2) Organizations concerned with foreign assistance

Matters regarding requests for and acceptance of foreign assistance are handled in the following manner. A request form is submitted by the ministry concerned where a request is made to the National Development Board, the country's office to contact regarding matters related to assistance being requested. The request is reviewed and evaluated at a working-level meeting in which the Ministry of Trade and Industry, the Ministry of Finance and the Ministry of Foreign Relations, in addition to the above-mentioned ministries concerned, participate. The request is then presented to a Cabinet meeting for final decision. Subsequent diplomatic procedures are then handled by the Ministry of Foreign Relations.

3.8 Impediments to Agricultural Development

Since 1950, agriculture and livestock industries in Mongolia have developed as part of a planned economy established as part of the country's socialist system with the economic and technological support of the nations of the Soviet Union led COMECON organization. Crops were cultivated on government managed farms, and thanks to the introduction of large machinery, the production of grains, feed crops, potatoes, etc. expanded during this period.

Traditional nomadic livestock raising was conducted by negdels established throughout the country, and efforts were made to increase the number of domestic animals reared through government control of this type of animal husbandry. In the intensive livestock production area, dairy farms, pig farming, and poultry farms were established around large cities such as Ulan Bator in order to supply city dwellers with animal products, resulting in increased production of milk, pork, and eggs. Thanks to these measures, the production of agriculture products peaked during the late 1980s, and the nation was even self-sufficient in wheat.

The rapid transition to a market economy that started in 1990 invited political and economic chaos, followed by social confusion, resulting in a severe slowdown in productive activity in the agricultural sector of the economy. A variety of impediments to the development of agriculture latent under the planned economy that prevailed prior to 1990, were instantly made manifest, and the effects of these impediments, which acted in complex ways with new impediments created by the shift

to the market economy, have included a rapid decline in agricultural productivity. These factors are analyzed in the following paragraphs.

1) Systemic Problems

(1) Financial Administration Problems

In order to revive the nation's economy, the government of Mongolia has accepted a program of Structural Adjustment Policies as part of the policy support being provided by the World Bank and IMF. These polices include: [1] Devaluation of the exchange rates, [2] Tighter monetary restraints, and [3] stricter budget management. As a consequence, the administrative organization of Mongolia has been reformed, with large numbers of administrators and technicians being released from public service. The curtailment of government agriculture spending has prevented the implementation of new policies aimed at serving the needs of the market economy.

(2) Insufficient Financial and Monetary Supply Systems

As a result of sharply rising input material and machinery prices, a slump in agricultural product prices, and delays in receiving payment for products sold, the business performance of many corporate farms and intensive animal husbandry enterprises is poor, and as their liabilities mount, their ability to borrow funds is sharply curtailed. As a result of the shrinkage of the money supply caused by the monetary restraint policy of the government and the introduction of high interest rates to control inflation, the system that supplies funds to enterprises no longer functions effectively.

(3) Insufficient Agriculture Support Systems

The agricultural support systems that supplied operating funds, compensated producers, provided aid in the event of disasters, supplied materials needed for daily life and agricultural in put, gathered and shipped farm products, and provided information, cultural amenities, and entertainment, all of which were destroyed by the division and break up of the state farms and the negdel, have neither recovered nor been replaced by new institutions.

2) Shortage of Human and Intellectual Resources

(1) Shortage of Trained and Skilled

An increase in the number of farm units following the break up and privatization of the state farms and the negdel has created the need for many skilled specialists in a wide range of fields. The breaking up and privatizing these agricultural units without satisfactory accompanying measures to provide an appropriate skilled and educated

human resource base has created a serious shortage of personnel able to deal with the needs of a market economy.

(2) Insufficient Human Resource Development Systems

Organizations involved in research and education in the agricultural and livestock industry were reorganized in 1993 as a unified system with the National Agricultural College at its peak in order to integrate research and educational activities, but facilities and government funding for this program are still insufficient. There are almost organizations such as the Technology Training Center, specializing in the training and development of human resources nor engaged in the introduction and dissemination of external technology.

(3) Shortage of Technology and Skilled Know-how

While the country has inherited considerable cultivation, irrigation, diary farming, and farm management technology from the old regime, it has not developed and accumulated very much cost-priority farm management technology and know-how needed to operate in a free market economy.

3) Shortage of Material Resources

(1) Shortage of Seeds, Fertilizer, and Other Input Materials

Under the planned economy, the government managed the importing and supply of all materials used to produce agricultural products (agricultural machinery and machinery parts, fertilizer, seed, pesticides, and veterinary medicines). Although this system was privatized after the shift to the free market system, it still does not function fully under this new system. With Mongolia dependent upon foreign imports for almost all input materials, a shortage of foreign currency and confusion in the system that supplies such materials have resulted in a severe shortage of such materials.

(2) Deterioration of Facilities and Machinery

Almost all existing irrigation facilities, intensive animal husbandry production facilities, storage facilities, dairy product processing facilities, flour milling plants, and food processing facilities of various kinds were constructed with the aid of the former Soviet Union and the countries of Eastern Europe during the 1970s, and are due for replacement. In spite of this, the shortage of funds means that they can not be replaced, and must therefore either be shut-down or operated at lower and inefficient capacity levels.

(3) Shortage of Spare Parts

Almost all of the large tractors, combines, intensive animal husbandry facilities, agricultural product processing plants, and other agricultural machinery was manufactured in the former Soviet Union or Eastern Europe, and the current economic challenges being faced in these countries hampers efforts to obtain the spare parts needed for this machinery.

4) Related Fields: Insufficient Resources and Fragility

(1) Insufficient Transportation Services

Physical transport in Mongolia is almost all done by road, but because of the low quality of the roadway network, it is expensive to gather and ship farm products and transport losses are high. While more than 80% of the trucks and other vehicles formerly operated by the government-owned transport companies have now been transferred to the private sector, many of them are past their usable age and have deteriorated, further reducing the efficiency of the physical distribution system in the country. A shortage of fuel has also cut the amount of time that these trucks can operate.

(2) Underdeveloped and Deteriorated Related Industries

Formerly, agricultural machinery and parts, fertilizer, pesticides, and other input materials and equipment were obtained by barter from various COMECON member countries along with such consumer goods as vegetable oils, sugar, clothing, and the like. Because Mongolia's role was limited to supplying COMECON countries with mineral ore and unprocessed agricultural products, it has not developed related manufacturing industries capable of producing high quality agricultural products and production materials and machinery. Further, although its primary processing industries, of which leather production and weaving are prime examples, are relatively developed, these existing industries have deteriorated because of the economic confusion following the transition to a free market economy.

(3) Insufficient Social Infrastructure

Almost all of the country's infrastructure systems ミ its water supply and sewerage systems, electric power supply, communication systems, and the like ミ have deteriorated to a considerable degree. Moreover, a shortage of financial resources is delaying their renewal. Although the infrastructure is fairly advanced in Ulan Bator and other large cities, it is in an extremely backward condition in farming areas. With

the breakup of the negdel system, the system formerly used to provide information to nomadic groups has ceased to function, preventing them from obtaining the weather information and market price information needed to effectively manage their farms and livestock, and even information related to their daily lives has become ever increasingly difficult to obtain.

CHAPTER 4 DEVELOPMENT PLAN

4.1 Development Objectives and Basic Policies

4.1.1 Aims of the Development Plan

1) Target Year

Target year for the development plan has been set at 2010. One of the reasons for this is that it will be required relatively long term to set the agriculture and rural development in the right direction and to be realized the development effect. Further, since the entire economic and social system of Mongolia will need to be reformed in accordance with the shift to a market economy, new technology and know-how should be introduced and under the system the direction and required measures for regional development should be clearly identified.

In setting the target year, consideration is also given to its being in harmony with the national development plan targeted the year 2010 under preparation by the NDB.

2) Objectives and Goals

(1) Objectives

The objectives for the Study Area are following:

a. to attain the population's nutrition norm and to heighten the self-sufficient rate of food through increasing and stabilizing of food production;

b. rising farmers income and living standard, correcting differences in culture and income between urban and rural area, alleviation of poverty and reducing unemployment rates through the realization of sustainable, high productivity and self-reliant agriculture; and

c. production increase of import substituting items and improvement of international balance of payments by promoting the export of agricultural products.

(2) Goal of Food Supply

The goal is to provide a stable supply of food to the 1.5 million people living in the Study Area by the target year, and to meet the population nutrition norm fixed by the Ministry of Health according to WHO guidance. The projected population and the supply goal of major commodities are shown in Table 4.1.1.

Table 4.1.1 Targeted Production and Demand of Staple Foods

Item	Unit	Consumption in 1989 (State)	Targets in 2010				
			Demand		Production		
			State	'Study Area (a)	State (Assumption)	Study Area (b)	Balance (b)-(a)
Population	Thousand	2,100	3,000	(50.0%) 1,500			
Meat and Meat Products	Thousand tons	196	255	(45.1%) 115	<107.1%> 273	(26.7%) 73	< 63.5%> -42
Milk and Milk Products	Thousand tons	253	762	(42.1%) 321	<107.9%> 822	(32.1%) 264	< 82.2%> -57
Wheat	Thousand tons	496	695	(64.2%) 446	<105.3%> 732	(66.0%) 483	<108.3%> 37
Flour	Thousand tons	221	314	(49.7%) 156	<100.0%> 314	(57.0%) 179	<114.7%> 23
Potato	Thousand tons	58	192	(51.0%) 98	<100.5%> 193	(70.5%) 136	<138.8%> 38
Vegetable	Thousand tons	45	191	(51.3%) 98	<100.5%> 192	(63.5%) 122	<124.5%> 24
Sugar	Thousand tons	50	72	(51.4%) 37	< 26.4%> 19	(100.0%) 19	< 51.4%> -18
Vegetable Oil	Thousand tons	3	6	(50.0%) 3	< 41.7%> 2.5	(36.0%) 0.9	< 30.0%> -2.1
Calories required a day	Kcal	2,600	3,200	3,200			

Note: ( ) indicates percentage of national total within Study Area.
< > indicates self-sufficiency rate. Figures of < > in the " Balance" indicate self-sufficiency rate of Study Area..
Consumption in 1989 was calculated by multiplying state population by per capita consumption.
Wheat consumption in 1989 was assumed by the Study Team with referring the data of the MOFA.
Figures of the " Wheat" include neither loss nor seed.
Figures of the " Potato" and " Vegetable" in 2010 include neither loss nor seed

4.1.2 Development Strategies by Sector

1) Basic Strategy

In undertaking regional development, the problems of the area, their natural and social characteristics, and other factors are taken into consideration, and attention is given to harmonize between the development and the protection of the natural environment through the most efficient use of existing arable land (controlling development of new

arable land) and the distribution of livestock in accordance with livestock raising capabilities of grassland.

In addition, along with restoring and increasing agricultural and livestock production by making the maximum use of the potential in the area, importance will be attached to promoting local industries that make the most of local ingenuity, in order to have balanced growth in urban and rural areas.
The basic strategy for the development by sector is as follows;

- Crop Sector -

Goals:
a. Increase wheat and potato production
b. Fulfill diversified needs for vegetables, fruits, etc.
c. Establish a domestic production system for sugar and vegetable oil

Strategies:
a. Establish breeding and stable supply of crop seed and seedlings
b. Enhance the production infrastructure through rehabilitation of irrigation facilities

- Livestock Sector -

Goals:
a. Establish a stable supply of livestock products to the urban population
b. Encourage export promotion of livestock products
c. Improve living standards of herders

Strategies:
a. Increase production, processing and distribution capabilities for milk, meats and eggs
b. Raise levels of livestock product quality
c. Enhance assistance to herders and farmers through establishment of farmers' cooperatives

- Common Fields -

Goals:
a. Improve administrative and financial systems in response to changing market economy system
b. Establish systems that support technology and human resources development
c. Activate regional economy/society and alleviate poverty

Strategies: a. Improve financial and mutual relief system
b. Improve facilities related to research and education
c. Regional localization of processing plants, etc.
d. Improve infrastructure; distribution, roads, etc.

2) Development Strategies by region

Strategies to be adopted in the area will be as follows by considering the present state of region's agriculture and topographical suitability.

It should be noted that the types, regions, and aspect are not simple, in which considerable portion of livestock farming is included.

A. Crop Farming Sector

Crop farming will be promoted in Selenge, Tov, and northern Ovorhangai where there is much arable land. The crop promotion area will be divided into following three types.

A-1 Irrigated Intensive Crop Farming Area

Production and supply bases for vegetables, fruits, and other intensive farming crops that are based on the use of irrigation, including those cultivation in greenhouses, will be formed in Darkhan, Ulaanbaatar, and other regions in the suburb of large cities, in order to guarantee the supply of fresh products for the Mongolian people.

A-2 Irrigated Industrial Crop Farming Area

In order to improve the rate of self-sufficiency for sugar, and vegetables oil which completely or largely depend on import from other countries, production will be increased through the development of new farms within the irrigated agricultural area with producing sugar beets, rape seed, and other industrial crops in consideration of the state of distribution and location of processing plants.

A-3 Rainfed Crop Farming Area

The production should soon be restored in grain crops, fodder and green manure crops, potatoes, and other crops that are relatively extensive farming and drought-resistant crops. Thus systems of being bases for supplying principal foods and livestock feed will be established.

B. Livestock Farming Sector

The production of livestock products will be increased, while giving attention to maintaining and improving the productivity of grasslands in Bulgan, central and southern Ovorhangai, and areas in the suburb of large cities.

B-1 Intensive Livestock Farming Promotion Area

While continuing to utilize former state farm assets, dairy, hog, poultry, and other intensive livestock farms will be developed and promoted in Ulaanbaatar, Darkhan, Erdenet, Arvaiheer, and other regions in the suburb of large cities, in order to establish a system of supply that responds to the urban consumer demand for raw milk, meat dairy and meat products and eggs as quickly as possible.

B-2 Nomadic Farming Promotion Area

In Bulgan and central and southern Ovorhangai, a system for sustainable reproduction will be established and livestock production will be increased based mainly on traditional nomadic raising of the five livestock types through livestock feeding in response to the carrying capacity of the grasslands and the introduction of improved livestock breeds. In addition, local industries will be promoted through the construction of processing facilities in rural areas.

3) Environmental Considerations

Individual projects proposed in this Master Plan are designed with sufficient emphasis on environmental conservation, in accordance with the basic development policies.

(1) Land Utilization Plan

Sufficient attention must be paid to the conservation of the natural environment. For example, natural environment protection areas that are to be preserved through government actions should be excluded from the areas to be developed as farms. In addition, existing farmland should be fully utilized. Further expansion of farmland will not be planned.

(2) Agricultural Development Plan

a) Irrigation

A plan for development and reconstruction of irrigated farmland must be developed with sufficient consideration to the protection of aquatic life, both animals and vegetation, and water use by local people living in the basin area.

b) Farmland Preservation

About half of the 787,000 ha of existing farmland has been affected by soil erosion, and it has been pointed out that some of the abandoned farmland is facing the danger of desertification. To protect the soil of arable land from erosion and to prevent desertification, windbreak forests need to be provided around farmland, and farming plans with sufficient consideration to soil protection measures need to be developed.

(3) Livestock Farming Development Plan

a) Intensive Livestock Farming

Measures to dispose of excreta generated by dairy farms, pig farms and poultry farms need to be provided by developing a "livestock farming-crop cultivation integration system" in which manure production facilities are set up for each farming facility to produce organic fertilizer, which in turn is sent to vegetable-producing farmers in the outskirts of large cities.

b) Nomadic Livestock Farming

Currently well pumping facilities are rapidly becoming old and deteriorated, and as a result usable wells are fast disappearing from grassland (meadow). As a result, livestock animals are concentrated around the scarce usable wells, raising concern about the potential impact on the ecosystem of the surrounding grassland areas. Therefore it is necessary to optimize the geographic arrangement of wells so that deterioration of grassland will be prevented through planned use of grassland.

4.1.3 Land Utilization Plan

1) Basic concept

The basic purpose of this program is to secure land for the production of agricultural and livestock products required in 2010 from the Study Area, which has a total area of 23,565,000 ha. In addition, a land use program most suitable to this region in 2010 will be laid out in consideration of

[1] trends in land use for other purposes including residential and industrial use as well as future needs;

[2] regulations for land use from the viewpoint of preservation of natural environment; and

[3] ensuring consistency with the land use program laid out by the state.
(See Fig. 4.1.3.1)

(1) Arable land

Conditions for arable land taken into consideration include:

[1] areas with a required minimum precipitation of 250 mm a year or over;

[2] land with a gradient of less than six degrees in consideration of the operationability of large machines and prevention of soil erosion;

[3] land with a fine calcificated black brown soil, shallow black soil with a relatively high content of organic matter; and

[4] places with a trunk road running close by for easy transport of harvested crops.

It is necessary in the future to duelop and maintain roads for going cultivation and transport of harvested crops, and to conserve soils for maintenance of land productivity.

(2) Grassland

The area of grass land will be 15,868,000 ha, which is the total area minus the area of land for other purposes. However, from the standpoint of effective use of grass, the area of land available for use will be 17,404,000 ha, which is a combined area of 900,000 ha of forest area covered with grass and 640,000 ha of the Tobal route.

(3) Forest area

An analysis of satellite photographs of the area specified by the Ministry of Nature and Environment (4,732,000 ha) shows that the actual forest area has an area of 3,527,000 ha, indicating that decrease of forests is well under way. For this reason, the program calls

for encouragement of afforestation from the viewpoint of environmental protection to secure a forest area of 4,732,000 ha as specified by the Ministry of Nature and Environment. Part of the forest area will be effectively used as a source of grass.

(4) As for the area of urban industrial area and natural environment protection area, the figures specified by the Ministry of Nature and Environment are adopted.

(5) Other area includes roads, rivers, bare land as well as the Tobal route, which is designated as the special area by the state.

2) Land use program by Aimag

The following table shows the land use program scheduled to be realized by the year 2010 for each applicableAimag.

Table 4.1.3.1 Land Use Program for 2010

(Unit:1000ha)

	Selenge & Darkhan-Uul	ToV & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total
Arable land	335	300	111	41	787
Grass land ①	1,976	4,962	2,974	5,956	15,868
Forest area	1,821	1,284	1,415	212	4,732
②Area of land to be used as a grass resource	(270)	(190)	(390)	(50)	(900)
Urban & Industrial area	52	53	83	22	210
Natural Environment Protection area	28	727	2	20	777
Other area	231	549	373	38	1,191
③Area of land to be used as a grass resource	(40)	(430)	(170)		(640)
Total	4,443	7,875	4,957	6,290	23,565
Area of land to be used as a grass resource ①+②+③	2,286	5,582	3,534	6,006	17,408

3) Matters to be noted regarding land use.

One of the important task of this Master Plan is to lay out an agricultural and livestock development program in harmony with the conservation of natural environment. To this end, the proper method of using land is required.

When the natural conditions of the Study Area are taken into consideration, the following methods of land use, which are in line with the purpose of the new land law, are recommended.

[1] The right to use grassland and arable land must be given to nomads and farm companies individually, and rental fees should be collected in accordance with land productivity. Collected fees must be used to cover expenses for taking various measures, including the maintenance of grassland's ecosystem, and prevention of soil erosion in arable land.

[2] Land users must be placed under an obligation to effectively use land which they are entitled to use, and provide maintenance and management in good faith.

[3] The forest area must be protected, and measures, such as afforestation, must be taken for the forest area which has turned into grassland, to contribute to conservation of natural environment, cultivation of water resources, and conservation of soils.

[4] Aimags and Sums must monitor the grassland located within their jurisdiction in cooperation with research institutes. The number of livestock put to grazing must be regulated as required to protect the productivity of grassland, and measures to protect grassland should be implemented so that grassland can be used continuously.

[5] The state should regularly study and analyze the productivity of land in a scientific approach, and take necessary measures.

4.2 Improvement of Administrative and Financial Systems

After its shift to a market economy, the Mongolian government accepted structural adjustment recommendations by the IMF and World Bank, and accordingly embarked upon a series of steps to reorganize of government organizations as well as many laws and administrative systems. However, these reorganization projects have not yet been completed to the present day, and a review of a range of laws and systems is still actively being made at the Diet and ministry levels.

Consequently, there are many shortcomings in the current laws and administrative systems, leading to confusion caused by redundant or insufficient arrangements. To remedy this situation, donor nations and institutions are now studying the laws and administrative systems from various perspectives and presenting proposals for the promotion of reorganization and improvement of operations. The following subsections discuss main institutional improvements, using the ADB report on agricultural sector program loans as the main reference material.

4.2.1 ADB Proposals on Improving Administrative and Financial Systems

1) Improvement of the Institutional Framework

In accordance with policies based on the IMF recommendations, the number of staff at MOFA was reduced from 280 people in 1989 to 68 people in 1995. In conjunction with this rationalization, MOFA's work has been rationalized as follows:

[1] Transfer of administrative work related to land policy- and environmental matters to MNE [1992];
[2] Privatization of the Production Goods Provision Department (Agrotechimpex Co., Ltd., 1991);
[3] Transfer of the research sector with a staff of almost 2,000 people to MES;
[4] Transformation of the National Hygiene Department (which has a staff of more than 3,000 people when local branch offices are included) and related organizations to new, semi-autonomous organizations; and
[5] Privatization of state-run farms and enterprises.

However, part of the responsibility associated with the above work areas is still left with MOFA and also the role of MOFA itself is not clearly defined. As a result, most of the staff does not really understand the present structure, making it impossible for MOFA to play its role as a service organization for promotion of agriculture to a sufficient extent.

This situation makes it vital to further reform agriculture and animal husbandry-related systems, and the following work must be done as a prerequisite to reform:

[1] Determination of the general policy objectives for the promotion of agriculture and animal husbandry as well as of the functions necessary to attain these objectives;

[2] Clarification of the responsibility structure and systems/roles necessary to make the functions work, and of the relationship between them; and

[3] Clarification of the organization, resources and budget allocations necessary to fulfill the responsibility.

The ADB has identified the following main functions as those functions comprising the institutional framework for agriculture and animal husbandry:

[1] Management of agricultural and animal husbandry administration

Planning and evaluation of policies, plans and projects; technology review through monitoring and evaluation; economic, social and environmental impacts evaluation; collection and analysis of statistical data, etc.

[2] Promotion of agriculture and animal husbandry

Promotion/management-related guidance, provision of market information and related guidance, livestock and animal husbandry techniques, crop production techniques, related guidance, etc. for producers.

[3] Seed/stock breeding services

Improvement of food quality and productivity through the provision of improved seeds and livestock.

[4] Research and development

Development and provision of improved practical techniques for supporting the profitability and sustainable vitality of agriculture.

[5] Services to protect livestock and crop health

Border control; hygiene control vis-a-vis consumers and export markets; quality standards control for the processing of food products, etc.

[6] Internal management

Human resource development to reinforce the administrative staff; financial control and auditing of governmental and quasi-governmental agricultural organizations.

2) Practical Institutional Improvement Proposals

Based on the above improvement framework, practical improvement proposals have been presented as described below.

(These proposals are based on the argument that all government institutions including MOFA should stop direct participation in the procurement and distribution of production goods or the processing and distribution of products.)

(1) Organizational Reform of the Ministry of Food and Agriculture (MOFA)

The establishment of a strong MOFA with prime function of sector management and promotion sector is one major factor requiring attention as part of institutional improvement. Different from the time of planned economy, the clients of the Ministry are now private individuals and enterprises. Further, the prime role of the Ministry now is to help farmers and enterprises achieve a self-supporting status by providing information and advice, removing impediments, and developing management improvement motivations of individual farmers in the form of the desire to pursue income and improve profits. From this viewpoint, it has been proposed that MOFA should concentrate its functions on the management of the agricultural and sector, promotion of agricultural and internal management. Table 4.2.1 shows the proposed organizational structure.

(2) Related Institutions

[1] Regulatory activities should be limited to specialized subsidiary institutions such as plant protection and livestock veterinary services. With regard to the subsidiary institutions associated with seed and livestock improvement, operation on a commercial basis should be established to prepare for future privatization.

[2] Responsibility for supervising agriculture and livestock-related national enterprises should be transferred from MOFA to the Ministry of Finance or one of the Cabinet offices.

[3] Responsibility for development and promotion of tasks and matters associated with the secondary processing, production and trading of agriculture products should be transferred to MTI.

[4] Responsibility for managing emergency reserves of food and feed should be transferred to the Ministry of Finance or other institution which is under the direct supervision of the Cabinet.

(3) Land Policies

Administrative responsibility associated with the utilization and lending of land, including duties associated with implementation at the local government level, should be clearly put under the control of MNE. MOFA should not concern itself with the allocation of land but conduct the monitoring and administration of environmental impact on the allocated agricultural and livestock land in coordination with MNE.

(4) Total Development

Overall responsibility for the coordination of rural development should be borne by the local governments. However, local governments should fulfill this role within the framework of national policies and plans for agriculture, animal husbandry, health, education, employment, energy and alleviation of poverty which are developed by related central government agencies.

The only cases in which MOFA should bear this kind of responsibility are in those cases where social development or poverty alleviation programs specifically include agricultural production or their market activities; otherwise all it has to do is watch social aspects in the development of rural development plans. It is desirable to set up a consultative organization or steering group at the local or Aimag level to coordinate rural development.

(5) Wheat Fund

Establishment of a wheat fund is justified only when it is set up for the purpose of food security management during times of emergencies. For example, those wheat funds which have the secondary purposes of generating a source of government revenue, procuring harvests, or stabilizing prices must be avoided.

4.2.2 Important Considerations for Institutional Reform

Institutional reform so far has been conducted in accordance with the structural adjustment program agreed to by the IMF and World Bank. The underlying idea of this program is to achieve a small government and to eliminate government interference with private business or reduce it to a equilibrium point. The above ADB proposals can be considered to be in line with this direction.

There is no denying that these policies have worked, as the downward trend of the economy stopped in 1995 after the country has experienced five years of market economy,

and now there are signs of positive economic growth. Behind this is the massive aid which in total exceed 40% of the GDP (about 44% in 1993; it is estimated that this amounts to U.S. $84 per person). However, on the other hand, certain problems such as a reduction in the scale of the economy, an increase in the unemployment rate and an increase in the number of persons living at poverty levels have emerged. Therefore, although the reform of the administrative and financial systems will basically be pursued in line with ADB proposals, it must also focus on the following points:

(1) Active Government Assistance for Agricultural Development

During the shift to the market economy system, the government privatized state-run farms etc. without providing the required support arrangements. As a result, many farms are now finding themselves unable to continue their operation. Some form of active assistance by the government, including financial assistance to agricultural enterprises etc., must be provided for the time being until the market economy stabilizes.

(2) Provision of Human Resources for the Implementation of Projects and Technical Guidance

Excessive reduction in the size of the government sometimes has negative effects on the implementation of projects necessary for agricultural development and on the provision of technical assistance. As there is a lack of staff in many agencies, including MOFA, and this is inhibiting further policy development, it is necessary to provide a certain level of human resources.

(3) Consideration of Characteristics of Mongolian

The Mongolia is a small country both in terms of population and population density. This country is also unique in that a mobile industry, nomadic herding, constitutes the basis of the national economy, and thus the tradition of mutual help is deeply rooted. These are characteristics which cannot be seen in other countries that have transformed themselves into a market economy, including east European countries. In order to establish a stable market economy regime, therefore, it is necessary to develop an original (as opposed to standardized) regime that is well suited to the characteristics of Mongolian.

For example, the above characteristics essentially undermine the efficiency of administration, social services, industrial investments etc., and excessive reductions in the size of the government and regulation of investment hinder economic growth.

Moreover, in the planning and reform of other systems, it is desirable to take into account the nationality of Mongolia, including traditional practices and the national mentality of its people.

4.3 Agricultural Development Plan

4.3.1 Crop Production Promotion Policy

The agricultural production, which has dropped sharply after the shift to the market economy system, must be restored as soon as possible in order to achieve food production levels which meet national demand by the target year. To this end, production capacity of cereals (notably wheat) and potatoes should be strengthened, and production of vegetables and fruits should be stepped up. In addition, domestic production systems for vegetable oil and sugar should be provided, so that the country can put an end to the current reliance on imports for the supply of these products. In addition, efforts need to be made to secure sustainable and self-sufficient agriculture suited to a market economy. The basic recommended policies for promoting crop production are outlined below.

(1) Growth of production must be achieved through improvement of land use efficiency and enhancement of land productivity on existing arable land. No outward expansion of arable land should be made.

(2) Disease/insect-resistant, cold-resistant, and high-yielding crop varieties must be developed through breeding, so that higher and more stable unit yield will be achieved. In particular, with regard to wheat, which is the staple crop, the development and introduction of higher protein varieties, which are better suited to processing for bread, must be promoted.

(3) Production of sugarbeet and rape seed need to be expanded in order to promote the import substitution of sugar and vegetable oil.

(4) With regard to the production of potatoes and vegetables in the remote Bulgan and Ovorhangai Aimags, only the amount required to meet the local demand should be produced, since high transport costs and losses are unavoidable for these crops.

(5) Development and introduction of new crops which would match diversifying national needs must be promoted.

4.3.2 Land Use Cropping Plan

1) Introduced crops and standards for crop cultivation

The plan are made on the basis of existing crops such as cereals (wheat, barley, oat, rye), potatoes, vegetables (cabbages, carrots, onions, turnips and others), fruit (chatsurugana). When projected crops are selected, comprehensive considerations were given to such factors as the adaptability to natural condition of crops, the trend of change in consumption in accordance with diversified food life pattern of people, the marketability for the crops and the profitability of the production. The crops being considered include ten items from among various types of cereals and beans, thirty-two from vegetables, three from fruit, seven for industrial use and medicine, and three from fodder crops (Table 4.3.2.1, Annex). In the planning typical crops represent each classification.

In addition, sugarbeet and rape seed will be introduced in line with the national policy of developing domestic production systems for sugar and vegetable oil. However, further accumulation of technical know-how is necessary to achieve stable production of high-quality sugarbeet. In addition, domestic production of sugar requires an integrated approach including not only raw material production but also processing, and strong financial and technical support by the government is necessary until production/processing techniques and the operation as well as management systems of factories are established. Figure 4.3.2.1 in the Annex shows the crop cultivation standards for major crops in Mongolia.

2) Cropping System

The traditional cropping system has been widely accepted in Mongolia to plant a crop in two years with a fallow year between them. However, the system will be changed into a new system to give priority to the sustenance and improvement of soil fertility, the soil and environmental conservation and the soil moisture sustenance to improve the crop intensity and the land productivity. Therefore, the basic cropping pattern will be to grow two to four crops in four years based on the locality and conditions of fields where the crops concerned are grown.

On the other hand, group of cereals, root crops, leafy vegetables and beans will be combined considering the characteristics by crops. It will be planned to avoid that a crop belonging to a family is grown one after another. For crop rotations typical cases

are indicated by cultivation type; irrigation ,non-irrigation, open field and greenhouse, respectively (Figure 4.3.2.2).

3) Land use and crop planting plan by Aimag

Areas which are producing fresh products such as vegetables will be allocated mainly around big cities while agricultural products for processing materials will be grown in the areas surrounding the processing plants on the basis of such factors as land area, population, distance to the consuming cities and location of processing plants by Aimag. Planting areas are planned for each crop in consistency with the planting program mentioned above 2).

Table 4.3.2.3 Land Use and Crop Planting Plan by Aimag

(unit: ha)

Aimag	Selenge & Darkhan-Uul	Tov & Ulaanbaatal	Bulgan & Orkhon	Ovorhangai	Study Area Total
Arable land	335,000	300,000	111,000	41,000	787,000
Irrigated	12,300	3,100	5,100	4,500	25,000
Planted area	227,440	201,040	75,700	28,830	533,010
Cereals	147,750	147,500	37,440	11,510	344,200
Potato	3,850	7,050	820	540	12,260
Vegetables	4,200	1500	640	490	6,830
Sugar beet	2,600	350	1,000	1,050	5,000
Oil crops	1,100	200	500	510	2310
Fruits	400	300	0	0	700
Fodder crop	67,540	44140	35,300	14,730	161,710
Fallow	107,560	98,960	35,300	12,170	253,990
Planted rate	68	67	68	70	68

4.3.3 Agricultural Production Plan

1) Planned Unit Yield by Crop Type

The planned unit yield values for different crops have been determined through total evaluation taking into account field research data of PSARI (Table 4.3.3.1, Annex), unit yield and trends in other countries (Table 4.3.3.2, Annex), as well as the potential for

improving production management techniques in Mongolia (Table 4.3.3.3, Annex), amongst others Table 4.3.3.4 shows the unit yield of main crops.

Table 4.3.3.4 Comparison between Current and Planned Unit Yield

(unit: ha)

Main crop	Irrigated		Non-irrigated		Remarks
	Current	Planned	Current	Planned	
Wheat	2.7	3.5	1.3	1.7	
Potato	19.0	25.0	13.2	15.0	
Vegetables	-	25.0	-	-	
Cabbage	30.0	45.0	-	-	
Onion	5.0	10.0	-	-	
Carrot	11.0	20.0	-	-	
Sugar beet	23.0	30.0	-	-	
Rape seed	-	1.5	-	-	
Fruits	0.2	1.4	-	-	
Fodder crops	-	-	9.0	15.0	

2) Measures to Increase Crop Yield

(1) Securing a Stable Supply of High Quality Seeds/Seedlings

Mongolia relies on imports for the supply of many of its seed and seedlings. Breeding practices to improve the adaptability to the country's natural environment, crop yield, taste, suitability for processing, and other similar factors have not yet been attained. Therefore, efficient systems for the breeding, multiplication and supply of high quality seeds and seedlings must be established.

(2) Effective Utilization of Livestock Waste

Reduction of soil nutrients and collapse of the balance between elements due to the consumption of nutrients by crops, soil erosion, etc. began to be observed in arable land of the study area with the passing of time after the start of land reclamation, and now reduction of the organic matter content of the soil, which is a measure of the soil productivity, is being observed. Therefore, active utilization of livestock waste generated from intensive livestock farming must be pursued. To minimize the impact of harmful weeds, disease (including pathogenic organisms), and insects pests included in

livestock waste on crops, manure should be fermented to a sufficient level before use. Consideration will also be given to reducing the cost of transporting manure through the use of low-cost modes of transportation such as wagons.

(3) Introduction of a Rotation System Incorporating Green Manure Crops

To maintain and improve soil productivity, supplementing of organic matters is essential. In wheat production, the most important source of organic matter is wheat straw, and in a cold climates, it takes at least a year for the wheat straw to decompose. Therefore, in the context of wheat production, the traditional rotation system in which crops are normally produced once every two years with a fallow period for every production cycle will be used as the basic system. In addition, in order to diversify the rotation system through the introduction of new crops, rotation patterns under which crops are produced 2-4 times every four years will be adopted and green manure crops, including beans, will be incorporated into the rotation system.

(4) Vegetable Production through Cultivation of Seedling

As the growing period is short in Mongolia, seedlings will be first cultivated in specialized facilities and then transplanted to open fields, in order to extend the growing season. Facilities for seedlings will be set up in a simple plastic house or tunnel. For Cucurbitaceae vegetables which are likely to weaken during transplantation, a "pot cultivation" method will be adopted so that the seedlings can be transplanted to open fields without any negative impact. Pots for root crops should be made of materials which rapidly decompose after transplanting. Soil which was not seriously infested with harmful insects or weeds should be used for the cultivation of seedlings using such techniques as disinfecting the soil by solarization in the summer.

In the past Mongolia was importing onion sets (small seed balls) from the former Soviet Union to produce onion balls; however, in the future, the country must become self-sufficient in the production of onion sets. Onions will be produced by extending the growing period through transplanting using pots.

(5) Improvement and Extension of Techniques for Irrigated Agriculture

Techniques for irrigated agriculture concerning the period, frequency and volume of irrigation must be established mainly for vegetable production, and these techniques must be disseminated to the farmer level.

(6) Prevention of Damage by Disease Insects and Rodents

In Mongolia, damage by disease, insect pests and rodents constitutes a major factor which reduces crop yield. At present there is no way to get rid of these pests except by depending on pesticides, etc. Therefore technical development of chemical-free pest control measures such as biological controls must be promoted.

3) Crop Production Plans by Aimag

Targeted production volumes for each Aimag are shown in Table 4.3.3.5

Table 4.3.3.5 Crop Production plan by Aimag

(unit: 1,000, %)

Aimag	Selenge & Darkhan-Uul	Tov & Ulaanbaatal	Bulgan & Orkhon	Ovorhangai	Study Area Total
Cereals	253.2	251.1	67.5	23.0	594.8
Potato	86.3	111.3	20.5	13.5	231.6
Vegetables	105.0	37.5	16.0	12.3	170.8
Sugar beet	78.0	10.5	30.0	31.5	150.0
Oil crops	1.7	0.3	0.8	0.8	3.6
Fruits	0.6	0.4	0.0	0.0	1.0
Fodder crop	1,013.1	662.1	529.5	221.0	3,425.7
Total	1,537.9	1073.2	664.3	302.1	3,577.5
Share	43.0	30.0	18.6	8.4	100.0

4.3.4 Production Base Development Plan

1) Irrigation Development Plan

The targeted irrigation development area by the year 2010 has been determined as comprising about 25,000 ha, taking into consideration cultivation of sugarbeet, oil crops and vegetables which require irrigation. To meet this target, 24,977 ha of land was acquired from registered areas, based on the following criteria:

[1] There must be abundant water sources such as rivers in the area.

[2] The soil must be suitable for agriculture.

[3] The area must match the agricultural policies of the country.

[4] The area must be close to trunk transportation systems for transporting agricultural products.

Each of the selected areas is described in detail in the supplementary materials.

In this plan, the 15-year period up to 2010 is divided into two stages comprising an initial 5-year period and a subsequent 10-year period. The following two tasks must be completed in the first stage that is set to last up to the year 2000.

[1] An "Irrigated Agriculture Technology Development Project" will be conducted in order to solve the problems of "underdeveloped irrigation and cultivation technologies" and the "lack of human resources". Under this project, irrigation and cultivation technologies suited to Mongolia are to be developed and education and training for the dissemination of the technologies developed is to be provided.

[2] An area of 11,838 ha, about half of the 24,977 ha targeted to be brought under irrigation by the year 2010, must be developed so that Irrigation can be operated in a stable manner. This area includes the ADB projects and the projected sugarbeet cultivation area. Implementation of the ADB projects and development of the sugarbeet area are efforts that are in line with the government policy of Mongolia, and therefore must be promoted continuously with due consideration given to technical and financial help from other countries.

It is also necessary to conduct a thorough check of the status of the irrigation facilities of existing irrigated land and identify the areas that must be improved. Then rehabilitation must be done starting with the highest priority areas. However, since there is a limit to what the Mongolian government alone can do in the rehabilitation of irrigation facilities due to the underdeveloped status of technology concerning construction of such facilities, this will be limited to relatively simple rehabilitation work.

The above two tasks will be pursued in parallel with each other.

During Stage 2 of the Plan set to start from the year 2001, the remaining 13,139 ha of the targeted irrigation areas will be developed and brought under irrigation by 2010, utilizing technologies developed in the Irrigated Agriculture Development project described above (Table 4.3.4.1 in the Annex shows the targeted irrigation areas for the years 2000 and 2010).

2) Farmland Preservation Plan

(1) Farmland Preservation through Improvement of Farming Practices

Soil erosion countermeasures have been planned and implemented in Mongolia based on the country's traditional fallowing systems (systems in which fallowing is done once every two years or three years). The farmland preservation plan for non-irrigated land

under this Master Plan will make full use of advantages of the traditional fallowing systems by incorporating these advantages into the rotation systems which are based on farming practices. This farmland preservation plan will not apply to irrigated land which is provided with water and therefore is less likely to suffer from soil loss due to wind erosion or the like.

The following farmland preservation plans will be used based on individual farming practices and according to the degree of soil loss (assuming a soil loss influence area of 398,100 ha).

Farmland will be classified into "light loss land", "medium loss land" and "heavy loss land" based on the degree of soil loss, according to the results of soil loss surveys conducted by the Land Policy Research Center of the Ministry of Nature and the Environment, and farmland preservation measures for each category of land will be determined.

[1] "Light loss land" (248,700 ha): As the degree of soil loss is low in this category of land, fallowing is done once every three years or four years, and the residual left after the harvesting of wheat and residual of fodder crops will be cut so as to spread over the farmland by means of sprinkling, laying or plowing.
[2] "Medium loss land" (98,300 ha): Green manure crops (e.g. alfalfa) and the residual of crops will be plowed into fallow land, and contour belt cultivation (a rotation system in which pasture/perennial grasses and crops, etc. are produced alternately) will be introduced for some of the slope land in the crop cultivation area.
[3] "Heavy loss land" (51,400 ha): In addition to the countermeasures taken for "medium loss land", windbreak forests are also provided.

(2) Farmland Preservation through Provision of Windbreak Forests
In the Study Area, winds blow from the north and northwest throughout the year, and are especially strong in April and May. Tillage operations to prepare farmland in Mongolia for cultivation coincides with this season of strong winds, resulting in the loss of precious surface soil due to wind erosion.

Wind erosion in farmland usually occurs when the [1] wind speed is high, [2] land surface is bare, [3] soil is dry, [4] soil does not have sufficient strength against the impact

force of the wind, or [5] there is no man-made facility on the ground which restricts the movement of soil and sand.

Therefore, the basic idea of wind erosion prevention should be to provide windbreak facilities such as windbreak forests to suppress the speed of wind for a wide area and trap wind-blown sand.

[1] Location of Windbreak Forests

Windbreak forests are normally arranged perpendicular to the direction of wind (this is also the most effective style of arrangement). Under this farmland preservation plan, windbreak forests will be provided at intervals of approximately 200m or so along the east-west direction of the farmland.

[2] Width of Windbreak Forest Belt

The effect of a windbreak forest belt increases the greater its width becomes. There should be at least three of Trees Used rows or more comprising a belt width of about 8-10m.

[3] Types of Trees Used for Windbreak Forest

Basically, trees used for windbreak forests need to meet the following requirements:

[a] Tree trunks must be strong.
[b] Trees must have a dense crown and must be branched out from the lower section.
[c] There must be a sufficient amount of leaves on branches during the period of strong winds.
[d] Trees must grow quickly
[e] Trees must be deeply rooted.
[f] Trees must be suited to the climate and weather of the area.
[g] Trees must be resistant to disease-causing insects.
[h] Trees must not become an intermediary which transmits disease-causing insects to crops.

On the basis of the above requirements, cottonwood, yellow acacia and poplar, which are popularly used as roadside trees in Mongolia, will be used for windbreak forests.

3) Small-Scale Hydroelectric Facility Development Plan

A small-scale hydroelectric facility has already been constructed in Kharkhorin, Ovorhangai Aimag in 1961 with the help of China, but the generators have become old and deteriorated, and one of the two generators has been out of service for some time. As

this facility is a dedicated generation plant for irrigation facilities, the halving of the supply of electricity has led to a situation in which some of the farmland has had to be left fallow. Consequently, it is necessary to rehabilitate this power plant with the aim of expanding agricultural production and revitalizing agricultural villages in the area.

4.3.5 Farm Management Improvement Plan

1) Setting up of Model Farm Management Type

Representative model types are set up for as to crops selected from cereals, potatoes, vegetables, fruits and industrial crops as major crops and their combination. Their outline are shown table 4.3.5.1.

Table 4.3.5.1 Outline of Model Farm Management

(unit: 1,000t))

Division	Wheat Company	Wheat Small	Vegetable Openfield	Vegetable Greenhouse	Fruits	Potato	Multiple Wheat +
Number of workers	40	8	70	80	20	65	60
Planted area (ha)	2,500	500	140	3	50	300	1,320
Other area (ha)	2,500	500	0	3	20	300	1,320
Total Arable land (ha)	5,000	1,000	140	6	70	600	2,640
Tractor (set)	14	2	3	3	1	12	10
Combine (set)	14	2	0	0	0	12	12
Gross Income (1,000 Tg)	170,000	34,000	92,150	26,700	56,400	198,000	160,800
Expenditures (1,000 Tg)	160,100	33,300	44,920	25,170	44,920	134,580	138,070
Profit (1,000 Tg)	9,900	700	33,390	1,530	11,480	63,420	22,730

Although almost all of the farming is put into the traditional nomad farming sector, that is left out here because the model plans are targeted crop sector.

The scale of farm management be assumed to consist of medium or small size khorshoos and corporate farms which produce primary products, not including processing and storage. As for the arable land conditions the main slope less than 1/15 and the long side length more than 200m of field lots will be assumed. vegetables, fruits and industrial crops will be cultivated under the irrigated facilities, and cereals and potatoes under rain-fed condition. As for the agricultural implements the system using the medium farm

machinery, which currently introduce and have 80-100PS of their ability, will be adopted. In the system farm machinery will be utilized in operations for plowing, seeding, intertillage, weed and disease control, and harvesting as possible while man powers are subsidiary.

In the plan major facilities, office, farming implement shed, repair facility and storage house, are allocated by farm management type and size.

2) Outline of Model Management Plans

(1) Wheat Farming

The average area of arable land of the state-run farms before privatization was 15,000 ha, and some of these farms had an arable land area of as 40,000-50,000 ha. Although these farms have since been divided into smaller units, farming operations are still being conducted under a system similar to the former state-run farms. This scale of agricultural operation is inefficient from the viewpoint of farm management due to the following reasons. First, too much time is required to move people and machinery from one place to another. Second, storage and transport losses are large. Third, the need to adapt to greatly changing weather conditions with associated work delays leads to lower crop yields. Lastly, the number and size of machinery and facilities used are both too many and too large for the areas in which they are used in terms of cost, maintenance and efficient use.

To solve this problem, two efficient management models with arable land of 2,500 ha and 500 ha, respectively, have been designed. These models represent a rotation system for arable land without irrigation facilities, under which production is done once every two years with a period of fallowing for each of the 2-year periods. In addition, fallow land would be plowed four times a year in order to remove weeds, enhance soil productivity and maintain soil moisture so that wheat cultivation can be conducted on a permanent basis. Seeds would be 100% obtained through purchase.

(2) Vegetable Farming by Open Field Culture

The area of land used for vegetable cultivation in the outskirts of cities is on the rise because of the vegetable production policies being promoted by the government, such as free lending of vegetable cultivation land under the Land Law, and the increase in the demand for fresh vegetables due to the diversification of the diets of urban citizens.

However, there is fluctuation in the supply of seeds, and the level of farming techniques is low as well.

This model represents a rotation system for producing such main crops as cabbage, onion, turnip, carrot and garlic over a 4-5 year period on arable land with irrigation facilities so that management risks associated with price fluctuation can be minimized. With regard to onions and carrots, one-year old seedlings would be purchased and cultivated under this model.

(3) Vegetable Farming by Greenhouse Culture

Because of the harsh climate conditions of Mongolia, open field vegetable cultivation is limited to the five-month period from May to September. Vegetable prices fall from June to September when vegetables come onto the market, while even stored vegetables with reduced freshness are traded at high prices from October to May. In the greenhouse culture farming model, heated water from a thermal power generation plant is used as the heat source for glass greenhouses as part of a system for shipping fresh vegetables throughout the year so that management risks associated with price fluctuations can be alleviated.

Tomatoes and cucumbers are to be cultivated as the target vegetables, because the price of these vegetables is high and stabilized. These vegetables would be cultivated alternately under a rotation system comprising an eleven-month cultivation period and a one-month maintenance period.

(4) Fruit Farming

Mongolia's natural conditions limit the types of fruits that can be cultivated within the country. The country relies mostly on imports for its supply of fruits. The present main item, "chatturugana", is still a half-wild plant, the productivity of which is low, but unit yield is expected to increase as a result of selected variety improvement of PSARI. In addition, apples, Japanese apricots, plums, brambles and black currant are cultivated and bred in some areas. In the fruit farming model, the main fruit "chatturugana", bramble and black currant are to be cultivated on arable land provided with irrigation facilities and windbreak forests. Three-year old seedlings would be purchased and transplanted, and the crops will be harvested for 20 years from the year after the transplantation year, after which the crop will be renewed.

(5) Potato Farming

Potato is an important item with the second largest production volume after wheat. Potatoes are easily stored and processed, lasting a long time. However, there are a large overwinter losses of seedlings due to the poor state of storage facilities and the domestic seed production approach is susceptible to large fluctuations in planting area and unit yield due to disease damage, etc., resulting in reduced productivity. The potato cultivation model represents a rotation system for farmland without irrigation facilities, under which production is done once every two years with a period of fallowing for each of the two-year periods. Further, fallow land would be plowed four times a year to remove weeds, enhance soil productivity and to maintain soil moisture so that stable potato cultivation can be realized. Domestic seed production operations like those which are currently conducted would not be done, and seeds would be 100% obtained through original seed purchases.

(6) Combined Farming of Wheat and Potatoes

This model combines the cultivation of wheat with that of potatoes, which is a crop with high-profitability, in order to achieve equalization of labor by reducing the area of wheat production. It employs a method in which fallowing as well as rotation cultivation of wheat and potato crops is conducted on arable land that is not provided with irrigation facilities. Reductions in production costs can also be achieved through the sharing of agricultural machinery and facilities.

4.3.6 Production Costs by Crop Type

Current production costs have been unreasonably inflated by the yield losses resulting from the inefficiency of the super-heavy left-over machinery, fuel losses and losses associated with the storage and transportation of harvested products. In addition, delay in the collection of sales of traded products has become a major production cost-raising factor, forcing farmers to add to their high-interest debts. Therefore an analysis and classification has been made of production costs and the profitability of each of the crops selected for the above model management plans, assuming that the mechanization structure and production management techniques will be improved (Table 4.3.6.1).

Table 4.3.6.1 Production Cost by Crop

(1,000Tg/ha)

Crop	Seed	Fuel	Other onouts	Labor	Depricia-tion	Other	Total	Gross income	Profit
Wheat	12.0	7.0	7.5	0.7	14.3	8.3	49.8	68.0	18.2
Potato	202.7	17.1	9.8	7.4	139.5	75.3	451.8	900.0	448.2
Cabbage	6.6	7.1	7.9	56.3	145.1	44.6	267.6	675.0	407.4
Onion	120.0	7.3	8.5	55.3	144.4	67.1	402.6	700.0	297.4
Turnip	36.0	7.1	8.2	57.1	141.4	50.0	299.8	540.0	240.2
Carrot	28.8	7.2	7.9	60.5	149.8	50.8	305.0	540.0	235.0
Garlic	390.0	7.4	7.9	47.3	114.1	113.3	680.0	1,000.0	320.0
Tomato	136.7	360.0	14.0	788.7	2,416.2	743.1	4,458.7	5,400.0	941.3
Cucumber	136.7	360.0	14.0	788.7	2,416.2	743.1	4,458.7	4,950.0	491.3
Chatsurgan	187.2	14.5	8.0	60.5	501.3	154.3	925.8	1,200.0	274.2
Other fruits	138.0	11.8	8.0	55.0	455.4	131.6	789.8	1,080.0	290.2

*Multiple farming: wheat + potatoes

4.3.7 Agricultural Development Implementation Programs/Projects

A brief description of the main programs and projects required to implement the agricultural development plan is presented below.

(4.3.7.1)

Project Name	Irrigated Agriculture Technology Development Project	Beneficiary	Crop farmers
Target	Agricultural improvement promotion staff and irrigation engineers in the national government, Aimag governments and local governments.		
Purpose	To develop irrigated agriculture technology suited to Mongolia and Training and development of the related promotion staff and engineers.		
Work Items	(1) Establishment of an Irrigated Agriculture Technology Development Center. (2) Development of crop cultivation technology (3) Development of technology concerning the construction, maintenance of irrigation facilities and water management. (4) Training and development of agricultural improvement promotion staff and irrigation engineers.		

(4.3.7.2)

Project Name	Batsumber Irrigation Facilities Rehabilitation Project	Beneficiary	Apiculture Research Center
Target	Apiculture Research Center		
Purpose	To rehabilitate existing irrigation facilities and increase agricultural production		
Work Items	(1) Rehabilitation of main canal and head works. (2) Construction of greenhouses for growing chatturgana seedlings. (3) Improvement of irrigation facilities in farmland areas. (4) Rehabilitation of research facilities at the Apiculture Research Center. (5) Construction of waterworks wells and water distribution facilities.		

(4.3.7.3)

Project Name	Basic Irrigation Facilities Rehabilitation Project	Beneficiary	Crop farmers
Target	Ministry of Food and Agriculture, irrigation areas targeted for rehabilitation work.		
Purpose	To rehabilitate basic irrigation facilities such as dams, head works and trunk channels, and thereby increase agricultural production.		
Work Items	(1) Examination of the status of basic irrigation facilities in each of the existing irrigated areas. (2) Rehabilitation of basic irrigation facilities.		

(4.3.7.4)

Project Name	Existing Irrigated Areas Rehabilitation Project	Beneficiary	Crop farmers
Target	Existing irrigated areas and areas to be newly brought under irrigation (which are to be developed by the year 2010)		
Purpose	To rehabilitate or newly construct irrigation facilities/farmland to achieve steady supply of agricultural products.		
Work Items	(1) Thorough examination of the status of the areas to be brought under irrigation by the year 2010. (2) Designing and construction of irrigation facilities. (3) Rehabilitation, improvement and construction of farmland.		

(4.3.7.5)

Project Name	Farmland Preservation Measures Model Demonstration Project	Beneficiary	Crop farmers
Target	Agricultural specialists in the national government, Aimag and Sum governments and at corporate farms.		
Purpose	To rehabilitate of soil productivity of farmland, develop standards for soil loss prevention plans, and demonstrate farming operations and construction methods.		
Work Items	(1) Development of demonstration farmland. (2) Demonstration research and techniques development concerning soil loss countermeasures (contour cultivation, mulching, windbreak forests, plowing green manure into farmland). (3) Training and development of farm technologists at the Mongol government, governments of Aimags and Sums and at enterprise farms.		

(4.3.7.6)

Project Name	Farm Management Improvement Demonstration Model Project	Beneficiary	Crop farmers
Target	Agricultural Specialists in the national government and Aimag and Sum governments and management personnel and specialists of corporate farms.		
Purpose	To demonstrate and promote the main model management patterns presented in the Master Plan and related training for specialists and engineers.		
Work Items	(1) Development of demonstration farmland (a model farm will be developed and cultivated for each of the management types: about 7 farms in total). (2) Demonstrative exhibition of rotation systems and water/soil/cultivation management techniques. (3) Training and development of specialists in the national government, governments of Aimags and Sums and at corporate farms, and the dissemination of the knowledge to neighboring farms. (4) Education and training on management techniques and accounting.		

(4.3.7.7)

Project Name	Kharkhorin Area Rehabilitation Project	Beneficiary	Kharkhorin Farm, farmers
Target	Kharkhorin Farm		
Purpose	To expand irrigated area through the improvement of facilities, etc.		
Work Items	(1) Rehabilitation/improvement of trunk canal. (2) Rehabilitation of power generation facilities. (3) Rehabilitation of pumping facilities (4) Provision/improvement of service roads for facilities. (5) Training and development of electricians.		

(4.3.7.8)

Project Name	Agricultural Weather Observation System Development Project	Beneficiary	Crop/livestock farmers
Target	Specialists at the Agricultural Meteorological/Hydrology Research Center of the Ministry of Nature and the Environment.		
Purpose	To improve existing meteorological observation systems so that early forecasts can be provided to farmers.		
Work Items	(1) Improvement/development of agricultural meteorological observation facilities. (2) Establishment of data processing systems and agricultural meteorological forecasting systems through computerization. (3) Training and development of meteorological observation/meteorological forecast specialists.		

(4.3.7.9)

Project Name	Hydrological Observation Systems Development Project	Beneficiary	Those who are involved in the management of rivers and agricultural operations.
Target	Specialists and engineers the Institute of Water Policy, MNE of the Ministry of Nature and the Environment.		
Purpose	To improve existing hydrological observation systems so that data can be sent to interested parties in a timely fashion.		
Work Items	(1) Provision/improvement of hydrological observation facilities. (2) Establishment of data processing systems and "abnormal flood" warning systems through computerization. (3) Training and development of hydrological observation and data processing system specialists and engineers.		

4.4 Livestock Farming Development Plan

4.4.1 Livestock Farming Promotion Policies

Although there are some problems to be solved in the area of nomadic herding, production is increasing in a relatively steady pattern and the number of livestock is also on the rise as a general tendency. Therefore the potential of production of nomadic herding products such as milk and meat is high. Those products whose production has decreased most significantly are milk, milk products, egg for urban residents. Taking the above facts into consideration, the promotion policies for livestock farming have been defined as follows:

[1] Production of intensive livestock farming (dairy farming, pig and medium and poultry farming) in the outskirts of cities must be restored to secure stable supplies of milk, pork and eggs to urban residents.

[2] In the field of intensive livestock farming, growth of small farming enterprises must be promoted, in addition to existing large-scale farms.

[3] Efficient but sustainable use of grasslands must be pursued, with sufficient consideration to the maintenance of the ecosystem of grassland areas.

[4] Organic cooperation with the cultivation sector need to be sought in order to secure stable supply of livestock feed.

[5] Improvement in the ability of individual livestock and the level of hygiene control standards need to be sought.

4.4.2 Livestock Feeding Plan

1) Numbers of Livestock

The numbers of livestock to be fed in the target year have been defined as below based on the number of livestock fed in the reference year (1994) and in consideration of the production plans of the Study Area.

(1) The Five Animal Species

The numbers of the five animal species to be fed under the nomadic herding systems need to be planned in consideration of the balance between the number of livestock and the availability of grass resources, so that livestock will be increased in those area where grass resources are abundant. As the number of livestock (SU) per 100 ha of pasture is higher in the Central Area than the national average (see separate volume) and there is concern about the future impact of this on the ecosystem of the grasslands, it is necessary to minimize the planned numbers of livestock animals in this area. Therefore, SU for the entire Study Area was set to 90 head or less per 100 ha, on the assumption that drinking water facilities such as wells will be arranged in a systematic manner and measures for improving the productivity of grassland, etc. will be taken.

(2) Dairy Breeds

The number of dairy breeds will be increased to 1990 levels (40,000 head) through restructuring and improvement of large-scale dairy farms, development of small and medium dairy farm companies and similar measures in order to secure stable supplies of milk and dairy products for urban citizens of large cities including Ulaanbaatar. Regionally, the number of livestock will be increased in the city of Ulaanbaatar and Tov Aimag. In addition, small and medium scale dairy farm will be developed around the central area of each Aimag.

Table 4.4.2.1 Livestock Numbers Feeding Plan (2010)

(Unit:1000)

Species	Selenge & Darkhan-Uul		Tov & Ulaanbaatar		Bulgan & Orkhon		Ovorhangai		Total in Study Area	
	1994	2010	1994	2010	1994	2010	1994	2010	1994	2010
Cattle (Dairy Cattle)	120 4	126 9	247 12	300 28	209 1	209 2	236 1	236 2	812 18	870 40
Horse	49	49	246	236	158	158	222	222	676	665
Sheep	386	432	1,127	1,196	647	661	1,255	1,255	3,416	3,544
Goat	80	80	282	345	175	175	613	613	1,149	1,212
Camel	0	0	4	10	2	4	21	32	27	46
Total (5 animals)	640	670	1,920	2,114	1,191	1,209	2,347	2,359	6,097	6,379
Pig	11.2	17.2	5.9	9.8	3.2	5.8	0.9	1.5	21.2	34.3
Chicken	12.8	76.5	55.3	163.4	2.1	30.1	0.6	10.2	70.8	280.2

(3) Pigs

As the need for pork is not expected to increase dramatically, the target number of pigs to be raised has been set to 34,300 head, representing a 60% increase over the current figure. In addition to supporting existing pig farms, medium-scale pig farm companies for foreign breeds will be developed around big cities and small-scale feeding of native pig breeds by a pasturing method will be promoted mainly in rural areas. In particular, special emphasis will be given to the task of increasing the number of pigs in the Selenge and Darkhan-uul areas where pig farming is popular. To this end, companies for supplying breeding female pigs will be developed.

(4) Chickens

The number of chickens will be increased mainly for the production of chicken eggs for which demand is expected to increase in the future. In addition to supporting existing chicken farm companies, medium-scale chicken farm companies for egg production will be developed in the outskirts of the cities of Ulaanbaatar, Darkhan and Erdenet, and small-scale feeding of local chicken breeds will be promoted mainly in rural village areas. The target number of chickens to be fed has been set to 1990 levels (280,000). To achieve this target, enterprises for supplying chicks will be developed and promoted.

2) Feed Production/Provision Plan

(1) Feed Production/Provision Plan

Pasturing using the abundant grassland will constitute the basic source of livestock feed. To cope with the nutritional shortages of livestock during the winter, production of supplemental feed including hay, forage crops (silage/soilage) and formula feed will be increased, and active use of crop residual, straw and other farm by-products (beet tops, beet pulp, vegetable scraps, potato leaves/stems, etc.) will be promoted. In addition, storage systems for livestock feed will be enhanced to prepare against such emergencies as heavy snow damage.

Hay will be basically taken from the natural grassland for the time being, but in the future, the development of artifical pastures will be promoted in and around the forest steppe areas and dairy farms. To this end, breading of superior pasture seeds suited to Mongolia's natural environment, establishment of seed multiplication and supply systems, and establishment of cultivation management techniques will become necessary. As stable supply of roughage is crucial to the success of a dairy farm enterprise, production of high-quality silage will be promoted.

Currently, the production volume of supplemental feed is geographically unbalanced. Therefore, hay, etc. will be brought into those areas where these products are in short supply, including the Tov/Ulaanbaatar area and Ovorhangai area, from other areas where there is a surplus in the supply of these fodder. Further, since the Study Area is a major feed production area, it will be used as a supply base for feed shortage areas such as the Gobi area.

Table 4.4.2.2 Feed Production/Provision

(Unit:1,000 heads, 1,000ha)

Sections	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total in Study Area
5 Livestock	696.9	2,114.2	1,208.7	2,358.7	3,378.5
- do - SU	1,607.7	5,004.2	3,199.0	4,934.2	14,745.1
Grassland area	2,286.0	5,582.0	3,534.0	6,006.0	17,408.0
SU Head/100ha	70.3	89.6	90.5	82.2	84.7
Feed Demand	86.0	194.0	69.1	92.4	441.5
- do - Supply	211.4	157.4	93.0	31.1	492.9
Hay	54.9	2.8	26.6	1.7	104.0
Fodder Crop	84.4	55.2	44.1	48.4	202.1
By-product	9.7	6.6	4.4	2.8	23.5
Formula Feed	62.4	74.8	17.9	- 8.2	163.3
Balance	+ 125.4	- 36.6	+ 23.9	- 61.3	+ 51.4

(2) Grassland Utilization Plan

In order to achieve sustained development of Mongolia's livestock farming, it is essential to maintain a balance between the volume of grass resources and the number of livestock animals, and until now, this balance has been maintained through traditional nomadic herding systems. To realize efficient utilization of grassland, the following tasks will be undertaken while maintaining and developing these traditional techniques.

[1] Securing Drinking Water for Livestock

With the aging and deterioration of wells, concentration of livestock animals is occurring around usable wells, resulting in exhaustion of grasslands partly. To achieve efficient utilization of pasture, the function of existing wells will be restored and new water sources will be developed (see 4.4.4 Production Base Development Plan).

[2] Continuous Monitoring of Grassland Productivity

An organization for monitoring the productivity of grasslands will be set up for each Aimag. These organizations will be responsible for providing technical guidance and support with regard to adjustment of the number of graging animals, fallowing of exhausted grassland areas, simple renovation work, and related tasks.

[3] Management and Maintenance of Pasture

The right to use grassland and thus the responsibility to properly manage and maintain grassland will be given to nomads or cooperative organizations of nomads in accordance with the new Land Law.

3) Livestock Improvement/Hygiene Control Plan

(1) Livestock Improvement

In order to produce high-quality livestock farming products, it is important to endeavor to breed high-potential animals and improve native animals. Farming of selected superior livestock species must be promoted, and superior breeds that can live under Mongolia's harsh natural conditions must be created through cross breeding using superior domestic as well as foreign breeds. To this end, the following measures will be taken.

[1] Definition of Livestock Improvement Objectives

Livestock improvement objectives by animal species will be defined in order to improve the quality of each animal species. Improvements in the production volume of milk and meat will be sought for dairy cattle and native meat breeds. With regard to wool and cashmere, increases in the number of breeds that are capable of producing high-quality, internationally competitive wool and cashmere will be pursued.

[2] Strengthening of Livestock Improvement Organizations

Organization of the Department of Animal Husbandry of MOFA and Aimag/Sum level offices which are responsible for livestock improvement will be enhanced, and the budget for these organizations will be increased. In addition, a system for close cooperation with the RIAH which is responsible for conducting research and development in the field of livestock improvement techniques, as well as a system for collecting and transmitting livestock improvement-related information, will be developed.

[3] Strengthening of the Function of the Livestock Artificial Insemination Center

The function of the Livestock Artificial Insemination Center will be strengthened to enable a stable supply of the frozen semen of superior species and to promote dissemination of artificial insemination techniques.

[4] Organization of Livestock Fairs

In order to promote livestock improvement efforts by nomads, livestock fairs will be organized, and a system for awarding producers with prizes who produce superior species with high productivity will be instituted.

In addition, active use of artificial insemination techniques will be promoted by utilizing the results of the technological cooperation projects regarding the preservation of livestock animal genes, which is being conducted by the FAO.

(2) Livestock Hygiene Control

Livestock hygiene control plays an important role in efforts to achieve stable production and quality improvement of livestock products. With the collapse of the collective production system using NEGDELS, etc., level for the prevention and treatment of infectious diseases of livestock as well as of the hygiene control of livestock products has deteriorated. The following countermeasures will be taken to improve this situation.

[1] Enhancement of Livestock Hygiene Control Organizations

The organizational structure of the entire livestock hygiene control hierarchy ranging from the central government's State Veterinary Service, which is responsible for livestock hygiene-related work, through the Aimag/Sum governments, to individual nomads and national veterinary services will be strengthened. In addition, a system for close cooperation with the Veterinary Research Institute, which is responsible for conducting research and development concerning livestock hygiene techniques, as well as a system for collecting and transmitting livestock hygiene-related information, will be established.

[2] Improvement and Upgrading of Facility and Equipment at Research/Test Organizations

In order to improve the function of the Veterinary Research Institute, the Border Quarantine Offices and other hygiene test organizations, aged and deteriorated facilities and equipment will be upgraded and improved, and new techniques will be introduced. In particular, the procurement of information equipment, test equipment, chemicals, etc. at livestock hygiene test departments of Aimags, Cities and Sums will be supported as this has become difficult due to lack of financial resources.

[3] Enhancement of Pharmaceuticals Production Systems for Livestock

Research and development on vaccines and livestock pharmaceuticals at the Veterinary Research Institute together with domestic production of livestock pharmaceuticals by private firms will be supported in order to establish a system for securing a stable supply of pharmaceuticals.

In addition improvement of the level of livestock hygiene control will be sought by utilizing the results of the strengthening veterinary services project being undertaken by the EU, results of the technological cooperation project on the prevention of livestock diseases being conducted by the IAEA and other similar sources.

(3) Development of Livestock Technicians and Veterinarians

In order to improve livestock improvement efforts and livestock hygiene services, it is essential to develop qualified livestock specialists and veterinarians capable of performing these tasks. Currently the number of such specialists and veterinarians has been decreasing while that of livestock has been on the rise, resulting in a steady increase in the number of livestock per specialist and veterinarian. In particular, there has been a dramatic reduction in the number of livestock specialists due to the breaking up of the NEGDELS, etc. To remedy this situation, the teaching function and capacity of the National University of Agriculture and the RIAH will need to be improved in order to develop more experts. In addition, the number of experts for Ovorhangai Aimag will be increased in the Study Area so as to remedy the geographical imbalance in the deployment of such experts.

4.4.3 Livestock Products Production Plan

The production plans for major livestock products have been defined as follows, taking into consideration the demand for food (mainly for urban citizens) and the production potential of the Study Area.

1) Milk Production

Maximum use of milk obtained from the traditional five species which are fed under nomadic herding systems will be made, and this milk will be processed into milk products through the use of traditional processing techniques. Since it is not possible to supply sufficient amounts of fresh milk to urban residents with native species only, dairy farms located in the outskirts of large cities will be reorganized and improved so as to

secure stable supplies of milk and milk products for urban residents. In addition, a system for efficient and hygienic collection of milk produced by small-scale dairy farms and nomads will be established.

About 2/3 of the milk produced will be shipped from cow milk, and the annual production volume of milk per adult cow will be 310 kg for native cows, and 3,000 kg for foreign breed cows.

Table 4.4.3.1 Milk Production Plan

(Unit:ton)

Livestock	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total in Study Area
Cow (Local)	14,533	33,716	25,631	29,041	102,921
Cow (Foreign)	12,960	46,080	3,690	2,760	65,490
Mare	3,873	18,495	12,379	17,413	52,160
Ewe	3,502	9,691	5,351	10,165	28,709
Doe	649	2,795	1,413	4,962	9,819
Camel	34	1,117	502	3,614	5,267
Total	35,551	111,894	48,966	67,955	264,366

2) Production of Meat

Of the five species, cattle, horses, sheep and goats will be used to producee meat. Camel will not be used for this purpose. Improvement in the weight at the time of slaughtering and in the percentage of dressed carcasses will be sought through improvement of feeding methods, and other related measures. In order to secure a stable supply of meat for residents of large cities including Ulaanbaatar as well as tourists and to meet the diversifying needs for meat, the supply of meat from pig farming and poultry farming enterprises as well as from cattle fattening enterprises which will be promoted in the future needs to be increased. In addition, short-term fattening techniques for horses need to be established in order to promote exports of horse meat.

Table 4.4.3.2 Meat Production Plan

(Unit:ton)

Livestock	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total in Study Area
Cattle	4,048	9,242	6,664	7,297	27,251
Horse	973	4,644	3,109	4,373	13,099
Sheep	3,067	8,489	4,648	8,904	25,147
Goat	363	1,564	791	2,777	5,495
Pig	1,159	659	397	103	2,318
Chicken	37	80	15	5	137
Total	9,647	24,678	15,663	23,459	73,447

3) Egg Production

In addition to the enterprise-style poultry farms, small/medium-scale poultry farm companies need to be developed in the outskirts of large cities, and the feeding of native poultry breads will be encouraged to produce eggs according to increases in demand. The number of eggs to be produced per adult chicken has been set at 200 for foreign chickens, and 70 eggs per year for native chickens species.

Table 4.4.3.3 Egg Production Plan

(Unit:1,000)

Livestock	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total in Study Area
Total	9,134	20,434	3,127	917	33,612

4) Production of Other Livestock Products

The production volume of other major products of livestock farming including wool and cashmere have been planned as follows, based on the number of livestock available. As these products are strategic export items for gaining foreign currency, improvement of international competitiveness needs to be sought through quality improvement of products and diversification of raw wool by means of livestock improvement.

Further, as the export volume of high-quality casing is expected to increase in the future, the provision of collection and processing systems by the private sector need to be supported.

Table 4.4.3.4 Other Products Production Plan (Raw Material)

Section	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total in Study Area
Wool	627	1,735	958	1,820	5140
Cashmere	26	110	56	196	388
Camelhair	2	49	22	159	232
Leather	241	709	401	805	2,156

(Unit:ton, 1,000 sheets)

4.4.4 Production Base Development Plan

1) Shelter for Nomads

The severe cold of the winter season greatly impacts the productivity and accident rate of livestock. Although the number of newly provided shelter has been increasing since the introduction of private ownership of livestock, there is still a shortage of shelter in the Study Area relative to the number of nomadic herding farmers. In addition, the level of accommodation capacity and construction specifications are also low.

Therefore, the number of shelter needs to be increased so that all nomads can have their own shelter for overwinter use. In addition, the structure of shelter for overwinter use need to be improved so that they have at least a roof and three walls (three sides) to improve cold resistance.

2) Development of Intensive Livestock Farming Facilities

Many of the large-scale facilities for dairy farming, pig farming and poultry farming have aged and deteriorated or broken down and been placed out of service up until now. As these are important national assets, effective use of these facilities must be made, by, for example, dividing these into medium-scale enterprises and promoting them. To this end, first those intensive livestock farming enterprises which will continue to play the role of a core organization in the future should be selected, and renewal of aged and deteriorated facility and machinery, introduction of agricultural equipment necessary for expanding feed production, etc. need to be promoted in the manner of a model project. Then, improvement and development of facilities necessary to feed projected numbers of livestock animals need to be promoted, based on the results of the model projects. One of facility that need to be newly provided is animal manure handling facilities. These facilities must be capable of exchanging manure so that fermentation will be facilitated, and they need to be provided with manure yard with a space for storing products for a

certain period. These facilities are essential from the viewpoint of effective utilization of livestock waste and preserving the environment of the surrounding area.

In order to develop intensive livestock farming facilities, Mongolia has to depend on imports from other countries for many of the required materials and equipment. In this regard, the country is facing a problem of price balance between its livestock products and imported goods. Because of this, it is necessary to continue government assistance arrangements, such as subsidies, for the time being..

In designing facilities, it is necessary to give sufficient consideration to the cold insulation performance of barns which will be subject to the cold conditions of Mongolia's harsh winter. In this regard a small but efficient heating system using coal as fuel should be provided. Silos need to be designed in such a way that losses can be minimized and fluctuations in the numbers of livestock can be accommodated.

3) Drinking Water and Water for Miscellaneous Use Facility Development Plan

Groundwater, springs and rivers are being used for the drinking water and miscellaneous use water sources for nomads and livestock animals in nomadic herding areas. In Mongolia, as rainfall is scant and surface water is also scarce due to a lack of forests which hold water resources, ground water is being used as the main water source in a considerably large number of areas. The well facilities of these areas, most of which were constructed in the 1970s, are now facing frequent breakdowns of machinery, and many of these wells have been abandoned because they have since ceased to function. Thus, the number of usable well facilities has been decreasing, resulting in a situation where the area of usable grassland available for grazing is limited, and sufficient amounts of drinking water for nomads and livestock cannot be obtained.

In order to remedy this situation, an appropriate well facility location plan needs to be developed so as to realize efficient grassland use and improvement of the living standard of nomads. To this end, improvement work on deteriorated facilities and studies into developing new water sources need to be conducted with higher priority given to areas where there are serious shortages of water resources. In addition, in order to manage and maintain well facilities in a proper manner after the break up of the Negdels, a system for maintaining and managing of well facilities needs to be established by, for example, promoting the formation of utilizationgroups by nomads.

(1) Water Supply Facility Development Plan

a) Water Resource Investigation

In order to determine the volume of Groundwater reserves, collection and analysis of existing data, test excavations, etc. need to be performed and a location plan for water supply facilities needs to be developed.

b) Water Supply Facility Development Plan

Table 4.4.4.1 outlines the content of the Water Supply Facility Development Plan. According to data from the RIAH, the proportion of the area for which water supply is covered by well facilities relative to the total area of existing grassland is 71.9-89%, with water being supplied to 80% of grassland areas on average. Under this plan, location of wells will be planned for those grassland areas which are currently not covered by any water supplies facility, and a total review of well facility for the entire grassland area will be made in order to realize efficient utilization of pasture including these pasture areas.

This Water Supply Facility Development Plan has been developed based on the "Well Facility Provision Standards", which were defined in 1983 by MOFA, and Table 3.6.4 "Well Facility Utilization Status", which was prepared based on the results of field surveys in the Study Area.

(a) Rehabilitation and Development Plan

[1] Development of well facilities will be undertaken during the two-year period from 1997 through 1998 for the southern part of Ovorhangai Aimag, which is in urgent need of well facilities.

[2] In the subsequent five-year period (1999-2003), well facilities will be develop for the remaining part of Ovorhangai Aimag, and the rehabilitation and development of facilities will be conducted for Bulgan and Orkhon Aimags.

(b) Well Facility Development Plan

[1] Necessary facilities will be newly developed by 2000-2010.

[2] The target provision level will be 90% of the well facilities required.

(2) Management and Maintenance Regime for Water Supplies Facility in Nomadic Herding Areas

See Chapter 5 (5.2).

Table 4.4.4.1 Water Supply Facility Development Plan

Item	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total	Notes
①Area of Meadow (1,000ha)	2,286	5,582	3,534	6,006	17,408	
②Coverage Area of Existing well Facility (1,000ha)	89% (2,035)	71.9% (4,014)	76.8% (2,714)	88.3% (5,304)	14,067	①／(%)=
③Other than above (1,000ha)	11% (251)	28.1% (1,568)	23.2% (820)	11.7% (702)	3,341	①／(%)=
④Well Deployment Standard Area (ha/place)	2,641	3,630	2,641	3,215		
⑤Number of Newly Required wells (Number of Wells)	85	432	340+310 =650	218	1,395	③/④=
⑥Number of Existing Wells (Number of Wells)	2,563	2,635	688	2,029	7,915	
⑦Number of Available Wells (Number of Wells)	2,486	2,225	538	1,326	6,575	
⑧Number of Necessary Wells (Number of Wells)	770	1,106	1,028	1,650	4,554	①/④－⑤=
⑨Target Provision Level (Number of Wells)	693	995	925	1,485	4,098	⑧／90%=
⑩Number of Wells that Must be Rehabilitated/Provided (Number of Wells)	0	0	150	324	474	⑥－⑦= or ⑧－⑦=

4.4.5 Livestock Farming Management Plan

In order to produce livestock farming products as designated by the purposes of the Plan, the following types of livestock farming enterprises need to be deployed in the Study Area (management plans for major farming types are given in Table 4.4.5.1).

1) Nomadic Herding Household

The traditional nomadic herding systems are excellent systems that are well suited to Mongolia's natural conditions. Efforts need to be made to ensure that these systems will be maintained into the next century. Further, those people who newly begin nomadic herding in areas where there are abundant grass resources need to be supported. In terms of management techniques, active livestock improvement and improvement of feeding management techniques need to be pursued in order to increase the weight of animals at the time of shipment and to reduce accident rates.

In order to adapt the nomads to the new market economy social system, cooperative organizations of nomads should be developed and strengthened, and the supplying of living goods etc., the collection and shipment of livestock products, cooperative work, as well as the transmission and exchange of various kinds of information should be conducted through these organizations.

In the management plan, nomads with about 100 head of livestock have been targeted as the average farmers of the study area.

2) Intensive Livestock Farming Companies

All remaining livestock farming companies which have been operated as state-run farms will be privatized. At the same time, reorganization of large-scale dairy, pig, poultry farming enterprises which have been seriously affected by rapid privatization and promotion of small/medium-scale enterprises will be pursued in order to secure stable supplies of livestock products for urban residents. To achieve this, the securing of funds will become a most important task, and strong government support including low-interest loans for operation funds is essential. Figure 4.4.5.1 shows an overview of the intensive livestock farms location plan by area.

(1) Dairy Farming Companies

The following measures will be implemented in order to rebuild the milk production systems for urban residents.

[1] Reorganization of Large-Scale Dairy Farms

Dairy farms having the scale of farms operated during the "state-run farm age" which typically have 400-1,200 cows are too large to be successfully adapted to changes in the economic environment. Therefore, these farms need to be divided and reorganized into enterprises with 100-200 cows, in such a way that existing facilities, etc. can be effectively utilized. In addition, small/medium-scale enterprises with 10-50 cows need to be developed in addition to large-scale enterprises.

Results of the Small-Scale Dairy Farm Development Project being undertaken by DANIDA will be utilized in the promotion of small-scale dairy farms.

[2] Improvement and Development of Dairy Farming Facilities

Because machinery and facilities for dairy farming have become old and deteriorated, improvement and development of these facilities and machinery need to be promoted. In

particular, cold-proof measures for the winter is important. Cost reductions will be made by replacing current central heating methods with methods which improve the heat insulation performance of barns.

[3] Securing a Roughige Production Base

Production of roughage has decreased due to lack of input materials, aging and deterioration of agricultural equipment used for producing fodder. Consequently supplies of superior quality seeds, introduction of agricultural machineries, etc. need to be supported.

[4] Provision of Manure Production Facilities

Currently, effective use of livestock waste as manure is not being made, and there is even the danger of environmental pollution of surrounding areas. Therefore manure production facilities need to be newly developed in order to use animal waste effectively as manure for forage crop production. In addition, a system for supplying the manure produced to vegetable production farms, etc. need to be established.

[5] Improvement of Feeding Management Techniques

In order to improve the basic performance of milk cows, animal improvement through artificial insemination and establishment of feeding management techniques which are suited to Mongolia's natural conditions need to be sought. To this end, dairy farming facilities will be provided at tRIAH and systems for technology development as well as research and education enhanced.

[6] Mutual Aid through Establishment of Producers' Cooperatives

Producers' cooperatives will be organized around dairy farms, which are at the center of milk production business, and systems for the collective shipment of products, information exchange, mutual support, need to be established. In particular, as the success of an intensive livestock farming enterprise depends on the cost consciousness and leadership of management, acquisition of management know-how by management personnel of these companies needs to be sought in cooperation with RIAH, amongst others.

Dairy farms with about 200 cows have been targeted in the management plan as being the average-scale dairy farms in the Study Area. Since many of the existing mechanized dairy farms have facilities based on units of about 200 cows, a 200-cow unit is likely to be used as the basic unit for reorganization from the viewpoint of the effective utilization of facilities.

(2) Pig Farming Companies

With regard to pig farming companies, support including loans for operation fund should be given to large-scale pig farms, and medium-scale enterprises with 30-50 foreign breed sows need to be developed around crop cultivation farms and feed production plants. To achieve the stable management of pig farms, it is necessary to take the following measures.

[1] Improvement of Feeding Management Techniques

Feeding management techniques for foreign breed pigs which are suited to Mongolia's natural conditions need to be established and promoted. To this end, pig farming facilities will be provided at RIAH and the systems for technology development as well as research and education will be enhanced.

[2] Stable Supply of Breeding Pigs

Taxes on the purchase of superior breeding pigs from other countries need to be reduced and support provided so that planned renewal of reproduction pigs will become possible. In addition, domestic systems for supplying breeding pigs (including those of RIAH, etc.) need to be developed.

[3] Planned Renewal of Machinery and Facilities

Support need to be given so that planned renewal of pig farming facilities and associated machinery will become possible.

Pig farms with about 30 adult sows have been targeted in the management plan as the medium-scale pig farming enterprises to be developed and promoted in the future.

(3) Poultry Farming Companies

In the area of poultry farming, mainly egg collection enterprises will be promoted as the demand for eggs is expected to increase due to diversification of food needs in large cities. Support, including loans for operation funds need to be given to large-scale poultry farms, and medium-scale poultry farming enterprises will be developed around crop production farms and feed production plants. In addition, small-scale poultry farming companies with 500-1,500 chickens will be developed around Aimag capital cities. Also, improvement of the facilities of the Ulaanbaatar Poultry Farm will be supported, and the Darkhan Poultry Farm (of which construction has been stopped prior to its completion) should be divided and reorganized into private companies to be promoted. In order to realize stable management of poultry farms, it is necessary to take the following measures.

[1] Improvement of Feeding Management Techniques

Feeding management techniques for foreign breed chickens which are suited to Mongolia's natural conditions will be established and promoted. To this end, poultry farming facilities will be provided at RIAH and the systems for technology development as well as research and education will be enhanced.

[2] Stable Supply of Chicks

Taxes on the purchase of superior chicks from other countries need to be reduced and support provided so that planned renewal of egg production hens will become possible. In addition, domestic systems for supplying chicks (including those of RIAH, etc.) need to be developed.

[3] Planned Renewal of Machinery and Facilities

Support needs to be given so that planned renewal of poultry farming facilities and associated machinery will become possible. In the Master Plan, egg collection poultry farms with about 10,000 hens have been targeted as the medium-scale poultry farming enterprises to be developed in the future.

(4) Cattle Fattening Companies

It is expected that the need for high-quality beef will increase in the future, but establishment of fattening farm companies is lagging behind. Consequently, fattening facilities need to be provided at RIAH, and fattening techniques for active cattle and dairy bull calf as well as management know-how need to be established. In order to supply high-quality edible meat to meet the demand of the expanding market for tourists, etc., fattening enterprises need to be newly developed in the outskirts of large cities as well as Bulgan and Arvaikheer on the Tobal route, through the use of established technical know-how.

3) Integrated "Livestock Farming-Crop Cultivation" Companies

Integrated farming companies which combine livestock farming and crop cultivation (such as vegetable production-dairy farming-poultry farming and crop production-pig/poultry farming) should be developed mainly in the outskirt of large cities including Ulaanbaatar, Darkhan and Erdenet. This type of enterprise makes it possible to use livestock manure and farm byproducts effectively and to solve the problem of seasonal labor imbalances, thus enabling increases in income. Therefore, low-interest loan systems

to support this type of enterprises, as well as necessary technical guidance systems, need to be established.

4.4.6 Programs/Projects of the Livestock Farming Development Plan

The main programs and projects required to implement the Livestock Farming Development Plan are outlined below.

(4.4.6.1)

Project Name	RIAH Technology Development Project	Beneficiary	Livestock farms, nomads
Target	RIAH (Research Institute of Animal Husbandry)		
Purpose	To develop of intensive livestock farming techniques and educate specialists.		
Work Items	[1] Development of dairy, pig, poultry, and meat cattle fattening farming facilities. [2] Introduction of equipment for research/education. [3] Development of intensive livestock farming techniques. [4] Education/training for students of the National University of Agriculture, etc.		

(4.4.6.2)

Project Name	Milk Production Increasing Project	Beneficiary	Dairy farms and consumers
Target	Existing mechanized dairy farms and producers' association		
Purpose	To improve the productivity of dairy farms which are supplying milk to urban residents.		
Work Items	[1] Improvement of dairy farm facilities. [2] Development of compost production facilities. [3] Introduction of agricultural equipment for feed production and equipment for AI. [4] Establishment of dairy farm producers' association.		

(4.4.6.3)

Project Name	Grassland Productivity Improvement Program	Beneficiary	Livestock Farms, nomads
Target	RIAH, concerned divisions of each Aimag		
Purpose	To maintain and improve grassland productivity.		
Work Items	[1] Development of grassland ecosystem monitoring systems. [2] Establishment of a technology development center and model farmland areas. [3] Multiplication/provision of high grade seeds. [4] Introduction of machinery for grassland renewal.		

(4.4.6.4)

Project Name	Roughage Production Expansion Program	Beneficiary	Livestock farms, nomads
Target	RIAH, dairy farms and cattle fattening farms.		
Purpose	To expand production and reserve storage of roughage		
Work Items	[1] Growing of forage crop fields, artificial and natural grassland and determination of techniques to be used. [2] Establishment of multiplication/provision systems for high grade seeds. [3] Supporting of introduction of agricultural equipment for cultivation/harvesting [4] Reserve preparation of roughage for emergencies.		

(4.4.6.5)

Project Name	Intensive Livestock Farming Enterprises Development Program	Beneficiary	Livestock farms, farmers
Target	Livestock farms/farmers		
Purpose	To expand the production volume of livestock products through the promotion of small/medium-scale livestock farming enterprises.		
Work Items	[1] Development of medium-scale enterprises through break-up of large-scale livestock farms. [2] Support for start-up small/medium-scale livestock farming enterprises. [3] Establishment of systems for supplying breeding stock.		

(4.4.6.6)

Project Name	Veterinary Research Institute Technology Development Project	Beneficiary	Livestock farms, nomads
Target	Veterinary Research Institute		
Purpose	To improve the standard for the diagnosis and prevention of infectious diseases of livestock.		
Work Items	[1] Provision/improvement machinery/equipment at the Veterinary Research Institute. [2] Establishment of technology for the diagnosis and prevention of infectious diseases of livestock. [3] Education/training for students of the National University of Agriculture, etc.		

(4.4.6.7)

Project Name	Livestock Improvement Systems Enhancement Program	Beneficiary	Livestock farms, nomads
Target	MOFA, livestock improvement organizations of Aimags, Sums and Cities, the AI Center		
Purpose	To enhance livestock improvement facilities and organization structure of the government and local authorities.		
Work Items	[1] Provision/improvement of facilities and information transmission systems at government and local organizations. [2] Development of systems for supplying superior breeds. [3] Enhancement of the function of the AI Center and training of specialists. [4] Organization of Livestock Fairs.		

(4.4.6.8)

Project Name	Livestock Hygiene Control Systems Enhancement Program	Beneficiary	Livestock farms, nomads
Target	MOFA, livestock hygiene control organizations of Aimags, Sums and Cities.		
Purpose	To enhance livestock hygiene control facilities and organization of structure o f the government and local authorities.		
Work Items	[1] Provision/improvement of facilities and information transmission systems at the government and local organizations. [2] Improvement/provision of facilities at the Border Quarantine Offices and other hygiene testing agencies and introduction of equipment. [3] Training of specialists.		

(4.4.6.9)

Project Name	Livestock Fattening Enterprises Development Project	Beneficiary	Livestock farms
Target	Livestock farms		
Purpose	To develop and promote cattle, horse and sheep fattening enterprises to supply high-quality meat.		
Work Items	[1] Support for efforts to develop livestock fattening facilities. [2] Promotion of and guidance on livestock fattening techniques. [3] Development of marketing routes for high-quality meat.		

(4.4.6.10)

Project Name	Herder's Water Supply Improvement Project	Beneficiary	Inhabitants of rural area, nomads
Target	Specialists and engineers of Aimags and Sums, local inhabitants, nomads		
Purpose	To secure stable supply of drinking water/miscellaneous use water and to develop/train well facilities management/maintenance technicians.		
Work Items	[1] Examination of water resources (collection and analysis of existing data, test boring). [2] Renewal of well facilities (deep well). [3] Provision of new shallow wells. [4] Reorganization of well facilities management/maintenance cooperatives. [5] Training and development of geologists and facilities/machinery maintenance technicians.		

4.5 Agricultural and Livestock Farming Products Distribution and Processing Development Plan

4.5.1 Agricultural and Livestock Farming Products Distribution and Processing Development Policy

The development policy for the distribution and processing of agricultural and livestock farming products consists of determining the production and consumption volume of agricultural and livestock farming products for each region, obtaining the overall picture of future distribution volume of agricultural and livestock farming products, and improving existing distribution and processing factories and developing new distribution and processing facilities as required. In order to energize local economy, these new distribution and processing facilities need to be deployed at centers of local Aimags and Sums. Further, development of technologies for improving the quality of processed food for export to improve international competitiveness need to be promoted. Plans for individual agricultural and livestock farming products are outlined in the following subsections.

4.5.2 Marketing and distribution plan for agricultural and livestock products

1) Grain (wheat)

Here the plan will deal with wheat, the major grain products. The wheat consumption volume in the Study Area is forecast to comprise about 50% of the national total in the year 2010, but supplies of flour to other regions where wheat cannot be cultivated and its use as a raw material for alcohol, livestock feed, and others also be considered.

The three flour mills (Sukhbaatar, Darkhan, and Ulaanbaatar) in which the state owns a 51% share of assets account for 60-70% of the total national production capacity and have a large effect on production and consumption. Therefore, when proceeding with reforms aimed at privatization, this will be done so as not to cause a reduction in flour production.

As regards Bulgan and the northern part of Ovorhangai, it will be planed to establish a system for self-sufficiency in wheat with a focus on medium-scale flour mills (Bulgan, Khalkhorin).

Meanwhile, in order to vitalize regional economies, it will be supported to establish private small-scale flour mills (annual wheat production about 20,000t) in the Aimags (located in the center of Sums). An outline of the distribution and processing plan for wheat is shown in Table 4.5.2.1 and Figure 4.5.2.1

Table 4.5.2.1 Marketing and Processing Plan for Wheat

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Production Volume (grains)	253,200	251,100	67,500	23,000	594,800
For seed use	29,600	29,500	7,800	2,300	69,200
Self-consumption, Other losses	17,900	17,700	4,800	1,700	42,100
Supply Volume (grains)	205,700	203,900	54,900	19,000	483,500
For flour product. (grain vol.)			(-2,900)	(2,900)	
Large-/medium-scale flour mill	124,000	55,500	15,800	21,900	217,200
Darkhan Flour Plant	68,500				68,500
Ulaanbaatar		55,500			55,500
Sukhbaatar	55,500				55,500
Kharkhorin				21,900	21,900
Bulgan					15,800
Small-scale flour mills	7,500	10,500	9,600	-	27,600
Flour production volume (1)					
Large-/medium-scale flour mill	90,500	40,500	11,500	16,000	158,500
Darkhan Flour Plant	50,000				50,000
Ulaanbaatar	40,500	40,500			40,500
Sukhbaatar					40,500
Kharkhorin				16,000	16,000
Bulgan			11,500		11,500
Small-scale flour mills	5,500	7,700	7,000	-	20,200
Distribution of flour					
Flour demand in district (2)	26,500	96,000	18,500	15,300	156,300
Balance (1)-(2)	69,500	-47,800	0	700	22,400
Flour distribution plan					
To Tov/Ulaanbaatar	(47800)				(47,800)
To other regions*	21700			(700)	22,400
Other uses (grains)					
Formula feed production	60,400	94,900	26,600		181,600
Food processing & export	13,800	43,300			57,100

Note: *The 22,400 tons of flour sent to other regions are equal to the demand in the three southern Gobi Aimags. Grains other than wheat, such as barely and Oats, are included in the production volumes of wheat shown as above.

2) Greens (including vegetables, potatoes and fruits)

In the area of distribution and storing of greens (vegetables, potatoes and fruits), it is necessary to establish systems for managing these processes, especially in the city of Ulaanbaatar where there is remarkable concentration of population. The per capita annual demand for these products, including processed products, is low at present at 60-70 kg, but this is expected to increase up to 160 kg in the future, and production of vegetables in the outskirt of cities is also generally increasing. However, the number of retail shops that

deal with greens (which are fresh foods) is small, and at present these vegetables are only sold at nine private food markets and several state-run shops. As freshness is the most important factor in the distribution of green vegetables, development of trading systems must be promoted in conjunction with the development of production systems in order to increase consumption. At present, neither the producers nor the consumers have the necessary marketing channels, and as a result both production and consumption are limited. In the future, therefore, wholesalers who specialize in consignment-based sales for small-scale production farmers need to be developed and wholesale markets for promoting the distribution of products from wholesalers to numerous retailers need to be set up by the government. Provision of these wholesale markets will bring many benefits including [1] fair commercial trading, [2] proper pricing, [3] efficient collection and distribution, [4] reduction in distribution costs through economy of scale and [5] timely publication of price information.

Development of retailers needs to be promoted by simplifying required procedures and qualifications and by promoting free competition in the private sector. With regard to wholesalers, as certain levels of ability to transport and store green vegetables will be required, one scenario that is likely to be adopted is to reorganize vegetable storehouse companies which are being forced to reduce their scale of operation due to shortages of operating funds into vegetable wholesalers. Some of these vegetable storehouse companies are already promoting business diversification by, for example, entering into a consignment production contract with vegetable production farmers to reduce purchasing costs.

With regard to the distribution of green vegetables in country areas, as the degree of population concentration is low in these areas except for the presence of a few cities, there will be no problem in leaving the current manner of distribution the way it is (at present food markets are organized mainly by agricultural product trading centers), to be developed by free economic activities by the private sector. In areas where land is abundant, home cultivation of vegetables will be actively promoted to improve the standard of consumption.

The processing of green vegetables is advantageous in that it [1] mitigates the degree of fall in sale prices resulting from concentration of harvesting periods, [2] enables efficient utilization of low-quality products which would not otherwise attract any buyers, and [3]

reduces storage losses by enabling long-term storage, and also revitalizes the local economy. Therefore establishment of small-scale private factories for vegetable pickles, fruits juices, etc. need to be promoted.

Since it is difficult to assure production to meet national demand for fruit, it will be necessary to fill the gap with imports. However, production of fruits need to be expanded where possible, and simple processing techniques such as those used for processing jams and juices need to be developed and promoted. Tables 4.5.2.2 through 4.5.2.4 present an outline of the proposed distribution and processing plans for green vegetables.

Table 4.5.2.2 Marketing and Processing Plan for Potato

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Production Volume	86,300	111,300	20,500	13,500	231,600
For seed use	11,600	21,200	2,500	1,600	36,900
For self-consumption and losses in transit & storage	22,400	27,100	5,400	3,600	58,500
Potato supply Volume	52,300	63,000	12,600	8,300	136,200
Distribution					
Veg. demand in district (2)	16,400	62,500	11,400	8,200	98,500
Balance (1)-(2)	35,900	500	1,200	100	37,700
Distribution Plan					
To other regions*	35,900	500	1,200	100	37,700

Note: *The 37,700 tons of potatoes sent to other regions are equivalent to 40% of the demand in other regions

Table 4.5.2.3 Marketing and Processing Plan for Vegetable

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Production Volume	105,000	37,500	16,000	12,300	170,800
For seed use	300	100	-	-	400
For self-consumption and losses in transit & storage	31,500	8,300	4,800	3,700	48,300
Vegetable supply volume	73,200	29,100	11,200	8,600	122,100
Distribution					
Veg. demand in district (2)	16,200	62,200	11,200	8,500	98,100
Balance (1)-(2)	57,000	-33,100	0	100	24,000
Distribution Plan					
To Tov/Ulaanbaatar	(33,000)			(100)	(33,100)
To other regions*	24,000				24,000

Note: *The 24,000 tons of vegetables sent to other regions are equivalent to 26% of the demand in other regions

Table 4.5.2.4 Marketing and Processing Plan for Fruits

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Fruit Production Volume (1)	600	400	-	-	-
Distribution					
Fruit demand in district (2)	9,000	34,900	6,200	4,100	54,200
Balance (1)-(2)	-8,400	-34,500	-6,200	-4,100	-53,200
Distribution Plan					
Import volume	8,400	34,500	6,200	4,100	53,200

3) Formula feed

Formula feed is produced in order to supplement the inadequate supply of livestock feed in grass resources. It is mainly used in intensive livestock industry for the production of milk, meat, eggs and others around cities such as Ulaanbaatar.

Raw materials for formula feed include poor quality surplus wheat that is not suited for the production of flour (also barley, oats, and others that are included in the figures for wheat), wheat bran (a by-product from flour mills), oil cake (a by-product from vegetable oil factories), and trace nutrients considered necessary for livestock nutrition. Trace nutrients are imported.

Formula feed is mainly produced by feed plants set up alongside flour mills, but since future demand will reach four times the present production capacity, it will be necessary to establish new production lines or small-scale feed-mixing factories in the rural area.

Since the demand for formula feed is increasing in parallel with the advance of intensive livestock industry, it will be also needed to match the production of formula feed to this advance. An outline of the distribution and processing plan for formula feed is shown in Table 4.5.2.5. and Figure 4.5.2.1

Table 4.5.2.5 Marketing and Processing Plan for Formula Feed

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Supply volume of grains (1)					
From Selenge & Darkhan-Uul dist.	60,400				60,400
From Tov & Ulaanbaata dist.		94,600			94,600
From Bulgan & Orkhon dist.			20,100	6,500	26,600
Wheat bran production volume (2)	30,300	15,200	5,800	5,000	56,300
Large-/medium-scale flour mill					
Darkhan Flour Plant	15,800				15,800
Ulaanbaatar	12,800				12,800
Sukhbaatar		12,800			12,800
Kharkhorin				5,000	5,000
Bulgan			3,600		3,600
Small-scale flour mills	1,700	2,400	2,200		6,300
Vegetable oil cake (3)	100	200	400	500	2,100
Formula feed raw material (1+2+3)	91,700	110,000	26,300	12,000	240,000
Vol. produced by exist. feed plant	37,000	-	12,000	12,000	61,000
Darkhan Flour Plant	6,000				6,000
Ulaanbaatar	13,000				13,000
Sukhbaatar	18,000				18,000
Kharkhorin				12,000	12,000
Bulgan			12,000		12,000
Vol. newly produced	54,700	110,000	14,300	-	179,000
Total	91,700	110,000	26,300	12,000	240,000
Distribution of flour					
To Selenge & Darkhan-Uul dist.	62,800				62,800
To Tov & Ulaanbaatar dist.	20,500	89,500			110,000
To Bulgan & Orkhon dist.	7,400		26,300		33,700
To Ovorhangai dist.		20,500		12,000	32,500

4) Other agricultural products

(1) Sugar

The demand for sugar is estimated to reach 72,000 tons by the year 2010, and domestic production of sugar has been studied by the MOFA, also with a view to foreign currency savings. The cultivation of sugar beets was researched from an early stage, and since the cultivated results were favorable the domestic sugar production scheme was planned

by a Cabinet decision in 1993. According to calculations made regarding the profitability of sugar refineries on the basis of the outlook for its international price, it will be possible to promote sugar production in Mongolia as long as the raw material purchase price is kept low. However, the cultivation of sugar beets depends on irrigation facilities, and because continuous cultivation on the same land is not possible, a crop rotation system in cycles of four years has to be adopted. Therefore irrigation facilities equivalent to 4 times the sugar beet planting area have to be prepared.

When these investments are included in the calculation the profitability decreases, and imported sugar has a slight advantage. In order to develop and expand domestic production of sugar, strong support from the government is needed, including the arrangement of a agricultural infrastructure for sugar beet production (Reference to SUPPLEMENTARY MATERIALS). For sites for installation of sugar refineries, consideration will be made on factors such as losses and costs during transportation of the raw materials, and limits to storage times. Suitable sites are those with good infrastructure such as roads and electric power and near where a certain required irrigation area can be secured. At several such sites refineries with a sugar beet processing capacity of around 50-500 tons par day will be planned. The distribution and processing plan for sugar is shown in Table 4.5.2.6.

Table 4.5.2.6 Marketing and Processing Plan for Sugar

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Production vol. of sugar beet	78,000	10,500	30,000	31,500	150,000
Losses in transit or storage	7,800	1,000	3,000	3,200	15,000
Sugar beet processing volume	70,200	9,500	27,000	28,300	135,000
Number of sugar refineries	3	1	3	1	8
Sugar production volume (1)	9,800	1,300	3,800	4,000	18,900
Distribution					
Sugar demand in district (2)	6,100	23,300	4,200	3,100	36,700
Balance (1)-(2)	3,700	-22,000	-400	900	-17,800
Distribution Plan					
(to Ulaanbaatar)		(4,600)			
Import	3,700	17,400	400	900	17,800

(2) Vegetable oil

Oil crops have been cultivated on an experimental basis for some time in Mongolia, and the oil pressing machinery used in various countries has been compared and studied.

The demand for vegetable oil in the year 2010 is expected to reach 6,000 tons, and plans for domestic production scheme was decided in 1993 at the same time as those for sugar. With regard to the installation of factories, since it is not efficient to gather oil seeds from plantations existing across an extensive area and to products oil intensively in one place, small-scale oil pressing machinery that can meet the demand within a district will be installed at several sites in the district. The distribution and processing plan for vegetable oil is shown in Table 4.5.2.7.

Table 4.5.2.7 Marketing and Processing Plan for Vegetable Oil

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Production vol. of sugar beet	1,650	300	750	750	3,450
Losses in transit or storage	170	30	70	70	340
Vegetable oil processing volume	1,480	270	680	680	3,110
Veg. oil production volume (1)	410	80	190	190	870
Veg. oil cake production volume	1,010	180	460	460	2,110
Distribution					
Veg. oil demand in the dist.(2)	500	1,890	350	270	3,010
Balance (1)-(2)	-90	-1,810	-160	-80	-2,140
Import	90	1,810	160	80	2,140

(3) Crop Storage Silos

There are a total of six crop storage silos within the Study Area, including those at five flour mill factories and the storage silo in Khotor. Storage capacity is anticipated to reach 322,700 tons in total, including 10,000 tons which will be added at the Kharkhorin flour mill factory with grant-in- aid from Japan. As the volume of crop supply is expected to be some 483,500 tons, it is necessary to provide storage facilities for the remaining 160,800 tons. The storage facilities to be expanded will mainly consist of facilities at flour factories in agricultural village areas where an increase in demand is expected and at formula feed factories which will be newly constructed. Table 4.5.2.8 shows the distribution plan for crop storage.

Table 4.5.2.8 Distribution Plan for Grain Storage

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Supply volume of grains (1)	205,700	203,900	52,000	21,900	483,500
Existing Storage capacity (2)	198,000	64,000	38,700	22,000	322,700
Bulgan Storage silo			38,700		38,700
Sukhbaatar	82,000				82,000
Darkhan, Hotol	116,000				116,000
Ulaanbaatar		64,000			64,000
Kharkhorin				22,000	22,000
Small flour mill's capacity (3)	7,500	10,500	9,600		27,600
New const. Storage vol. (1-2-3)	200	129,400	3,700		133,300

Note:1 Existing storage capacity in Kharkhorin flour plant includes newlly construction by Japanese aid.

Note:1 Rural storage capacity using for seed and etc. is not involved in existing storage capacity

(4) Plans for Distribution and Processing of Other Agricultural Products

Plans for distribution and processing of other agricultural products include those for the development of collective collection and shipment facilities and small-scale vegetable processing plants in vegetable producing areas and for supporting private foods-related industries in country areas including small-scale bread and food product factories, soft drink factories, salt production factories and packing factories . This support includes privileged arrangements for land use and tax breaks associated with the establishment of factories, low-interest loans on the capital needed for establishing factories, tax exemptions for the importing of machinery, and the promotion of joint ventures and partnerships with foreign enterprises, which will provide an environment for energizing the economic activities of private enterprises. In addition, development of technologies for processing foods suited to the environment of Mongolia and development of food safety and hygiene systems need to be planned.

4.5.3 Marketing and Processing Plan for Livestock Products

1) Milk and dairy products

The demand for milk is expected to reach about 760,000 tons nationwide and about 320,000 tons in the Study Area in the year 2010, demand in urban areas accounting for 64% of this. In rural areas, it is expected that production and distribution of milk from adult females of the livestock raised by herders exceed self-sufficiency, but in urban areas

where population is concentrated the demand cannot be met by the supply of milk from local herders alone, thus this will be supplemented by dairy farms.

The Study Area has a lower proportion of the nation's livestock (around 23%) than of its population (around 50%), and thus to meet the demand supplies of milk should be derived from other regions. In particular, although demand in urban areas is large, as milk goes off quickly and is difficult to preserve long-term, it will be supplied in the form of dairy processed products that can be distributed. Therefore, it will be necessary to improve traditional milk processing technology and to install research facilities in existing milk factories in order to develop milk product processing technology that can respond to distribution over long distances, as well as strengthening the system of hygiene monitoring. In addition, it will be necessary to introduce milk processing technology such as powdered milk, butter, and reconstituted milk from abroad and to raise the consumption of milk in winter.

Since the level of population concentration in the center of Ulaanbaatar is great and there is an urgent need for a supply of nutritional foods for children and the sick, this is the district in which the arrangement of a system for milk supply is strongly required. Therefore, following measures will be planned:

[1] the installation of cooperative milk collection facilities for receiving milk from dairy farms and local herders;
[2] the introduction of chilled storage equipment and vehicles with refrigerators; and
[3] the establishment of milk collection routes and arrange distribution channels.

Some of these have been selected as priority projects forming part of the Milk Production Increasing Project, and this project will give lateral support to the functional improvement of milk plant where refrigerating equipment is being set up with aid from Japan.

Milk factories are to be newly provided and by the year 2010, about 1/2 of the total milk demand of the Central area Aimag centers will be covered. To this end, establishment of milk factories by the private sector need to be actively promoted in Sukhbaatar, Zuunmod and Bulgan. The development of milk collection systems needs to be pursued with regard to the Erdenet Milk Factory which is currently out of operation as well as the establishment of a milk production base through the development of private dairy farms. Table 4.5.3.1 and Figure 4.5.3.1 show the proposed distribution and processing plan for milk.

Table 4.5.3.1 Marketing and Processing Plan for Milk

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Milk from 5 types of livestock	22,600	65,800	45,300	65,200	198,900
Milk from dairy farm	13,000	46,100	3,700	2,700	65,500
Total (1)	35,600	111,900	49,000	67,900	264,400
Demand for milk (2)	59,900	178,100	42,200	41,000	a: 321,200
Balance (1)-(2)	-24,300	-66,200	6,800	26,900	-56,800
Distribution					
To Selenge & Darkhan-Uul dist.			(6,800)	[26,900]	(6,800) [26,900] ([33,700])
To Tov & Ulaanbaatar dist.	(6,800)	[26,900]			
Supply from within the Study A.	17,500	39,300			56,800
Supply from other regions					
Milk demand in urban area	Sukhbaatar 9,100 Darkhan 23,200	Ulaanbaatar 135,500 Zuunmod 8,600	Erdenet 15,600 Bulgan 6,800	Arvaiheer 8,200	Total b: 207,000 (64% of demand a)
Milk plant production capacity in urban area (at present)	Sukhbaatar n.a. Darkhan 5,000	Ulaanbaatar 65,400 Zuunmod n.a.	Erdenet 5,000 Bulgan n.a.	Arvaiheer 1,500	Total 76,900 (37% of demand b)
New milk processing plant (plan)	Sukhbaatar 4,100 Darkhan 5,700	Ulaanbaatar 2,400 Zuunmod 4,300	Erdenet 2,800 Bulgan 3,400	Arvaiheer 2,600	Total 25,300 (12% of demand b)

2) Meat and meat products

The demand for meat in the year 2010 is anticipated to be about 255,000 tons for the nation as a whole and about 115,000 tons for the Study Area. In the Study Area, supplies of meat should be derived from other regions in order to meet the demand, as in the case of milk.

Livestock are brought to meat factories by moving them (Tobal) during a period from August to December when meat factories operate. In the Study Area, there are large-scale meat factories in Darkhan and Ulaanbaatar, and livestock are gathered there through movement routes. In order to strengthen meat processing and distribution in future, the role played by the meat factories in Darkhan and Ulaanbaatar is large, and about 70% of the urban meat demand is supplied from these two factories. Therefore it is important to maintain and improve the processing functions of these two factories, and to

systematically update their machinery and equipment. In the Darkhan meat factory, refrigeration facilities are being set up by aid from Japan. In addition, although supplies of meat sometimes used to be made to the former Soviet Union, in future it will be necessary to develop meat processing technology and strengthen the system of hygiene management so that the rest of the world may receive supplies of the meat resources produced from the pure natural conditions with which Mongolia is blessed.

As one aspect of strengthening the meat supply system in Darkhan and Ulaanbaatar, attempts are being made to promote a pig farming industry, and thus it will be required to establish new pork production and processing lines. To supplement meat supply, to supply meat to foreign travelers and others, and to diversify meat products, these pork processing factories will incorporate processing stages for sausages and ham etc. as well as slaughtering and dismemberment, and it will be positively planned to promote the introduction of advanced technology from overseas.

To promote the regional meat industry, it will be needed to establish small-scale meat factories in Bulgan and Arvaikheer, transit location in Tobal, in order to supplement the meat factories in Darkhan and Ulaanbaatar.
In addition, meat storage facilities will be needed in the outskirts of Sukhbaatar, expected to develop as a center of international trade in future. Further, it will be aimed to vitalize rural economies by installing several small-scale processing factories for sausages, ham, and others in regional towns. The distribution and processing plan for meat is shown in Table 4.5.3.2 and Figure 4.5.3.2.

Table 4.5.3.2 Meat Marketing and Processing Plan

(Unit:tons)

Category \ District	Selenge & Darkhan-Uul	Tov & Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Study Area (Total)
Meat from livestock inside dist.	8,450	23,940	15,250	23,350	70,990
Pork production volume	1,160	660	400	100	2,320
Chicken meat production volume	40	80	10	10	140
Total (1)	9,650	24,680	15,660	23,460	73,450
Demand for milk (2)	20,300	6,690	14,230	13,380	c: 114,890
Balance (1)-(2)	-10,650	-42,300	1,430	10,080	-41,440
Distribution					
To Selenge & Darkhan-Uul dist.			(1,430)		(1,430)
To Tov & Ulaanbaatar dist.				[10,080]	[10,080]
Supply from within the Study A.	(1,430)	[10,080]			([12,230]
Supply from other regions	9,220	32,220			41,440
Meat demand in urban areas	Sukhbaatar 2,700 Darkhan 9,300	Ulaanbaatar 54,200 Zuunmod 2,600	Erdenet 6,200 Bulgan 2,000	Arvaiheer 2,700	Total d: 79,700 (69% of demand c)
Meat processing plant prod. capacity in urban area (at present)	Darkhan 18,600	Ulaanbaatar 36,000 Baghangai 3,320			Total 57,920 (73% of demand d)
New meat processing plant (plan)	Darkhan 1,200 (Pork & Chicken)	Ulaanbaatar 1,200 (Pork & Chicken)	Bulgan 8,200	Arvaiheer 2,700	Total 13,300 (17% of demand d)
Meat storage capacity (at present)	Sukhbaatar n.a. Darkhan * 3,200	Ulaanbaatar * 24,000 Zuunmod 300	Erdenet 3,000 Bulgan 360	Arvaiheer 3,000	Total 3,860 (42% of demand d)

Note: *Include refrigerator volume in meat processing plant.

3) Distribution and Processing of Other Livestock Farming Products

There are wool, cashmere, animal leather, etc., in the area of distribution and processing of other livestock farming products which are important export items of Mongolia. However, distribution and processing of these items is not discussed in this report, as MOFA does not have any jurisdiction over this area.

With the popularization of private ownership of livestock, animal trading is also becoming popular, but at present this is mostly limited to relative trading. In many cases there is no choice for nomads in country areas who do not have accurate price information but to accept a one-sided offers from purchasers which is disadvantageous to the herders.

To remedy this situation, regularly-scheduled livestock markets need to be set up in local towns in country areas, and public auctions involving many livestock buyers need to be conducted to achieve proper pricing in local livestock trading.

4.5.4 Agricultural and Livestock Farming Products Distribution and Processing Development Implementation Programs and Projects

The main programs and projects required to implement the Agricultural and Livestock Farming Products Distribution and Processing Development Plan are outlined below.

(4.5.4.1)

Project Name	Milk Distribution/Processing System Enhancement Project	Beneficiary	Producers and consumers
Target	Existing large/medium-scale milk products processing plants and milk producers' cooperatives.		
Purpose	To secure the supply of milk to urban areas and improve facilities and machinery at existing factories.		
Work Items	(1) Construction of collective milk collection facilities and establishment of producers' cooperatives. (2) Introduction of refrigeration facilities and refrigerator cars for milk. (3) Improvement of facilities/machinery and maintenance of production ability at three milk products processing plants (Darkhan Plant, Ulaanbaatar Plant and Ulaanbaatar Children's Milk Plant).		

(4.5.4.2)

Project Name	Agricultural/Livestock Farming Food Products Processing Technology R&D Project	Beneficiary	Consumers
Target	Agricultural/livestock farming food products processing-related research facilities/specialists.		
Purpose	To develop research systems for the development of agricultural/livestock farming, food products processing techniques and to cultivate related specialists.		
Work Items	(1) Provision/improvement of equipment/machinery at food products processing-related research facilities. (2) Research and technology development of processed food products suited to the Mongolian environment. (3) Research and development concerning food products production techniques which enhance the international competitiveness of Mongolian products. (4) Training and development of food products processing-related technologists.		

(4.5.4.3)

Project Name	Food Products Hygiene Technology R&D Project	Beneficiary	Consumers
Target	Food products hygiene research facilities and related specialists.		
Purpose	To develop food products hygiene research/monitoring systems and cultivate of related specialists.		
Work Items	(1) Provision/improvement of equipment/machinery at food products hygiene-related research facilities. (2) Enhancement of food products hygiene/safety-related systems and development of hygiene monitoring systems. (3) Training and development of food products hygiene-related specialists and hygiene monitoring staff.		

(4.5.4.4)

Project Name	Existing Flour Mill/Meat Factories Supporting Program	Beneficiary	Producers and consumers
Target	Existing large/medium-scale flour mill factories/meat factories.		
Purpose	To secure outlets for wheat and livestock, improvement of equipment/machinery at existing factories.		
Work Items	(1) Improvement of equipment/machinery and improvement/expansion of formula feed production facilities at five flour mill factories (Sukhbaatar, Darkhan, Ulaanbaatar, Bulgan and Kharkhorin). (2) Improvement of equipment/machinery at two meat factories (Darkhan and Ulaanbaatar).		

(4.5.4.5)

Project Name	Greens Wholesale Market Development Project	Beneficiary	Producers and consumers
Target	Ulaanbaatar city		
Purpose	To revitalize the marketing of greens through development of wholesale markets.		
Work Items	(1) Construction of wholesale market facilities. (2) Development of wholesale market-related systems and cultivation of wholesalers. (3) Development of wholesale market management systems and cultivation of market managers. (4) Introduction of equipment for publishing price information.		

(4.5.4.6)

Project Name	Agricultural/Livestock Farming Products Distribution/Processing Supporting Program	Beneficiary	Producers and consumers
Target	Agricultural/livestock farming products distribution/processing facilities.		
Purpose	To secure outlets for agricultural/livestock farming products and development of distribution/processing facilities.		
Work Items	(1) Promotion of establishment of sugar and vegetable oil production factories. (2) Construction of collective collection/shipment facilities and processing plants for vegetables and fruits. (3) Promotion of establishment of other food products-related factories. (4) Addition of new storage facilities for crops, vegetables and edible meat.		

(4.5.4.7)

Project Name	Milk Products Processing Plants Supporting Program	Beneficiary	Producers and consumers
Target	Medium/small-scale milk products processing plants and milk producers' cooperatives.		
Purpose	To secure outlets for milk and improvement of equipment/machinery at existing factories.		
Work Items	(1) Enhancement of milk collection system through the introduction of collective milk collection facilities, refrigeration equipment and refrigerator cars. (2) Improvement of equipment/machinery at two milk products processing plants (Arvaikheer, Erdenet). (3) Promotion of establishment of three new milk products processing plants (Sukhbaatar, Zuunmod, Bulgan).		

(4.5.4.8)

Project Name	Country Area Agricultural/Livestock Farming Products Processing Plants Supporting Program	Beneficiary	Producers and consumers
Target	Agricultural/livestock farming products processing plants in rural areas.		
Purpose	To secure outlets for agricultural/livestock farming products and promotion of establishment of small-scale processing plants in country areas.		
Work Items	(1) Construction of two meat factories (Bulgan, Arvaikheer). (2) Improvement/provision of equipment/machinery at small-scale meat processing plants. (3) Promotion of establishment of production/processing plants for chicken and pork. (4) Improvement/provision of equipment/machinery at small-scale flour mill factories and formula feed factories. (5) Promotion of establishment of new small-scale milk products processing plants.		

(4.5.4.9)

Project Name	Livestock Market Development Project	Beneficiary	Livestock farmers
Target	Bulgan and Ovorhangai Aimags		
Purpose	To realize of fair livestock trading through provision of livestock markets.		
Work Items	(1) Construction of livestock market facilities. (2) Development of livestock market-related systems. (3) Development of livestock market management systems and cultivation of market managers. (4) Introduction of equipment for publishing price information.		

4.6 Agricultural Support Plan

4.6.1 Farm Family Support System Reinforcement Plan

1) Plan to Improve the supply of production materials

(1) Seeds and seedlings

Although the Darkhan Agricultural Institute (PSARI) multiplies and distributes seeds and seedlings of crops, it is unable to supply sufficient quantity, resulting in dependence on imports for 70% to 80% of the demand. Seeds of wheat, barley and other similar varieties are often taken from farmers' own crops and reserved. However, when prices go up due to a shortage of wheat for flour use, wheat from which seeds are taken are also sold, often causing a shortage of seeds.

Seeds and seedlings are imported mainly from individual traders in Russia and China. The quantity and price of seeds for supply substantially change depending on the activities of individual importers and the storage during the winter, greatly affecting the trend of agricultural production and crop-production cost. For this reason, a system will be developed by which multiplica-tion and distribution of seeds and seedlings are centrally controlled with the PSARI playing the central role. To be more specific, the PSARI will be responsible for the integral process of development of superior varieties, multiplication and control of breeder's stock seeds, multiplication of original seeds and multiplication/distribution of seeds for cultivation while regional agricultural experiment stations will be in charge of multiplication of pure breeds. As for the multiplication of seeds for cultivation, the system calls for departments in charge at Aimags or sums to make arrangements with farms to take seeds on a contract basis, taking account of the distribution of crop producing farms. Because of this, financial aid for provision of the facilities and equipment related to the PSARI will be arranged as a priority project.

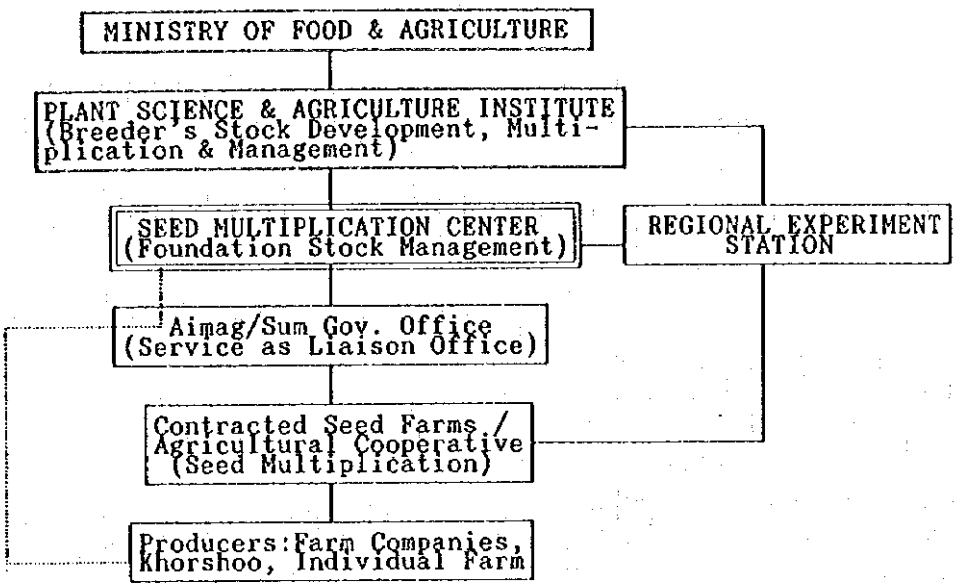
(2) Agricultural machinery and tools, spare parts and production materials

Production materials including the goods donated through KR2 are supplied almost exclusively by the Agrotechimpex Company. At present, the demand of producers is not satisfied almost entirely due to a shortage of production materials and incomplete sales network and means transportation.

Farmers will be encouraged to form an organization such as agricultural cooperatives to establish a system which ensures supply of production materials at proper prices carefully determined to meet the demand of agricultural producers as well as aftercare. To this

end, a project for improvement and consolidation of the nationwide agricultural cooperatives will be arranged after local agricultural cooperatives are fully organized.

Fig. 4.6.1.1 Seed Multiplication & Distribution System (Example)



2) The agricultural financing system

The "Food and Agriculture Fund" was established in August 1994, and put into operation in May 1995. This fund is financed by profits gained through sales of foodstuffs and goods provided by international agencies and donor countries, contributions from companies and the general public, and earnings obtained through financial management of overseas loans and counterpart funds of the donated goods.

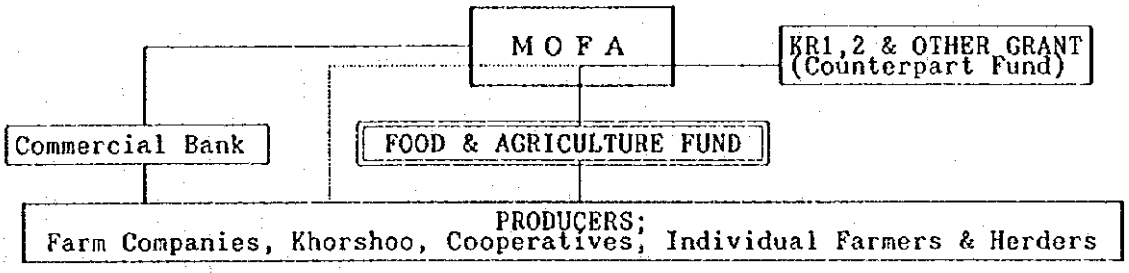
The purpose of the fund is to provide aid for projects for increasing the productivity of food and agricultural products, improving the production structure, reserving food and seeds, preventing natural disasters and crop damage due to disease as well as assisting farmers in the event of such disasters and damage, and promoting the "National Food Supply Improvement Plan". However, the size of the fund is small because it was set up rather recently.

The Fund has provided loans only for 18 wheat producing companies among those whose performance has deteriorated so much that they cannot obtains loans from banks.

In the future, it is required to promote the improvement of this system, and try to secure funds and operate funds efficiently by servicing loans provided for farmers from ordinary banks and incorporating a credit guarantee system instead of just providing loans directly from the Fund.

The size of the fundamental fund should be expanded through the creation of government's additional funds, and diversified financial measures such as payment of subsidies for key facilities and machinery should be taken.

Figure 4.6.1.2 Agricultural Financing System



3) Agricultural mutual aid and insurance system

Mongolian Agricultural Insurance Company was organized in 1991, and offers facultative agricultural insurance on cattle and crops. However, the legal system for mutual relief and insurance has not been established yet. Farmers and managers of companies and Holsho only have a little knowledge about mutual relief and insurance, and have to pay high insurance premiums because of low rate of the insured although the indemnity rate of insurance is 80%. The amount of funds of for mutual relief and insurance is as small as Tg. 200 million , and there may be a lack of fairness in payment because there is no public institutions for surveying or appraising accidents or disasters.

Efforts should be made to increase the number of farmers who insure the main agricultural and livestock products and offer stable insurance service by taking a combination of such measures as reducing the burden of payment of premiums on the part of farmers through use of the National Treasury, improving the capability of paying indemnity through reinsurance guarantee, and raising the indemnity rate.

In addition, the government should also establish the legal system for mutual relief and insurance, and work out ways to educate the public on the system and diffuse it. At the

same time, the government should also create the system for providing guidance on proper operation of the insurance service by setting up public survey/appraisal organization within local administrative bodies to investigate into accidents or disasters.

4) Food Supply Stabilization System

Under the former government, the production and supply of food were all managed by the government, and a system to promptly cope with unexpected events was in place. Because of this, confusion due to food shortages or excessive rises in prices was not a frequent event in Mongolia, even at the time of a natural disaster.

However, with the shift to a market economy, food production and supply systems have been broken up and privatized, seriously undermining the government's ability to control supply volume and prices at the time of an emergency.

In Mongolia, the balance between supply and demand collapses easily, because of the high disaster rate and limited harvesting seasons due to the harsh natural conditions. In addition, the disintegration of centralized systems has resulted in a steady increase in the number of urban residents who do not have a means of food production. Furthermore, Mongolia is an inland, landlocked nation, and its domestic transportation capability is also low.

In February 1995, the "Food Law" was established in Mongolia. This legislation defines the role of the government, related agencies and the general public in relation to food security, food production and food related services. With regard to food security, this law requires the government to establish a "food fund" and local authorities to bear responsibility for securing emergency reserves. Thus, it is necessary to establish a system similar to the one shown in Figure 4.6.1.3.

However, care should be taken when developing such a system not to interfere with the price formation process in the market and confuse market mechanisms or influence the profits of farms and processing plants. Further, it is also important to give careful consideration to trends in the activities of the agricultural commodity exchange and reorganization of local markets during the process of developing this system.

In order to stabilize the balance between supply and demand for the nation's basic staples, local agencies will need to purchase these items when there is a surplus in supply using the "Food and Agriculture Fund" and store them in reserve bases located in major cities.

Once a natural disaster or supply shortage occurs the agency can then, sell the reserves of food through the agricultural commodity exchange.

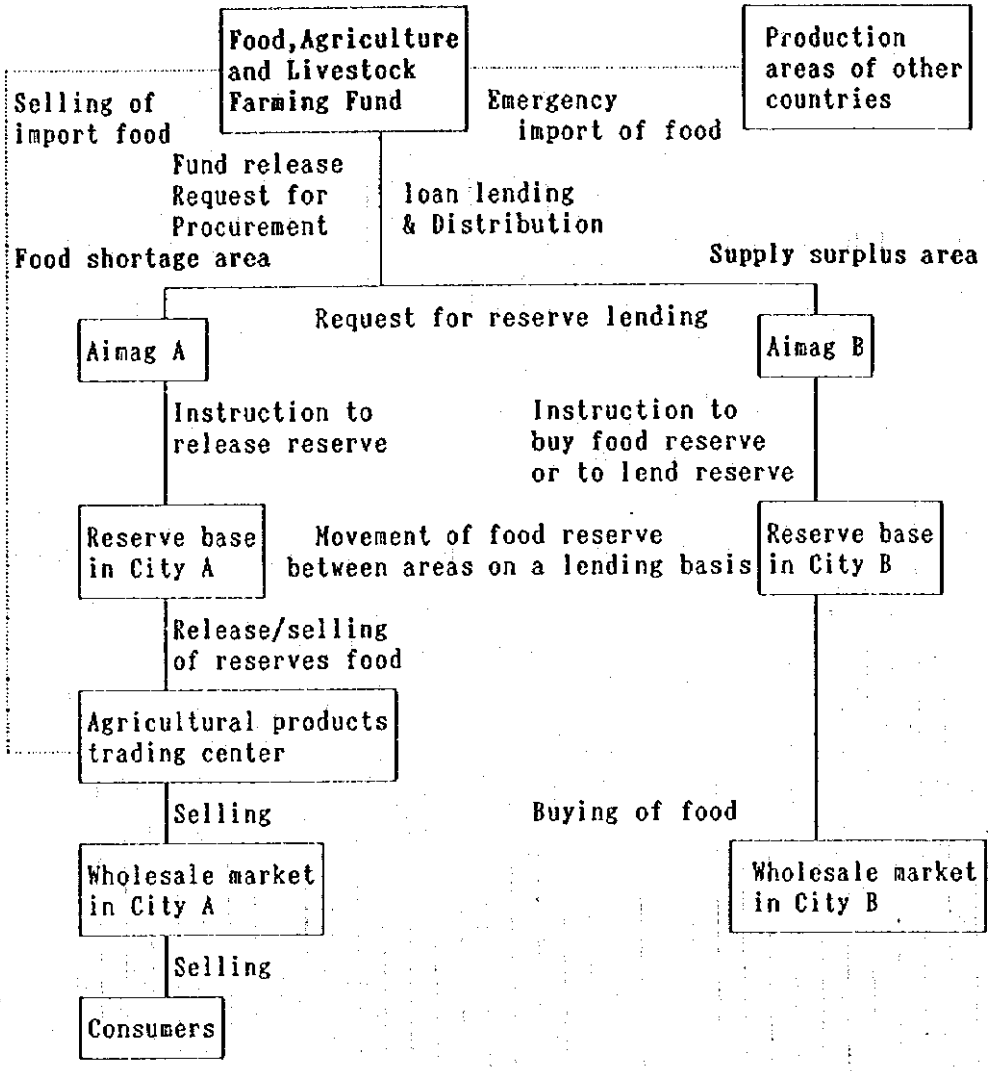
If a major natural disaster should occur in a given area and result in a serious food shortage, food reserves of other areas will need to be temporarily used to supply the required volume, and if there is still any shortage, the amount will be immediately imported from other countries to enable a stable supply of food.

If the target volume of emergency reserves is defined as a volume that would cover the demand for food in 2010 by the urban residents who do not have a means of producing food for one month, the national total for this amount would come to 39,000 tons, while the total for the Study Area would be 19,000 tons.

In addition, in order to enable smooth management of the "Food Supply Stabilization System", it is necessary to promote the development of the market in conjunction with the formation of the system.

The distribution of agricultural products is to be managed through the agricultural commodity exchange which was established in 1991. However, a lack of adequate legal and legislative systems has resulted in a situation whereby wholesale trading and retailing are mixed in the same arena and relative trading on personal levels abounds. For the future, the agricultural commodity exchange will provide a place for the trading of agricultural products and function as a public market in which wholesale trading and retailing will not be mixed. Trading will have to be conducted in an auction style so that proper pricing which reflects the quality of the products will be realized. Further, the exchange also needs to be developed into an organization which transmits market information not only to markets but to producers and consumers as well.

Fig. 4.6.1.3 Food Supply Stabilization System



4.6.2 Farm Family Organization Promotion Reinforcement Plan

1) Agricultural Cooperative Associations

In Mongolia, there is a cooperative-like organization called the National Association of Mongolian Agricultural Cooperators, which is comprised of a number of the Khorshoos and agricultural companies that were formed as a result of the disintegration of the Negdels. There is also an organization known as the Union of Mongolian Production and Service Cooperatives, which is comprised of Khorshoos, but the participation rate among agricultural Khorshos is low.

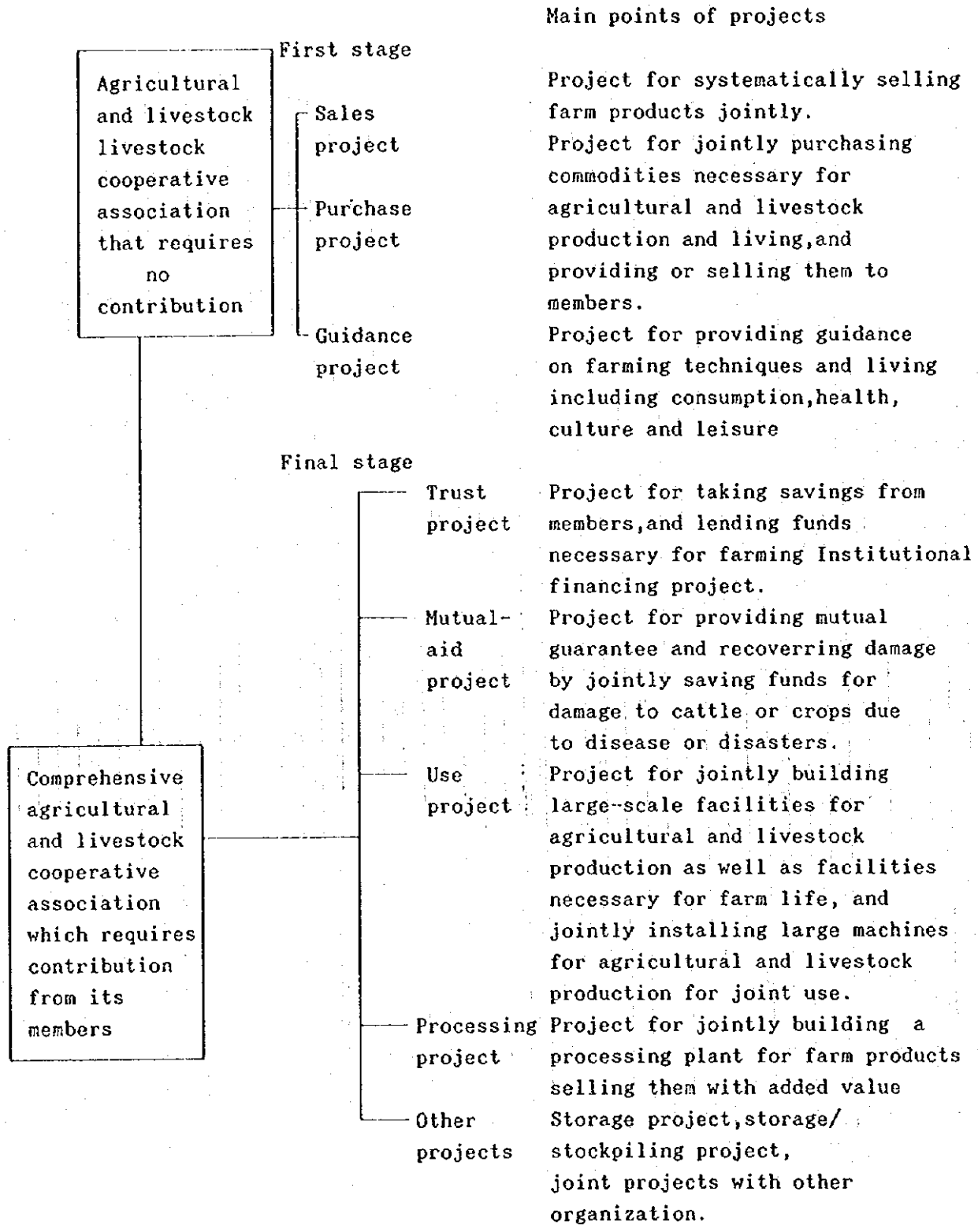
There is no cooperative-style organization which is comprised of companies that were formed as a result of the disintegration of state-run farms, and no cooperative organization exists for vegetable production farmers and herders, who constitute personal enterprises of their own.

The above two cooperative-like organizations offer intermediary services for the trading of agricultural products, financing-related intermediary services and trade information services, but do not have the function/system to enable them to provide services which reflect the needs of farmers and nomads.

What are needed by the front line farmers and herders as well as companies and Khorshoos now are the information on the trading of agricultural products, production inputs and daily goods, operating fund as well as management and farming techniques-related promotion and guidance. Therefore, agricultural cooperatives which are specifically capable of conducting sales, purchasing and guidance activities in an integrated manner need to be organized by area or type of operation and promoted. These types of cooperatives are also advantageous in that they can be managed even when the amount of investment money collected from members is small or when there is no investment obligation at all and trust between the members and the managing organization can be strengthened. As the needs of the members diversify, the organizations will be developed to include work in the areas of credit, mutual aid, utilization or processing as required, in addition to the selling, purchasing and guidance related work. To this end, an Agricultural Cooperatives Improvement Project will be set up.

As a preliminary step, a study must be conducted to prepare measures to improve the overall functions and organization of the agricultural cooperative association system, including the product distribution and production materials acquisition systems. Japan will provide support for the preparation of the master plan for the strengthening of the agricultural cooperative association system necessary. And an S/W was signed in December 1995.

Fig. 4.6.2.1 Projects of Agricultural Livestock Cooperative Association



2) Agricultural Production Organizations

Production unit in agriculture and livestock farming is divided into organized management such as companies and Holshos and individual management mainly consisting of livestock farming. It is assumed that companies and Holshos will be grouped together or unified in reasonable sizes by the Partnership Law and the Holsho Law which were put into effect in May 1995, and will thus be more consolidated as production organizations. However, private enterprises are engaged in individual, independent farming, and do not show signs of progress in joint operation or formation of organization.

Before the establishment of the negdel system, nomads were conducting efficient production operations by forming a cooperative work organization called "Nufururoru" to perform the procurement of feed during the winter, building of fences for livestock animals, improvement and development of wells, etc. on a collective basis.

It is expected that during the initial stage of the formation of the agricultural cooperatives, the participation rate will be low and it will be difficult to achieve a system capable of conducting collective work or production. Therefore, the "Nufururorus" will be revived as a kind of freewill organization suited to the market economy regime, and then evolved from a collective work organization into a production organization through the establishment of primary processing facilities to add value to agricultural and livestock products.

4.6.3 Research and Development System Reinforcement Plan

There will be developed and reinforced a system for developing the agricultural production and farming management techonology conforming to the climate of Mongolia. Present state of agricultural research organization is written in Chapter 4.6.3.1 in the supplementary materials

1) Testing and research activities which should be reinforced

For the agricultural production, Mongolia is under severe natural conditions. In particular, the crop cultivation sector is under dual restrictions: one is a limited range of crops to be cultivated, and the other is requirement for a characteristic farming management technology which is different from those in the other districts.

However, on account of a short history of crop cultivation following the technologies of the former Soviet Russia and East European countries, and meager stock of tests and researches for improvement of the technology, it has the productive power remained at a relatively low level.

In the stock farming, the intensive livestock sector is in a similar condition to the crop cultivation sector, but the traditional nomadic sector having a long history has generated a distinguished form which is fitted to the conditions of Mongolia.

When these conditions are taken into account, the following research themes should be preferentially taken up mainly by the PSARI and RIAH for further increase of the agricultural production.

(1) Crop research field

[1] Breeding

Practical application tests of high quality seeds selected from local varieties, crops and varieties introduced from foreign countries, establishment of fundamental breeding technology by artificial crossing and genetic engineer-ing and breeding of cold-, diseases- and insect-resistant varieties.

[2] Agricultural chemistry

Research and development measures for improvement of the soil moisture keeping capacity and for maintenance and promotion of the soil fertility, and analysis of the effects of physico-chemical properties of soil upon yield, analysis of factors serving for improvement of unit yield, and establishment of such measures including soil fertilization.

[3] Agronomy

Development of tillage technology, crop rotation system and cultivation technology for prevention of soil erosion, retention of moisture and maintenance and promotion of fertility, development of cultivation technologies for newly introduced crops, and establishment of weed, disease and insect control technologies.

[4] Farm machinery

Selection of optimum machines by crop and by work, and establishment of a new mechanization system which is not following the current mechanization system

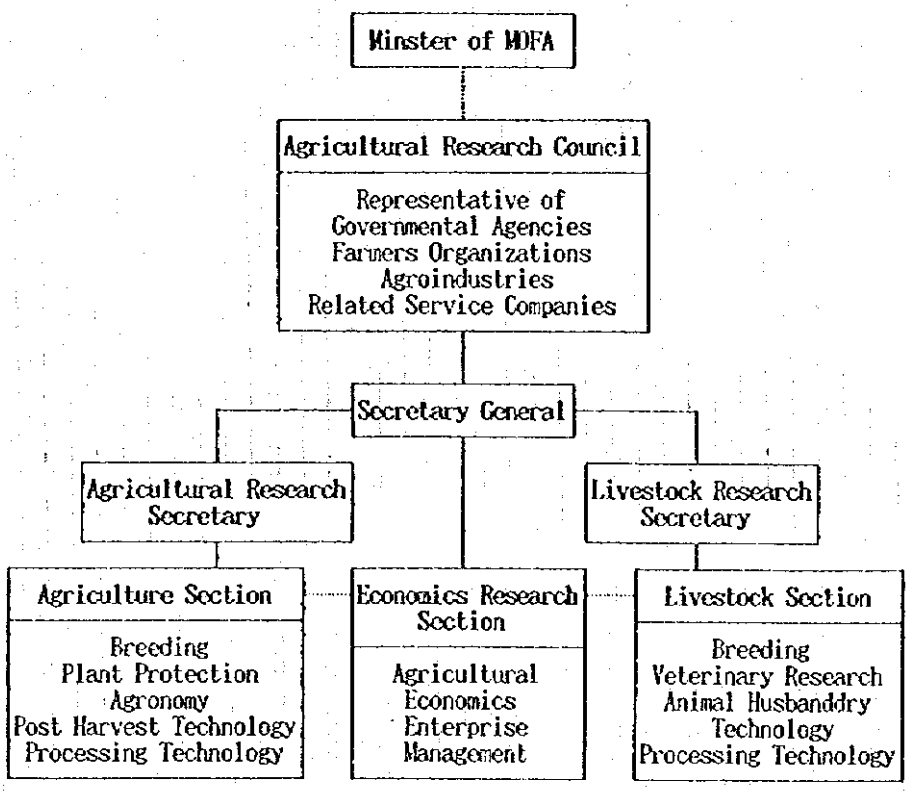
appropriation of the profits through the national treasury to the experiment and research activities along with the national fund.

(2) Improvement of the research management and operation system

The National University of Agriculture(NUA) is to control the agricultur-al researches, but in reality, the research organs under the NUA are not well coordinated with one another but are rather operated veitically.

The agricultural study is, so to speak, a general science, and without coordination and cooperation of the organs concerned, research and development is scarcely implemented nor the application technology built up.

Figure 4.6.3.1 Proposed Experimentation & Research System (By ADB)



Thus, there should be installed a research management organization in the MOFA with the functions to appreciate and arrange the needs of the farms, determine the research themes and arrange them according to priority, and assign the works from organ to organ and

(2) Livestock farming and veterinary field

[1] Animal improvement

Native animal quality improvement tests, Establishment of excellent animals selection method; Adaptability test of foreign breeds, and breeding of new breeds through crossing; and Animal improvement tests through introduction of new livestock technology.

[2] Animal feeds

Accumulation of analytical data of feeds, and preparation of feeding standard by each breed and raising stage,development of leguminous grass breeding and cultivation technologies; establishment of fodder crop cultivation technology and silage making technology; and Establishment of simple renovation technology for pasture.

[3] Livestock product processing

Product development and establishment of quality improvement technology through introduction of new livestock product processing technologies; and formulation of livestock product quality specifications and management stand-ards.

[4] Animal diseases

Establishment of the technology for control of infectious diseases of animals, establishment of the sanitary management technological system of animals and livestock products, and research and development of drugs for animals.

2) Improvement of the testing and research system

(1) Reorganization of the research institutions

The current institute management is greatly dependent on the self-supporting accounting system on the profits of sales of the seed multiplication division and/or attached livestock division, and the governmental budget for the salary of researchers and research expenses are not satisfactory.

Thus, the researchers have but to exert their efforts for the profitable division for their living rather than the research division, to say nothing of inadequate research facilities and equipment.

Therefore, in order to establish a system under which the researchers are able to devote themselves to the research activities, there should be taken improvement measures, including separation of the profit divisions from the research institute organization, and

coordinate them, and also integrally and systematically execute the appropriation of the budget.

(3) Improvement of the research-related facilities and equipment

In order that the experiments and researches along the foregoing major research themes are smoothly implemented, there should be taken measures for maintenance, repair and improvement of the facilities, equipment and machinery.

(4) Utilization of the results of experiments and researches, and securing the continuity

Presently, systematic stock and utilization of the results of past tests and researches are not satisfactory.

[1] It is only through accumulation of the results of tests and researches and their successive reflection in the subsequent researches that the development of advanced technologies and know-how can be expected.

Then, the function of the Information Center of the NUA should be reinforced for integral management of the results, publication of the informa-tion on the results of researches for disclosure to the personnel concerned for extension of the results.

3) Establishment of human resources Development system

[1] An "Agricultural Technology Training and Extension Center" (tentatively named) would be installed in the NUA for education of the basic knowledge of tests and researches as well as the practical technology, while a integrated training system would be fabricated to comprise the methods of human resources training at the government agencies, schools and farms.

[2] Through activation of the exchange of researchers with the advanced countries and international research institutions, there should be promoted the acquisition of new knowledge and know-how and be improved the measures for re-education of the educational staff for efficient rearing of domestic practical experts.

4.6.4 Technology Dissemination System Improvement Plan

A systematic extension system is not yet established in Mongolia. In addition, Mongolia has a rather unique sector consisting of nomadic herders for whom a specialized type of extension system will need to be developed.

In consideration of these circumstances, the following new extension systems should be tried and tested to establish one which is best suited to Mongolia.

1) Improvement of the system for extension of crop and livestock farming technologies

[1] Proposal of a model extension system in the local level.

[2] Promotion of the measures of improvement pertaining to the method of coordination between the test and research organs and the educational organs, and personnel and financial allowance required for extension.

2) Development of the system for collection and transmission of information related to agriculture

[1] Strengthening the system required for exchange of information between Ministry of Food and Agriculture and Aimag, Sum and nomads.

[2] Strengthening of the measures for effective use of radio broadcasting, etc. as means of information transmission.

4.6.5 Agriculture Promotion Implementation Programs and Projects

A brief description is given below regarding the Agricultural Promotion Implementation Programs and Projects to be implemented under the Development Plan.

(4.6.5.1)

Project Name	Seed Multiplication and Provision Project	Beneficiary	Crop farmers/companies
Target	National government (PSARI)		
Purpose	To develop high grade seeds and multiplication of seeds to stabilize production and improve profitability.		
Work Items	(1) Enhancement of the PSARI and Provision of a Seed Multiplication Center. (2) Research and development concerning new varieties and multiplication/management of breeder's stock seeds. (3) Multiplication and distribution of cultivation seeds through contracted farms and agricultural cooperatives. (4) Liaison/contract-related services at Aimag/Sum offices.		

(4.6.5.2)

Project Name	Agricultural/Livestock Farming Financing System	Beneficiary	Agricultural producers
Target	National government (Food and Agriculture Fund)		
Purpose	To provide financial resources including the operating fund for agricultural farming as well as to improve farm management and expand production.		
Work Items	(1) Enhancement of the Food and Agriculture Fund and generation of required funds. (2) Provision of subsidy for improvement of facilities, introduction of machinery and land development projects, etc. (3) Lending of operating funds and funds to repair damage from natural disasters. (4) Credit assurance for general bank loans.		

(4.6.5.3)

Project Name	Agricultural /Livestock Farming Mutual Relief/Insurance System	Beneficiary	Agricultural producers
Target	Insurance companies and administrative agencies of Aimags and Sums.		
Purpose	To strengthen mutual relief/insurance systems in order to address the problem of the insecurity of management due to accidents/disasters.		
Work Items	(1) Development/improvement of legislative and legal systems in the areas of mutual relief and insurance. (2) Reduction of premium costs for farm managers through the use of government funds. (3) Improvement of compensation capability/coverage through reinsurance. (4) Provision of Aimag/sum-level committees for the investigation and assessment of accidents and natural disasters.		

(4.6.5.4)

Project Name	Food Supply Stabilization System	Beneficiary	All citizens of Mongolia
Target	National government and Aimags		
Purpose	To ensure stable supply and prices of staple food through preparation and releasing of emergency food reserves.		
Work Items	(1) Strengthening of the Food and Agriculture and Livestock Farming fund and lending of operating funds. (2) Establishment of reserve bases in major cities. (3) Development of food stabilization commissioners in each Aimag and issuance of mobilization orders to reserve bases. (4) Management of lending of reserved food among reserve bases. (5) Selling of reserved food through agricultural commodity exchanges.		

(4.6.5.5)

Project Name	Agricultural Livestock Farming Cooperatives Formation Project	Beneficiary	Agricultural producers
Target	Agricultural producers		
Purpose	To promote the formation of cooperatives by producers in order to improve productivity and standards of living.		
Work Items	(1) Organization of cooperatives for conducting collective work based on cooperative efforts among agricultural producers. (2) Collective selling of agricultural products. (3) Collective purchasing, supply and selling of production equipment and living goods. (4) Guidance regarding management of agricultural farming and agricultural life. (5) Other items as appropriate (credit/mutual relief/utilization/processing-related work).		

(4.6.5.6)

Project Name	Agricultural Research Cooperation Project	Beneficiary	Farmers, companies
Target	Researchers of the Government of Mongolia		
Purpose	To conduct research and testing concerning technological improvement of crop cultivation and to modernize crop cultivation.		
Work Items	(1) Rehabilitation of facilities, equipment and machinery at Agriculture Research Center. (2) Enhancing the function of Information Center, centralized management of data, extension of technology. (3) Various research and tests regarding such areas as mechanical systems, cultivation technology, fertilization technology, enhancement of soil fertility, and breeding.		

(4.6.5.7)

Project Name	Agricultural Livestock Farming Technology Training and Promotion Project	Beneficiary	Agricultural producers
Target	Specialist and engineers in government and the schools.		
Purpose	To modernize agriculture through efficient training of technologists.		
Work Items	(1) Establishment of an Agricultural Techniques Training and Extension Center. (2) Exchange of researchers with developed countries and international organizations. (3) Re-education of specialized staff and engineers. (4) Education regarding basic knowledge and provision of training on practical techniques to farmers.		

(4.6.5.8)

Project Name	Agricultural Livestock farming technology Promotion Systems Development Project	Beneficiary	Agricultural/livestock farming producers
Target	Extension staff at research and educational organizations.		
Purpose	To establish a system for extending agricultural techniques and promote the use of new techniques.		
Work Items	(1) Securing of extension staff and financial resources. (2) Establishment of model extension systems. (3) Enhancement of the information exchange system. (4) Establishment of a technology information system.		

(4.6.5.9)

Project Name	Agricultural Information Systems Improvement Project	Beneficiary	Corporate farms, nomads
Target	MOFA, local authorities, corporate farms, nomads		
Purpose	Provision of information to corporate farms and nomads and information exchange among interested parties.		
Work Items	(1) Introduction of radio communication facilities and cars equipped with radio communication devices. (2) Provision of various kinds of information through radio broadcasting. (3) Introduction of telefax equipment at the local offices of authorities. (4) Introduction of personal computers at MOFA and various Aimag departments.		