar*		
Crops Foundation	*Ulaanbaatar*		
Dr.Baatar Togoonyam CVO Room 24 in old building	(9905-1014) vetsermongolia@magicnet.mn *Ulaanbaatar*		
Bynie, MIA Responsible for cooperatives	Stop in room 303 *Ulaanbaatar*		
Tungalog, Food Department	*Ulaanbaatar*	Nov 21, 2013	
Byambadorj, MIA	Responsible for pastures *Ulaanbaatar*		
Batjargal, Head, Animal Breeding Division (Formerly UNDP Combating Desertification)	(9917-9141) *Ulaanbaatar*	Oct 7, 2013	√
Jigjidperuv, Genebank	*Ulaanbaatar*		
Sanlye, Monitoring and Evaluation	*Ulaanbaatar*	Oct 9, 2013	√
Government offices/agencies – Aimag level			
Surunjav, Vice Governor	Choir, Gobi-Sumber	Oct 11, 2013	√
Delgermunkh, Animal Breeding, Registration and Reporting	Choir, Gobi-Sumber	Oct 11, 2013	√
Darkhanbat, Agricultural Specialist	Choir, Gobi-Sumber	Oct 11, 2013	√
Ulziisaikhan, Mgr Sumber Sheep Locally Owned	Choir, Gobi-Sumber	Oct 11, 2013	√

Contact Person/Organization	Contact Details/Location	Date, Time	√
State Enterprise (Nucleus breeding flock)			
Mr. Nergui, Director, Agriculture Office	Darkhan	Oct 14, 2013	√
Mr. Enkhbat, Crops	Darkhan	Oct 14, 2013	√
Veterinarian	Darkhan	Oct 14, 2013	√
Cooperatives Specialist	Darkhan	Oct 14, 2013	√
Ms. Oyuntugs, Intensive Farms	Darkhan	Oct 14, 2013	√
Government offices/agencies – Soum level			
Bayarsaikhan, Governor	Sumber soum	Oct 11, 2013	√
Mr. Gereldambaa, Vet Director, VABU	Sumber soum	Oct 11, 2013	√
Mr. Davaasuuren, Agronom, Head of VABU	Khongor Soum	Oct 15, 2013	√
Universities and Research Institutes			
Baldan, Director School of Biological Resources and Management Mongolian State University of Agriculture (MSUA)	9900-2316 Baldan_tumar@yahoo.com *Ulaanbaatar*	Oct 9, 2013	√
Batbuyan – Rural Sociology Specialist	*Ulaanbaatar*	Oct 5, 2013	√
MSUA – Research Inst of Animal Husbandry (RIAH)	*Ulaanbaatar*		
Lhagshaa Competitiveness Institute - Study on wool for carpet, woven textile, insulation materials	Central Tower Rm 1010A *Ulaanbaatar*		
Bayarsukh Noov, Director General MSUA Plant Science and Agricultural Research Institute (PSARTI) - forages	Darkhan	Oct 14, 2013	√
Private Sector Processing/Marketing			
Hides/skins – Darkhan Nekhii Batsaikhan 9937-2555 Met with Ms Chansel, director of garment mrk.	*Darkhan*	Oct 14, 2013	√
Mr. Erdenebat, Mogol Noos (wool)	Ph. 9111-3264, *Ulaanbaatar*		
Mr. Enkhbaatar (owner),Darkhan Max (meat)	*Darkhan*	Oct 14, 2013	√
Oyunsuvd, Senior Manager Oeg Guril Ltd (flour milling)	Darkhan	Oct 14, 2013	√
Mr. Nasaankhou,Monfresh (milk)	Ph: 9911-2328, *Ulaanbaatar*		
Fibers – Goya cashmere	*Central Tower, Ulaanbaatar*		
Carpets – Erdenet or Ulaanbaatar khifs	*Ulaanbaatar*		
Potato and vegetable			
Fodder factory			
Meat trader	Choir, Gobi-Sumber	Oct 11, 2013	√
Wool processor, Choir Kharkhan Company	Choir, Gobi-Sumber	Oct 12,2013	√
Farmers and Herders			
Tumorbaatar and Erdentsetsgee Extensive livestock and nucleus herd keepers	Gobi-Sumber	Oct 12, 2013	√
Semi-intensive dairy	Gobi-Sumber	Oct 11, 2013	√

Contact Person/Organization	Contact Details/Location	Date, Time	√
Hay making and dairy	Gobi-Sumber	Oct 12, 2013	√
Extensive livestock	Gobi-Sumber	Oct 12, 2013	√
Mr. Enkhjargal, Director Ogelshin Farm (wheat)	Khongor soum, Darkhan-Uul	Oct 15, 2013	√
Mr. Zoondee, Nyambiagal Davaa LLC Potato and Vegetable	Bayangol soum, Selenge	Oct 15, 2013	√
Mr. Enkhtuur, Vice Dir, Montarimal XXC Dairy, Beef, Greenhouses	Bayanchandman, Tov aimag	Oct 15, 2013	√
Veg producers selling at UB markets	*Ulaanbaatar*		
Associations and Cooperatives			
Nasanjargal, President - Seabuckthorn National Program/ Mon. Nation'l Assn of Seabuckthorn Growers and Producers (MNASGP) www.chatsargana.mn Golden_fruits@chatsargana.mn	ph: 9911-6339 Tel: 7015-6339 *Ulaanbaatar*	Nov 20, 2013	√
Mongolian Crop Farmers Association	*Ulaanbaatar*	Nov 22, 2013	
Meat Association	*Ulaanbaatar*	Nov 22, 2013	√
Altantsetseg Cashmere and Wool Association	*Ulaanbaatar*		
Dairy Processors Association	*Ulaanbaatar*		
Dairy Farmers Association	*Ulaanbaatar*		
Mr. Bayarmunkh, wool coop	Gobi-Sumber	Oct 11, 2013	√
Projects and Individual Consultants			
Murray Maclean, Chief Technical Adviser, FAO, Integrated Livestock-based Livelihoods Support Programme UTF/MON/009/MON Mongolia Global Agriculture and Food Security Project (GAFSP)	murray.maclean@fao.org *Ulaanbaatar*	Oct 4, 2013	√
Khasa, Project Coordination Office Sustainable Livelihoods Project	9911-4884 MoF 6th floor *Ulaanbaatar*	Oct 4, 2013	√
Mr. Enkh-Amgalan, Centre for Policy Research (re. SLP and Peri-Urban project)	cpr@cpr.mn Ph 9911-9027 *Ulaanbaatar*	Oct 7, 2013	√
Ser-Od Tsetsgee,Dairy Project Director, Dairy company	tsetsgee@mongolia-dairy.mn suunbilegdel@magicnet.mn Phone 9911-3784 *Ulaanbaatar*	Oct 3, 2013	√
Turmandakh, Director, President, MFARD SDC Potato Project	turoo@mfard.mn Ph: 99277280 *Ulaanbaatar*	Oct 7, 2013	√
Ms. Enkhamgalan and Johan Ramon SDC Green Gold Project	*Ulaanbaatar*	Oct 5, 2013	√

Contact Person/Organization	Contact Details/Location	Date, Time	√
Vanchin, Project Coordinator, LAMP Former Manager of ADB Agriculture and Rural Development Project (ARDP)	Vanchints@gmail.com 9911-2476 *Ulaanbaatar*	Oct 7, 2013	√
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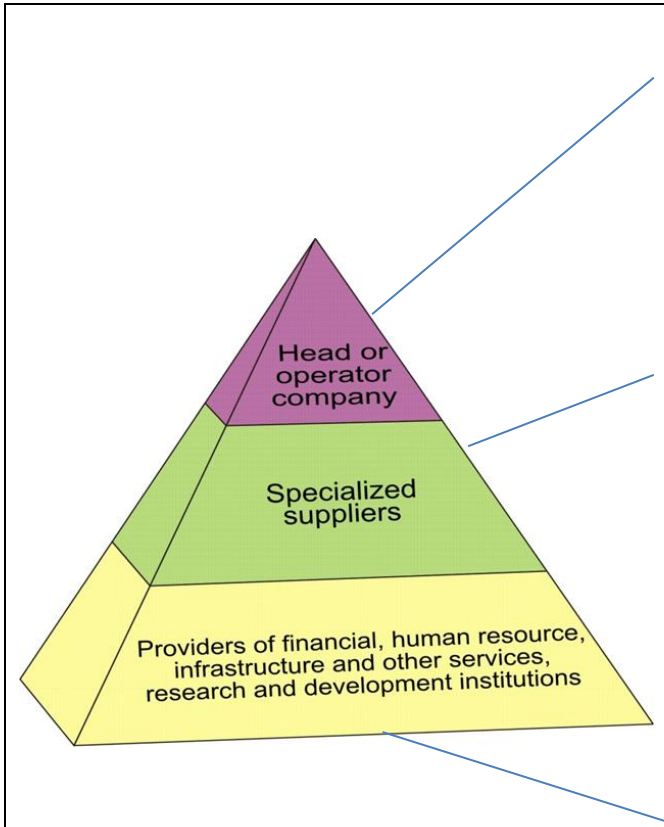
Appendix C: Selected Major Policy and Regulatory Issues

Level	Specific Need	Impacts of Non-Action	Comments and/or Examples
Policy Development	Secure land tenure regarding usage rights and conflict resolution.	Unstable usage rights discourages infra-structure investment (barns, fences, wells).	The Peri-Urban project demonstrated the positive impact of long-term leases.
	Grazing fees for managing pastures, animal numbers and herd composition.	Overstocking, pasture degradation and increasing frequency and severity of dzuds threaten long term productivity.	Grazing fees are included in the Draft Land Law.
	Year-round land rights for crop producers enforced to keep livestock off crop fields.	Standing crops and residue are at risk. Soil fertility suffers as farmers are unable incorporate crop residues into the soil.	Complex Law on the Crop Industry is ready to go before Parliament.
	Removal of conflicting laws and/or multiple versions of laws being proposed.	Conflicting standards and programs block overall sector development and put some strategic public sector programs at risk.	Land Law vs Draft Pasture Law; Animal Health laws; Food Safety/CODEX vs the IFC law for GASI; IBL vs risk assessment, pasture plans, VABUs.
	Policy and subsidy tools that will minimize market distortion.	Direct intervention into markets (inputs, commodity exchange) and quantity-based subsidies distort market and policy signals and discourage private sector investment.	Policy tools that are less distorting and deemed "green light" by WTO are available including tax breaks and income stabilization programs.
Implementation & Enforcement	Rationalize responsibilities and improve coordination between Ministries and agencies.	Overlap leads to conflicts and poor implementation and enforcement policy.	Local parliament resolution with regard to the Land Law can resolve some issues at local level.
	Clear policy. adequate enforcement and provision of information and training in food safety laws and regulations.	Shortage of inspectors and inadequate development of HACCP and other system for voluntary compliance. Insufficient understanding of how food safety laws should be applied. Lack of transparency.	
M&E	Policy and programs are not assessed and results of programs are not fed back into an informed policy feedback loop.	The MIA has insufficient staff and resources to effectively monitor and evaluate programs.	

Appendix D: Potential Cluster Development in Mongolia

<table>
<tr>
<td rowspan="3"> 
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<td>- Support brand development, ensuring the legal recognition of the brand is in place.
- Support technological renovation, product development and quality assurance.
- Strengthen management capacity.
- Develop collaborative approaches to R&D, logistics and pursuit of export markets.</td>
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<td>- Promote specialized suppliers of high quality raw product through price differentiation, contracting and input supply arrangements
- Allow private sector suppliers of inputs and services to emerge including private seed multiplication, agricultural inputs and machinery. Step back from direct Increase support to R&D and extension including the linkage between the two. Consider new funding programs for government-research-industry partnerships. In the short-term, conduct strategic planning for cluster development, identify markets and raw material needs, improve raw material quality and work on technology transfer. Medium term, consider investment into a food or agro-product development center.
- Provision of inputs and provide, if desired, rebates and other credits/cost offsetting. Promote private livestock breeding farms while preserving national breeds through a public genebank.
- Where input suppliers are lacking, investigate PPP arrangements for start-ups. Use PPPs to support the start-up of specialized services such as custom equipment operations (custom tillage, spraying, harvesting).</td>
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<td>- Universities, colleges, TVET centers and extension programs provide qualified technical personnel and skilled labor. Strengthen agriculture and agribusiness programs at university and college level. Develop continuing education programs.
- Invest in marketing infrastructure, transportation and logistics such as milk collection and cooling systems, storage and market outlets.
- Develop a funding mechanism for agriculture that is removed from MIA decision-making and governed by standard banking procedures.</td>
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