

Current status of crop production in Mongolia

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INTRODUCTION

Mongolia is a land locked country of 157 million ha situated on the Central Asian steppe between Russia and China where it experiences a severe continental climate and low precipitation. The total area of agricultural land is 130 million ha of which more than 98 percent is pasture. With a population of only 2.5 million, it has one of the lowest population densities in the world. In 1990, Mongolia's transition to a market economy inflicted severe shocks on the economy and the social system.

Herding became the main source of income and the number of herder households in Mongolia doubled between 1990 and 2000. Livestock numbers increased from 25.8 million head in 1990 to a maximum of 33.6 million head in 1999. Others moved to county centres and obtained small plots of land, enabling them to grow vegetables for family consumption and sale.

Inter-regional migration has become a dominant feature of rural areas, with a steady movement of families from western provinces to the centers. Between 1998 and 2000, migration to urban areas accelerated and the urban population increased by seven percent. Reasons for this migration include seeking employment, the need to be closer to better social services, no access to credit in remote areas, and natural disasters in rural areas that killed herds and

severely lowered livelihoods. In-migration places increasing pressure on the limited pasture resources of the cropping zone resulting in overgrazing and desertification and creating conflict with local farmers and herders.

Mongolia has a long history of agriculture development. For many centuries nomadic herdsmen have grazed their livestock on the extensive steppe and produced a wide range of animal products for both their own consumption and for the slowly growing urban population. During the 1960's, crop development began, when large areas of steppe land were ploughed. The large-scale crop state enterprises grew mainly wheat and fodder crops, but also pilot cultivation took place, for crops such as oilseeds, soybean, maize, rape and sunflower. Even sugar beets were tried on a few plots. Vegetable production, especially potatoes, did continuously increase. Also, in the remoter provinces, in the East, West and South, some nucleus areas were built up for crop production, generally with irrigation.

We might ask, "How is it possible, to develop agriculture and to achieve rural development in such a vast country – 1,5 million square kilometres – with such a small present population – 2,5 million inhabitants? In a country where the average annual rainfall is with less than 250 mm rather low and the frost-free period is generally less than 120 days a year. "

One part of the answer is Mongolia's diversity. In Mongolia's central-northern area, there is a large area with rainfall higher than 300 mm a year that enables production of variety of crops. This area covers at least half a million hectares with reasonable soil conditions suitable for crop production and is not too far from the

communication network, infrastructure. This area could be sufficient to produce enough of the most important staple crops necessary to supply the population of Mongolia.

Food and agriculture potential of the country has successfully attracted foreign investors for the last decade. Specifically, the amount of national investment in food and agriculture sector has sharply increased, particularly in beverage, milk and meat processing, intensified livestock farming (such as poultry, pig, dairy and beef feedlots). This investment has been forthcoming due to the Mongolia's comparative advantages, with a market location neighboring and two big countries, which have a huge consumption of these products. Mongolia also has the potential to run export-oriented organic farming to produce ecological clean products.

However, after the political change, the emerging market economy and the rapid privatisation at the beginning of the last decade, all economic activities of the country slowed down as production subsidies ended.

In spite – or may be because - of the quick privatisation, crop production, especially wheat, has decreased continuously and the productivity of the crop land declined due to the lack of agriculture inputs. In addition, there was also no knowledge of farming systems that could be successfully operated under market conditions. Building up new types of enterprises, in agriculture and all industries, advanced slowly.

But today, after more than a decade of experience, the structural changes needed in the agriculture and food industry are slowly crystallizing. Although a few of the privatised large-scale crop

enterprises may, can, and will work successfully, it is recognized, that the area of the "Agro-Industrial Complexes" has become history.

Medium and small-scale enterprises in agriculture production, marketing and food processing are emerging and work successfully. The idea, that the country has an eternal vast and growing steppe, suitable for an ever increasing livestock production is now being replaced by a new political, economic and social concept which recognizes, that crop and livestock production have to be intensified in those areas, suitable for production. And crop and livestock production have to be integrated. Economic growth has to be compatible with the conservation of our natural environment. The second characteristic of this new concept is, that the economic growth has to be decentralized in order to achieve rural development.

Considering all above factors and needs the Mongolia's agriculture structure, the farming system and the Government agriculture policy are in a process of change.

After a decline of agriculture production and productivity during the last decade, the trend goes upward again through integration and intensification crop and livestock production, emerging semi-settled and medium and small-scale farms, cultivating numerous other crops beside wheat, introducing up-to-date technologies of modern farming.

The Government of Mongolia has made a number of very positive efforts to increase the level of both foreign investment and national investment in the food and agricultural sectors. The principal laws that govern the sectors are widely regarded as legislation encouraging sector development while protecting the rights of foreign and national investors. Food and agricultural

investors receive preferential tax treatment and there are no barriers to repatriation of wealth created from either industry. In addition, the Government has designated the sector as one of the key sectors for Mongolia's economic development.

For economic development to take place in Mongolia, especially in the agriculture and food sectors, a comprehensive concept needs to be developed, based on private initiative, the creation of new enterprises, the introduction of new capital, private sector know-how, and management skills.

The Mongolian agriculture sector needs cooperation and investments. Not only capital is needed, but even more technical and economic know-how as well as management. Investors, whether nationals or foreigners, are invited to participate even more in this development towards a social market economy, which takes into account the need to preserve our valuable natural environment and cultural traditions.

Mongolia is already producing a variety of valuable agriculture and food products. Food industries are developing, the domestic demand is increasingly supplied by national production and a surplus can and will be channeled into the international market. But all this requires an investment mentality and trust into the future of the country.

Basic country information (2003)¹

Population:	2.475.400
Area:	1,566,000 sq km (610,740 sq mi)
GDP by sectors:	
Agriculture	20.7
Mining	8.6
Service and trade	27.6
Inflation:	1.6% in 2003
Language:	Mongolian
Religion:	Buddhism
Literacy rate:	82.9%
Land boundaries:	8.158 km, with Russia 3,485 km and with China 4,673 km
Average altitude:	1,580 m above sea-level
Terrain:	Vast semi-desert and desert plains, mountains in west and south-west, Gobi Desert in south-east
Climate:	Average summer temperature +20°C, average winter temperature -26°C, average rainfall 200-220 mm. Winter lasts from November to late April, Spring May through June, Summer from July through to September.

FOOD AND AGRICULTURE SECTOR OVERVIEW

Agriculture is one of the major economic sectors of Mongolia and the country's economy is very much dependent on the development of

¹ Source of information: FIFTA, Ministry of Finance and Economy and National Statistics Office.

agricultural production. Agriculture and food processing industries represent major sector of the Mongolian national economy, accounting for one third of the Gross Domestic Product and exports. More than 40 percent of the working force is engaged in the sector.

Mongolian food and agro industry sector consists of processing and food industry, livestock and crop production.

Highlights of the Food and Agriculture sector, 2003

	Units	
Total livestock		25.307.800
Cattle	Head	1.784.300
Sheep	Head	10.706.200
Goats	Head	10.603.400
Horses	Head	1.958.300
Camels	Head	255.600
Pig	Head	13.700
Arable land	ha	385.203
Total cultivated	ha	226.561
Cereals	ha	207.311
Potatoes	ha	5.421
Vegetables	ha	5.869
Fodder crops	ha	3.210
Total size of pastureland for grazing animal	ha	80,000.000
Average yield		
Wheat	ton/ha	0,88
Potatoes	Ton/ha	9,3
Total annual yield		
Wheat	ton	164.400
Potatoes	ton	78.673
Vegetables	ton	59.610
Fodder crops	ton	9.424
Hay		814.508

Agriculture Status and Opportunities for Development

Agriculture comprises three subsectors: (i) extensive and semi-intensive livestock; (ii) crop production; and (iii) agroprocessing. It is extensively based on natural resources making it prone to adverse climatic conditions. The sector is susceptible to external shocks that affect prices for major agricultural outputs and inputs.

The cropped area includes seeded land, summer fallow, and abandoned land. Cereal, potato, vegetable, and forage production in Mongolia, after large-scale introduction in the late 1950s, peaked in the late 1980s with a total of 1,300,000 ha in crop and summer fallow. Cereals account for 92 percent of the seeded area, of which wheat accounts for 97 percent. Grain production declined by 79 percent between 1990 and 2004 as average yields fell from 1.12 tons per ha to only 0.80 in 2004, and seeded area declined. Total sown area in 1990 was 787,500 ha and reached a minimum of 138,600 in 2004.

The sharp decline in area and yields was caused by the removal of subsidies, a lack of quality seed, old and/or obsolete equipment, shortages of inputs, limited access to credit, limited training and experience of new private farm managers, and lack of markets.

Despite the importance of the agricultural sector, it receives of only 1.8 percent of Government spending. This has led to deterioration in infrastructure and services needed for the sector to develop. Irrigation schemes, which used to cover more than 50,000 ha have fallen into disuse, and now cover only 14,000 ha.

Privatized veterinary and extension services struggle to survive in a market that is dominated by poor households operating on a barter system. Agricultural research is constrained by a shortage of funding and cannot

facilitate the innovation in livestock productivity, crop varieties and agricultural products needed to help the sector shift to sustainable production in a market economy.

Livestock

The meat processing industry has recovered significantly in recent years due to a resurgence of demand from Siberia and the Soviet Far East creating an opportunity for Mongolian abattoirs to establish specialized feedlots to provide a more stable supply of livestock meeting the quality standards of the export market. This would extend the use of slaughter facilities, improve dressing percentages, allow anti-mortem health inspections and lead to a significant increase in meat production and a reduction in grazing pressure. Small-scale meat processors in Ulaanbaatar have created a demand for pork and backyard pig producers are seeking supplies from greater distances. Egg consumption is still only 13 percent of the pre-transition level, and there is growing consumer demand for chicken. Pigs and chickens are well suited to small-scale production and would offer income diversification for vegetable farmers.

The development of markets for intensive and semi-intensive livestock production will have multiple benefits for the crop sector. The demand for feed grains, crop by-products and fodder crops will provide cash markets for new crops allowing farms to diversify production. This will improve soil fertility through the introduction of legume crops and diversify production and marketing risks for farmers. Farmers will have the choice of marketing grains directly or to add value to the grain price by feeding it through livestock. The choice of selling or feeding grains gives farmers a

tool for managing longer-term cyclical price fluctuations in both livestock and grain markets. Livestock production also provides farmers the opportunity to utilize surplus labor in the winter. Finally, livestock production is a very important strategy for improving cash flow over the year, since production can be timed to allow for sales in all months.

Field Crops

Dry lands occupy about half of the world's land surface. Desertification of dryland is characterized by a cycle of natural and socio-economic causes and effects with sand and dust storms being both a symptom and cause of desertification (i.e. removal of soil). Deposits of blowing soil can destroy crops and make areas uninhabitable, as well as causing respiratory disease. Conventional tillage practices (frequent, deep plowing) allow the soil to dry to the depth of tillage, leaving it prone wind erosion. Conventional tillage also leaves no residue cover on the field and returns a limited amount of organic matter to the soil. This contributes to increased losses of soil moisture to both evaporation and transpiration and the loss of soil fertility. Abandoned land that is not re-established is also vulnerable to desertification by wind erosion.

Large areas of Mongolian cropland are heavily eroded and a system needs to be introduced that will stop desertification and soil losses. New approaches in soil conservation including weed control, water management and minimum tillage that are able to improve the yield without large investments have to be considered. Fortunately, Mongolia can draw on 25 years of soil conservation experience and seed development in Europe, Australia, and America and four years of local experience in minimum tillage through various international donor programs when adopting this new

technology. Farmers are very interested, but need a means to start the system. Education, some investment in machinery and herbicides are needed immediately. In the long term equipment replacement can be financed from the profits gained by increased productivity. Education is most important because, without it, the investment money will be wasted and land abandonment and erosion will continue.

During the summer fallow year in Mongolia, several passes with a wide blade cultivator or plow are made to kill weeds and prepare summer fallow. Spring harrowing of summer fallow fields is a common practice in an effort to reduce spring moisture losses and kill early maturing seeds. Seeding is done after harrowing with a hoe press drill, or after one more spring cultivation with a double disk drill. The extra spring cultivation is considered to be necessary to firm the seedbed in fields that were plowed the year before.

The widespread use of the wide blade cultivator in Mongolia and research done 40 years ago shows that wind erosion has been recognized as a threat for many years. Another indication of local awareness of wind erosion problems is the large-scale adaptation of strip farming. In strip farming fields are split into long narrow strips (25-50m wide), where alternate strips are fallowed and seeded in any given year. This reduces erosion in that ground wind speed is reduced, and that airborne soil particles will deposit in the stubble where wind speed is reduced.

Weed control is one of the major factors limiting wheat production in Mongolia. At the farm, an average of 8-12 percent of the weight of the crop is removed as weeds (based on farm interviews). The flourmill then removes another 10 percent before milling. By killing these weeds at an early stage, the amount of water that the weeds have taken up would translate into a

similar yield increase of the wheat crop. Currently some farmers use 2,4D to control broadleaf weeds. Other species of broadleaf weeds such as thistle, wormwood, and buckwheat species that are not affected by 2,4D are present in wheat fields. Therefore, a need for newer broadleaf herbicides exists.

Minimum and zero tillage is a technology that has become widely adopted internationally in areas where moisture is a limiting factor. Minimum or zero tillage replaces field cultivation, which dries out the soil, with a chemical (glyphosate) application that does not disturb the soil, induce evaporation, or affect organic matter decomposition rates. It also reduces desertification and the incidence of dust storms. As the price of glyphosate has decreased and the price of fuel increased, minimum tillage has become more cost effective. Considerable success has been achieved in modifying existing equipment for minimum tillage operations. Opportunities remain for further adaptation until financing costs fall to levels that allow investment in new equipment designed for the purpose. There is a potential for alternative crops in Mongolia to establish crop rotations, improve soil quality, add nitrogen to the soil, reduce the risk of growing wheat in monoculture, provide livestock fodder, and increase farmers' incomes through diversification.

Minimum and Zero Tillage

Minimum and zero tillage is one of the technologies that have become widely adapted in areas of the world where moisture is the most limiting factor. Minimum or zero tillage replaces field cultivation with a chemical application, usually containing glyphosate (Roundup), thereby not disturbing the soil, reducing evaporation, and organic matter decomposition

rates. Minimum tillage also has the ability to reduce desertification and dust storms. Minimum tillage is partly responsible for decreasing the severity of dust storms. Also, yield reductions due to drought stress in 2001 was less severe than in the previous drought years.

By improving the water status with minimum tillage higher yields are achievable. Since 1998, several aid organizations together with the Ministry of Food and Agriculture has studied and demonstrated minimum and zero tillage in the Central Cropping Region. Where a complete system including improved straw management, seeding equipment, and spraying equipment was introduced, successes have been observed. Since then the government has promoted chemical fallow for minimum tillage by providing a low interest loan for herbicide purchases.

Chemical fallow can conserve $\frac{1}{2}$ to 1 inch (1.27 to 2.54 cm) more moisture than conventional fallow. Low disturbance direct seeding (zero tillage) will provide 0.4 to 1.5 inches (1.0 to 3.8 cm) more plant available moisture than conventional seeding while high disturbance direct seeding (minimum tillage) with no fall tillage and one high disturbance tillage

Irrigated Horticulture

Opportunities exist to address constraints and improve vegetable production and marketing to satisfy the growing demand from increasing urban populations. Access to irrigation can be improved by including flood, trickle and sprinkler systems within existing schemes. The critical issue is the need to develop systems for water management and paying for maintenance of irrigation infrastructure. New horticultural technologies including plastic tunnels, walk-in and fixed greenhouses with effective

watering and control systems that are already accepted technologies in Mongolian vegetable production could improve and stabilize production if introduced on a broader scale. Production can be increased and diversified by introducing new crops and varieties, including varieties suitable for long storage.

Marketing is a critical issue for the horticulture sector. Product quality can be improved and sales seasons lengthened by introducing improved post-harvest treatment, simple, effective storage facilities and processing technologies to increase grower value-added.

Improving growers' access to wholesale markets based on farmers' groups, and localized collection points for grading, packaging and bulk transport of group produce and linking input supply and product marketing to the provision of technical advice would improve market efficiency and improve growers access to market information. The availability of sound advice and information is the catalyst for increased input use leading to increased production and product quality from which both producers and consumers benefit.

During the pre-transition days, vegetable production was mostly undertaken on the irrigated state farms. In 1990, potato and vegetable production was 131.1 and 41.7 tons respectively, the latter comprising other root vegetables and cabbage.

With the privatization of irrigation farms, the areas planted to vegetables declined, mainly due to the collapse of formerly government funded irrigation schemes.

In the late 1990s, Government promoted the expansion of the vegetable industry through its Green Revolution Program. This program funded by the Government was approved in 1997. It aims to improve

supplementary food and income to low-income families by assisting with potato and vegetable production.

This, combined with the increasing incidence of subsistence production, has resulted in an increase of the areas planted to potatoes and vegetables from 6,200 and 3,200 ha in 1995 to 8,800 and 4,800 ha in 1999 respectively.

Vegetable producers use a variety of irrigation methods ranging from flood irrigation to exclusive sprinkler devices such as tractors with water guns or sprinkling wings to center pivots, side rolls, and movable laterals, the latter mostly relying on tractors for their mobility. The average size of vegetable producing units is estimated to be 5 ha.

Irrigation facilities available to the crop sub-sector usually comprise the diversion of permanent rivers into gravity conveyance systems (concrete lined or unlined canals (46 percent of irrigated areas) or, where topography permitted, pressurized steel pipe networks (54 percent of irrigated areas)).

In the Central Cropping Region around 27 dams were constructed to retain surface runoff and regulate river flows but were often of poor design and construction.

Since the late 1990s, inadequate maintenance of irrigation schemes (both head-works and primary and secondary canals previously government financed) and their subsequent progressive deterioration has led to a substantial reduction in the irrigated area² adversely affecting vegetable production and productivity.

In 2004-2005 the Government of Mongolia invested 1.6 mln US\$ in rehabilitation of irrigation facilities.

² At the beginning of the 1990s the irrigated command area was 49,593 ha, of which 38,359 ha was operational. By 2001 only 3,364 ha of government built schemes were operational. Of this, 1,400 ha (41.6 percent) was used for crop production and 1,964 ha (58.4 percent) for potato and vegetable growing. Less than 10.0 percent of privately established schemes were utilised by 2001.

Analysis of Key Problems and Opportunities

Constraints

The major constraints to increasing farm productivity are climate, inadequate water supplies and lack of knowledge of water management practices, inferior genetic and quality of seed material, insufficient production inputs and outdated production technology.

Most of the cropped area in the Central Cropping Region has, on average, 95-120 frost-free days each year with an average annual precipitation of 250-350 mm of which 70 percent falls between July and September. The uncertainty of early precipitation for the critical seeding operations results in variable seed germination with its subsequent effect on potential yield. In the case of vegetables, drought in the period 2000-2002 caused a decrease in production of about 24 percent which had to be substituted by increased imports.

Access to high quality vegetable and field crop seed in sufficient quantities at critical times is unreliable. Mongolia has in the past developed new varieties of cereal, fodder, and vegetable crops, but at present, variety breeding, pre-variety testing and production of breeder seed is severely limited by budget constraints. There is a big need in drought and hot resistant varieties of crops.

While domestic breeding and multiplication of seed has nearly ceased, there has been no significant importation, selection and multiplication of new varieties since transition..

A similar situation exists with input supplies. Under the socialist regime, inputs supplies were delivered to state farms. The private input supply business is still developing in Mongolia and access to high quality

inputs such as chemicals and farm equipment is limited, usually being supplied by traders sourcing from across both northern and southern borders.

Production equipment and machinery are aging. There are limited spare parts for the antiquated machinery and only a limited service capacity, apart from those in larger province centers.

As mentioned earlier, unpredictable weather makes agriculture production in Mongolia very volatile. There is a need for provision of an effective and affordable protection to farmers against the global warming devastating impact of adverse weather events, which leads to the need of developing climate stress free modern cultivation technologies under protected condition such as plastic house, green house, tunnels and new water management practices.

Development Opportunities

There are four key developments that contribute to providing an opportunity for the development of Mongolia's vegetable sub-sector.

The first is the already existing knowledge of farmers in working in vegetables production and the availability of adequate soils and water resources and land availability.

The second is the gradual change of the Mongolian diet that shows an increasing per capita consumption of fruit and vegetables across a wide range of income groups. As such, there is an increasing demand for vegetables that is currently being satisfied by imported products. With the poor road infrastructure in rural Mongolia, distribution of imported goods is made more difficult creating opportunities for localized production.

The third is that a comparative advantage can be demonstrated on seasonal production (using modern green house production technologies,

higher input levels and with assured water supplies) in selected products over imported items provided quality considerations are addressed.

The fourth is the relatively low marginal cost of rehabilitating many of the public irrigation schemes compared to the potential benefits derived there from.

The Government considers that the crop sub-sector could provide income generating opportunities and increase rural employment to alleviate the deepening poverty in the Central Cropping Region - key social and economic concerns.

As part of its rural development and poverty reduction strategies, Government has put a high priority in introducing the green house technology to increase horticultural productivity and production.

The forecasted demand for vegetables and tubers suggests there is a reliable market³. Projections of total consumption in 2015 indicate a potential market of 195,500 tons of potatoes and 198,600 tons of vegetables. This represents an increase of 3.8 and 6.9 times current consumption levels.

There is a significant import substitution opportunity for vegetable and fruit products as Mongolia produces only about 54 percent of all vegetables consumed. Main supplies to the central urban markets are China (fresh) and the former Soviet Union or Eastern Europe (processed).

In 1998, 93.2 percent of imported vegetable products originated from China with Russia being the next largest supplier. In that year, 10,284 tons of potatoes were imported from China and 1,050 from Russia.

With its membership into the World Trade Organization, China will progressively eliminate export subsidies on farm products and will have to

³ T. Enderneshuluun: Mongolia in "Marketing of Vegetables and Fruits in Asia and the Pacific", 2001. See also Supplementary Appendix A for further details on market analysis.

rely more on its comparative advantage based on its milder climate and cheaper labor to compete on export markets.

As domestic production of fruit and vegetables develops, there is likely to be greater focus on the supply of out of season vegetables from regions outside Mongolia. Opportunities for processed vegetables during this period may also provide an alternate market outlet for domestic production.

Mongolian markets are dispersed. In this setting, local production can be competitive when compared to the cost of transporting small volumes of imported, perishable products over long distances given poor road infrastructure.

With protected crop technologies and trainings to increase productivity, Mongolia can be competitive with China in most cool season crops that can be easily stored.

Domestic consumers also display a strong preference for local products based on the perception that they are hygienic and of high quality. Mongolian products are likely to remain competitive in the national market for quality fresh.

Technical development includes a need to increase the scale of production and product logistics to keep reducing unit costs while improving quality. In order to meet the estimated local demand, 26,000 ha of potatoes and 24,000 ha of vegetables would be required at current yields.

Opportunities exist to address constraints and improve vegetable production and marketing to satisfy the growing demand from increasing urban populations by (i) the rehabilitation of irrigation schemes and the development of flood, trickle and sprinkler systems on farms; (ii) the adoption of new production technologies - plastic tunnels, walk-in and fixed greenhouses with improved water management systems; (iii) the introduction of new genetic material - varieties with early maturation characteristics or

those better suited to extended storage periods; (iv) the introduction of improved post-harvest handling and storage techniques; (v) the promotion of improved farmer access to wholesale markets; (vi) the provision of crop insurance system to protect the farmers in case of occurrence of a disaster while reducing their credit risk.

These initiatives can be applied at different levels and in different combinations to promote improved incomes and nutrition amongst the small-scale subsistence producers, to achieve diversification and expansion of the medium scale commercial producers.

Given the labor-intensive nature of vegetable production, significant employment opportunities will be created across all producers and throughout all geographic areas, irrespective of the target markets.

The Government has shown a strong commitment to development of the crop sub-sector by establishing an Investment Fund (IF) using the proceeds of commodity aid that can be used on a non-subsidized basis for medium term financing of agricultural machinery and protected horticultural production facilities.