

The Safety of Mongolian Dairy Production¹

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要 旨

モンゴル国はアジア大陸の中心部に位置し、北部でロシアと、南部で中国と国境を接した内陸国であり、1990年に社会主義から市場経済へ体制移行した。モンゴル人にとって代表的な伝統食品の一つが牛乳など乳製品であるが、社会主義の時代は国内の牛乳の需要を全て国内の生産で賄っていたものの、市場経済に移行してから多数の産業は混乱し、国内生産量が減少して近隣の中国やロシアから牛乳を輸入するようになった。一方、海外からの輸入食料品は牛乳以外でも食中毒など健康被害が多く発生しており、食品の安全性の確保が問われている。伝統的な食文化を守り、安全で安心できる牛乳の国内供給体制を復活させ乳製品の自給率を高めなくてはならない。国際水準に適した品質の高い乳製品を生産し、国内生産力を高め国際競争力を獲得するため、前題となるモンゴル国の乳製品産業の安全制度について注目して論じる。

Keywords: Mongolian dairy production, food safety, quality

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1. Introduction

Mongolia is located in central part of Asia and borders northward with The Russian Federation and southward with The People's Republic of China. The size of the total territory of Mongolia is 156,410,000 km². The capital city is Ulaanbaatar and Mongolia is divided into 21 provinces. The total population of Mongolia is 3,018,000 and approximately 50% of it is the citizens of capital city. As for climate, it is as cold as -40C0 in January and it reaches to +35C0 in July. Its vast land Mongolia's leading sector had been pastoral cattle breeding. But, there was a giant reformation in Mongolian government, foreign trade and state-owned industries due to transferring from socialist society to free market economy had seen damaged in 1990.

Because of the effect of the transition, bankrupt and shutdown of state-owned industries had significantly increased the level of poverty and unemployment. Moreover, Famine and blizzard for 3 consecutive years between 1999 and 2002 was harmful to the Mongolian economy. The blizzard that causes in winter season and means that it is a kind of disaster of significant decrease in the number of livestock and death. Because of the disaster, thousands of livestock died and the herdsman lost their animals who have been continuing to immigrate from rural areas to the capital city until now.

On the other hand, domestic food productions were stagnant and import of food products had increased due to opening of foreign trade. As the example, let's study milk production which is a traditional food of Mongolia. Before 1990, when state-owned milk production was in full operation, it had been completely

providing for the domestic demand and the needs. But due to the privatization of state-owned enterprises whose equipment's were over-dated, enterprise productions were unable to maintain at normal levels. They could not fulfill domestic demand and needs which has been increasing day by day, especially in Ulaanbaatar. So, Mongolia began to import the milk from both neighboring countries: The Russian Federation and The People's Republic of China. However, the safety of imported milk, dairy products and other foods are distorted due to the weakness of law enforcement for food imports to Mongolia. For instance:

- In 2013, 34 primary school children were poisoned by imported milk and dairy products prepared for lunch.
- Worm named URUNOMIX, which is harmful to human body, was found many times in major imported food products including flour, rice, vegetables and fruit.
- In 2008, many people died due to "Asian Wolf" LLC which is imported from China.

Now, Mongolia imports about 50% of food from foreign country. We are using the import products which do not comply with requirements of safety standard and are harmful to human health, especially imports from China. This shows that foreign imported food of low quality products is not food, it is like as poison and harmful to Mongolians' health and life. Moreover, geographically, Mongolia is landlocked country, it takes at least 14-21 days to transport goods from a third country. This leads to the loss of food product storage and transportation security. Likewise, due to many reasons, Mongolians are not satisfied with the quality of imported products. As mentioned before, the poor controlling and inspection over importing food products is a main background of losing food security. So the Mongolian government should pay special attention on implementation of the Law of Food Security.

In this paper, I aimed to answer questions for what changes and reformation would be made and what kinds of standard should be adhered to by the government in order to secure the safety of food products including milk and dairy products. I had tried to seeking research works made by other researchers on the safety of milk production, but currently there is almost no detailed research on it with very few exceptions. For example: Sumiya (2012) in her diploma work named as "Mongolian animal husbandry" which wrote about: how to breed healthy livestock and how to protect and save traditional native Mongolian livestock, livestock's meat and milk. Also Gerelmaa (2009) did about "Cooperation" cooperative in Mongolian socialism period. Ganbat (2012) studied about Mongolian livestock production and how to distribute livestock forage. Finally, Tuvshinbat (2008) mentioned about the changed animal husbandry because of social transition in 1990. Also I

could not found any research on about food safety especially of milk and milk products.

Actually, Mongolia had been exporting milk and meat to highly developed countries including the Russian Federation, Japan, China and other countries after 2005. For example, as shown in Table 1, Mongolia had been exported meat to Japan.

Table1. Export of meat from Mongolia to Japan. (million.tn)

HS code	Goods	2005	2006	2007	2008	2009
020500-000	Horse meat	7.452	9.687	3.491	2.505	7
050400-011	Intestines for sausage	28.081	0	0	0	0

Source: <http://www.maff.go.jp/reviews/> 20Nov, 2014.

Nevertheless, now Mongolia cannot supply domestic milk market with domestic products. Because, in 2005 WHO identified ISO22000² to secure the satisfy of food products. The exporting milk and dairy product had been stopped because of milk and dairy products of Mongolia could not complied with this standard. In order to produce milk which complies with international standard, it is required and mandatory that small farms and herders should keep their operation according to ISO22000 standard as well. But it costs a lot and takes lots of time. For example, “MONGOL MILK” Company, which is considered as the biggest dairy production company in Mongolia, receives the required milks from approximately 3500 herders. It is impossible for these herders to independently supply milk that complied with the standard. For that reason, the Government of Mongolia should issue polices and give financial support to herders to establish farm, to increase milk and dairy productions as well as to secure food safety of the citizens. To address above issues and discuss the safety of Mongolian dairy production, I provide a birds- eye view of Mongolian food system focusing on its dairy industry in this paper.

The paper is structured as follows. Section 2 provides brief information on Mongolian food culture and its economy. Section 3 writes about Mongolian dairy industry and introduces its two major companies, MONGOLMILK Company and APU Company. In Section 4, I write about the problems and the quality of Mongolian food which is followed by the safety standard system in Mongolia. Section 5, gives concluding remarks.

2. Food culture and the economy of Mongolia

2.1 Mongolian food culture

Traditional Mongolian daily food products are meat and dairy products. Dairy products are called the White Food and meat the Red Food. Mongolian eats the dairy products during the summer to autumn without eating the meat. They start to eat the meat and meat products when it starts to get colder in winter. Therefore, during the summer the tradition is to use the dairy products to give a rest to the stomach tired from heavy consumption all along the winter. Even today, the herders in the countryside are keeping the diet this way. Traditional Mongolian livestock farming includes sheep, goat, horse, cattle and camels, as well. From these five types of animals, milk, meat, wool, cashmere and small intestines are used. The herders ride on horses and camels. Our herders manually process over 20 types of dairy products, and the major products are explained in detail in Table 2. By the change of social system in 1990, the food culture from European, American and Asian countries started to enter and Mongolian began to consume flour, vegetables, rice and others. In Ulaanbaatar, recently the food culture like Pizza, Burger, Korean and Japanese cook-shops are widely being opened due to the expansion of the American, Korean and Japanese food culture. Especially food tradition is changing day by day due to the relocation of the herders to Ulaanbaatar who intend to educate their children in the city. Unfortunately, due to lack of domestic food production, more than half of the food products are imported.

Due to this high level of imports, domestic food industries have no way to compete. We can say that the country has become dependant on foreign countries.

Among 11 dairy products, the most preferred product among Mongolians is fermented milk of mares (See, Table 2). During summer there are lots of people who don't eat anything other than Airag. Mongolian kids like to eat dried curds.

Table 2. Mongolian Dairy products

	Dairy's name	Basic ingredients	Production method
Processed dairy products	Drill dairy (Eezgii)	Milk sheep, milk cow	<ul style="list-style-type: none"> • Pour the milk in a pot and heat until it boils • Add fermented airag and stir using a spatula

			<ul style="list-style-type: none"> • Heat the pot for 1-2 min • Drain off ½ of liquid and dry the eezgey on a framed wooden board
Processed dairy products	Curd dairy (Aaruul)	Milk sheep, milk cow	<ul style="list-style-type: none"> • Add to curd sweets and fruits and mix and press it again • Place the curds on the wooden board • Slice the curds by wire • Dry the curd and place it in a sack cloth
Processed dairy products	Cheese dairy (Byaslag)	Milk sheep, milk cow	<ul style="list-style-type: none"> • Pour the milk into the pot and heat at 90⁰c • Add yogurt for milk coagulation • Place curded milk on a square cloth and wrap it with quadrangle • Place the wrapped curd between two wooden boards and put 2kg weight on it • Press out milk serum after 4 hours • Remove the cloth and put a thickened cheese on the wooden board for evisceration.

Processed dairy products	Yogurt dairy(Tarag)	Milk sheep, milk cow	<ul style="list-style-type: none"> • Pour the milk into the pot and boil • Boll the milk at 40-45^oc • Add yeast , then ladle up and pour back well • Transfer the product into a vessel and cover for 4hours
Processed dairy products	White oil (Urum)	Milk cow	<ul style="list-style-type: none"> • Pour the fresh milk into the pot and heat up to 82^oc and gently boil • Ladle up and pour back times until it creates foam on the surface • Leave the pot with milk for about 20hours in a static position
Beverage	Cheese dairy (Byaslag)	Milk sheep, milk cow	<ul style="list-style-type: none"> • Pour the fresh milk into the pot and heat until it boils • Pour out some boiled hot milk into a cup and add cheese for coagulation.
Beverage	Curds dairy (Hevlesen Aaruul)	Milk sheep, milk cow	<ul style="list-style-type: none"> • Add to curd sweets and fruits and mix and press it again • Place the curds on the wooden board • Slice the curds by wire

			<ul style="list-style-type: none"> • Dry the curd and place it in a sack cloth
Beverage	Yogurt dairy(Airag)	Milk sheep, milk cow, milk horse	<p><u>Tool and utensils</u></p> <ul style="list-style-type: none"> • Small and big sized pots made of alloy or aluminum. • Dripper <p><u>Processing steps</u></p> <ul style="list-style-type: none"> • Pour the milk into the pot and boil • Boll the milk at 40-45⁰c • Add yeast , then ladle up and pour back well • Transfer the product into a vessel and cover for 4hours
Beverage	Yellow oil (Shartos)	Milk cow	<ul style="list-style-type: none"> • Put the yellow oil into a pot boiling and melting • Mixing with a small amount of flour • Separate the liquid cream into a small vessel
Beverage	Milk Tea(Tsai)	Milk cow, milk sheep, milk goat	<ul style="list-style-type: none"> • To boil water with milk • To mix salt and tealeaf
Beverage	Milk	Milk cow	<ul style="list-style-type: none"> • To drink of boil well the milk

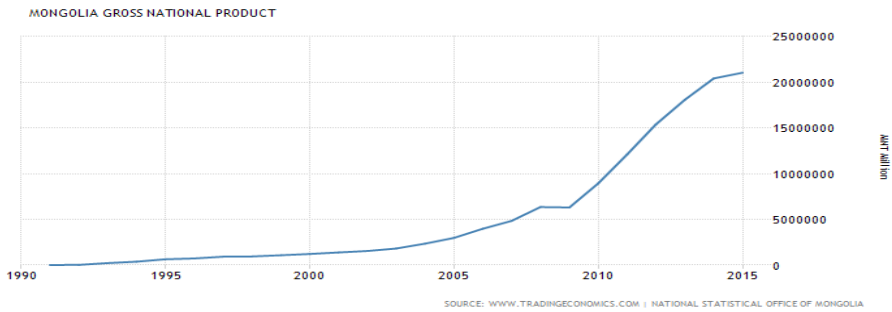
Source: Sharav(2011)

2.2 The Mongolian economy

Mongolian economy has traditionally been based on livestock and agriculture. Mongolia has large mineral deposits, such as copper, coal, molybdenum, tin, tungsten, and gold for industrial production. Collapse

of the Soviet Union in 1990-1991 destroyed Mongolian economy and Mongolia was driven into deep recession. Since then, Mongolia has transformed into vibrant multiparty democracy with a booming economy for 20 years afterward. (See Figure.1)

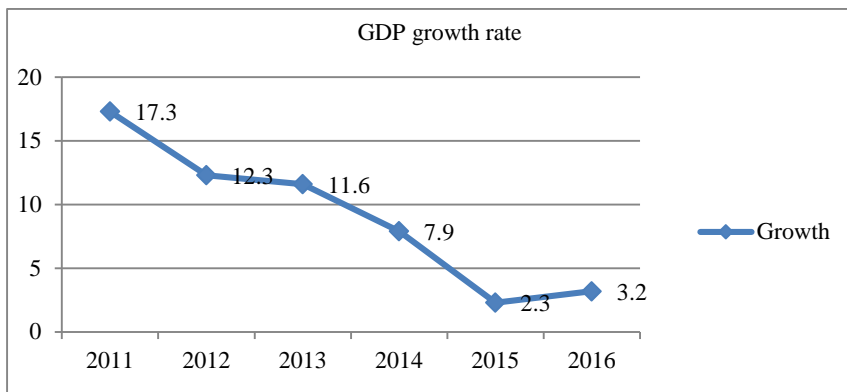
Figure1. Mongolian GNP increase (GNP)



Source: The World Bank Data, 2016 (<http://www.worldbank.org/en/country/mongolia>)

Current inflation rate is 2.1percent, and Mongolia’s GDP growth rate is slowed to 3.2 percent in the first half of the year in 2016 (See Figure.2). The Mongolian economy has facing challenges from persistent economic imbalances.

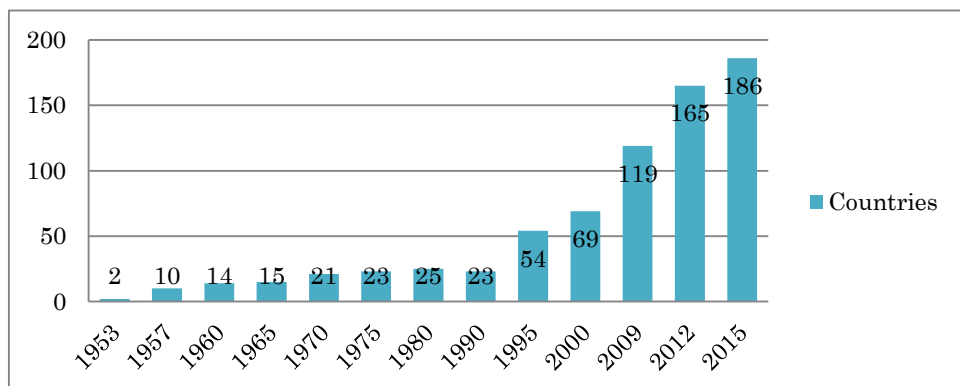
Figure2. The growth rate of Mongolian Gross Domestic Product



Source: Constructed based on the data from National Statistical Office of Mongolia’s Data2015.

Mongolian international trade had first started in 1640 in Russian Omsk city. During this period, more than 500 traders from China, Russia and Mongolia engaged in trade. Between 1921 and 1923, the first taxation contract was drafted. In May 1921 the Foreign Trade Organization was established and it supervised the imports and exports. At those times, foreign trade had been conducted by the cash payment or mutual exchange of the goods. Since 1923, with assistance of the Russian State, the foreign trade report and information started to reflect the separate counts in detail. In 1930 Mongolia had been importing approximately 20 types of goods and processing the quarterly report 4 times a year. Every year, the import goods' number was increasing. Since 1954 the foreign trade widened to the other socialist countries, Great Britain, Sweden and Japan. In 1992 Mongolia's government changed to the parliamentary government with a President and a Prime Minister in 1993 the Foreign Trade Ministry was established. On 29.Jan.1997, Mongolia joined the World Trade Organization (WTO). In 2008, approximately 8000 types of goods were traded with 119 countries, and in 2015 Mongolia imported 10000 types of goods from 186 countries (See Figure 3).

Figure3. Foreign trade for Mongolia



Source: The report of the Mongolian Agricultural Ministry (2015)

2.3 The Livestock industry of Mongolia

The livestock is national wealth for Mongolia. Traditionally, Sheep, goats, cattle, horse and camel have been commonly raised in Mongolia. In 1950, when the nationwide campaign for the establishment of cooperatives started, the majority of private livestock was transferred to the collective ownership of cooperatives. From 1960 to 1990, it was the collectivization period. But, in 1991, with the beginning of the transition and the livestock was transferred back to private ownership.

Table3. The number of the livestock (million)

	1932	1941	1961	1981	1999	2003	2009	2012	2015
Number of livestock	16,2	27.5	20.4	24.8	33.6	23.9	32.6	40.9	56

Source: National Statistical Office of Mongolia’s Data (www.nso.mn)

As in Table 3, number of livestock reached 56.0 mln.heads for the first time in Mongolian history in 2015. Livestock products are supplied to processing industries for producing a variety of semi-finished and finished goods. For example, goat, sheep and cow are for milk, skin and wool etc. The goat is processed in to the variety of products from milk to the finest cashmere, and Mongolian loves most cow milk.

2.4 The food industry of Mongolia

Today, Mongolia is not able to fully supply its consumer with domestic food and more than 50% of the total amount of the alimentation is imported from foreign countries, especially from China. Since the economical crisis of 1990, Mongolians are importing low quality food products from the southern neighboring China instead of expensive higher quality products. This is also the cause why the domestic competitiveness capacity is decreasing day by day. Moreover, due to low temperature dropping under 0°C during six months, it is very difficult to develop the agriculture in Mongolia. In the Table 4, it shows food production in Mongolia. Mongolian main food production is separated in 4 categories which are milk and dairy products, meat and meat products, flour and flour products and water and beverages production.

Table 4. Mongolian food and other products (Unit in thousands of tons)

Product name	2010	2011	2012	2013	2014
Meat (thous.t)	241	210	263.4	299.3	294.5
Milk(thous.t)	365.7	458.9	588	667	765.4
Potato(thous.t)	168	201.6	245.9	191.6	161.5
other vegetable(thous.t)	82.3	99.1	99	101.9	104.9
Wool(thous.t)	18.2	18.9	18.6	21.7	23.9
Cashmere (thous.t)	6.5	4.4	6.3	7	7.7

Source: National Statistical Office of Mongolia's Data 2015 (www.nso.mn)

Domestic food production has been growing as in shown Table4, however, Mongolia can't fulfill the domestic market. Because of this, imports has been increasing. Domestic production of meat and meat products have increased but chicken and pork have been importing in generally. As for domestic production of milk and milk products they have been increasing but the imports of dried milk and milk products have been increasing (Table4 and 5).

Table5. Imported food in Mongolia

Commodities	2010	2011	2012	2013	2014
Meat , (thous.kg)	73.5	90.2	92.8	103.2	99.4
Milk , (thous.liter)	123.6	190.2	207.1	230.1	258.3
Egg , pcs	20	25	20	22	24
Cereals , (thous.kg)	129.6	144.4	152.4	120.8	175.1
Potato , (thous.kg)	61.3	72.4	86.6	66.1	54.5
Vegetable , (thous.kg)	30	35.6	34.9	35.1	35.4

Source: National Statistical Office of Mongolia's Data 2015 (www.nso.mn)

In Table 6, we can see that only meat is exported from Mongolia. The meat is taking a leading place in our country's food production. In 2009 total food export was 427000 USD, but indications show its decrease by 36.2% in 2012 to 155000 USD. This decrease can be considered as the effect of the establishment of the standard ISO22000 and animals aphthous fever illness in Mongolia. For example in 2004, 48 tons of horsemeat was exported from Mongolia to Japan and now the export has been stopped. Still today there are many companies willing to cooperate in horsemeat export to Japan. But, due to their lack of fulfillment of the alimentary standard ISO22000 and the absence of the sea transportation, the export the horsemeat is not executed.

Table 6. Food exports of Mongolia

	2009	2010	2011	2012	2013	2014	2015
Meat (thous.t)	18	26.8	10	3.0	3.1		
Milk (thous.t)	0	0	0	0	0	0	0
Egg (pcs)	0	0	0	0	0	0	0
Flour (thous.t)	0	0	0	0	0	0	0
Wheat (thous.t)	0	0	0	0	0	0	0

Source: National Statistical Office of Mongolia's Data 2016 (www.nso.mn)

3. Dairy production in Mongolia

3.1 The history of Mongolian dairy production

Traditionally, Mongolians has the preference to and respects products from milk as “dairy products” (in Mongolian “Tsagaan idee”). It is said that there are approximately 500 kinds of dairy products in Mongolia. In 1924, Mongolia became a socialist independent country by the assistant and the help of Russian Federation. Since this social transition, Mongolia was influenced by Russian Federation. In 1941, regarding to the initiative by the Mongolian Ministry of Industry, two biggest production firms for “butter” were established. As a result, Mongolian domestic production had been increased and their production had filled 100% of domestic demand for “butter”. Then by the help of Russian Federation, “Mongol Milk” joint stock company for milk production was established in 1958. Incidentally, the visible changes were seen in Mongolian livestock sector and herdsmen had been looking after state owned five kinds of animals under “Union” (Negdel). That is, herdsmen agreed to give their animals under the ownership of the state and look after state owned animals and get salary from the state. By 1960, 75% of Mongolian total population has entered into “Union”. But in 1990, Mongolia transferred from socialist to the market economy so that the state owned properties were privatized. Mongolian livestock sector has been privatized as well. This transition and the changes in the society were very hard for herdsmen. During socialist society, feed, veterinary, salary and other assistances were provided by the state, but since 1990, these assistances had been stopped, then the herdsmen were in hard period. Therefore, not only the production of dairy products could not satisfy domestic demand but also Mongolia needed to import milk and dairy products from foreign countries including China and Russia since 1990. To overcome their production

imbalance, in 1999, the Government of Mongolia implemented White (milk) Revolution Program. Unfortunately, between 2000 and 2002, Mongolian livestock sector faced to severe blizzard and the number of animals died. Of course it influenced negatively to the herdsmen. According to Sumiya (2012), the number of cow increased by 10% between 1990 and 2000, decreased by 7% between 2003 and 2004, and decreased by 6% in 2005. Afterward, in 2004 the Government of Japan implemented “Special program for food security” with the help of Food and Agriculture Organization of United Nations (FAO), and it has been implementing successfully till now. The livestock husbandry is an important sector among agricultural sectors of Mongolia.

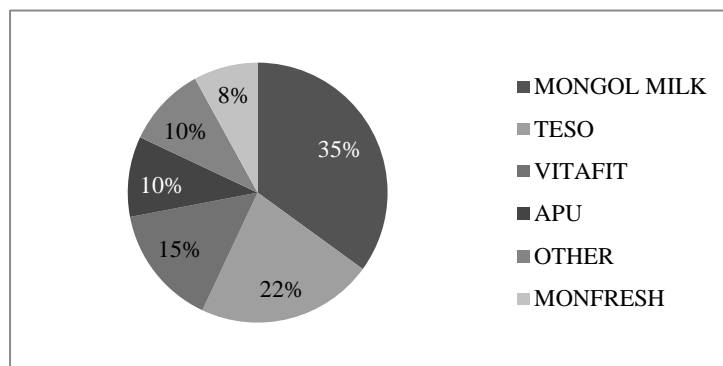
3.2 Current state of the dairy production industry

There are mainly five producers of dairy products in Mongolia, that is “MONGOLMILK ” Company, “TESO” Company, “APU” Company, “VITAFIT” Company, and “MONFRESH” Company. The biggest one is “MONGOLMILK ” Company. The company was initially established with name of “State Milk Production” in 1958.

Let’s introduce briefly about above five companies. First of all “MONGOLMILK ” Company, which is the first milk production company. “MONFRESH” Company produces three kinds of package milk and has capacity of 100 tons milk production in a day. “TESO” Company produces milk and curds (sour milk /aarts/). The curd is dairy juice which is produced from aaruul that is the traditional dairy product of Mongolia. Also, it produces ice cream and cream. VITAFIT Company is the first company that produces long-life milk (6 months) using dry milk. The company also produces juice and pure water. Actually, Mongolia is poor in growing fruit, so the company needs to import applicable fruits for fruit yogurt and other productions from abroad. The special feature of APU Company is the first company which produces fruity yogurt. APU Company is the first Mongolian company which obtained ISO22000 standard in 2015. Most well-known product of APU Company is its premium vodkas and beers. In 2013, the company was compliance with requirements of ISO 22000 standard for alcoholic beverages. The latest founded company among these five companies is TESO Company.

According to official statistic information by the Ministry of Food and Agriculture, Mongolia produces approximately 6 mln-7mln ton milk in a year. Figure 4, shows production share of these five companies in 2015. Seeing from Figure4 MONGOLMILK Company is leading by 35% in production, TESO 22%, VITAFIT 15%, APU 10% and MONFRESH 8%.

Figure4. Production share of the dairy industry



Source: National Statistical Office of Mongolia’s Data 2015 (www.nso.mn)

For other producers, there are so many herdsmen who produce milk and dairy products by handmade method. These herdsmen families usually produce and supply milk, clotted cream, cream, butter, aaruul and curd to the local market. The citizens of Ulaanbaatar and consumers around the Ulaanbaatar prefer to use produced milk such as long life milk and abovementioned five companies use dry milk in their production.

Table 7. Productions of dairy products after 2009

	2009	2010	2011	2012	2013	2014	2015
Raw milk(million liter)	493.7	338	530	588	667	765	789.5
Product milk (million liter)	24.8	33.8	55.4	72.8	63.9	71.1	90.3
Import of dry milk (ton)	19.1	28	36.9	36.8	34	35.3	37.7

Source: <http://mofa.gov.mn/reviews/> 15Oct, 2016

Imported milk was 0% before 1990, and after social transition of 1990 until 2002, milk import had been increasing year by year. But then milk import had been decreasing gradually and domestic production had been increasing. Until 2010, export and foreign trade of milk and meat products was in less level and the export of these products stopped due to foot and mouth disease and other diseases. According to Decision #23 by State Great Hural in 2010, “Animal” national program focusing on livestock husbandry sector was begun to be implemented. The purpose is to decrease import, increase domestic food production, develop livestock husbandry powerfully in compliance with regional development conception of Mongolia. In connection with this, the government helps to issue loan to small business holders in this business. By the end of 2015, imports of dry milk reached to 37.7 tons. (Table7)

In the following subsection, I will introduce the two representative dairy production firms; MONGOLMILK Company and APU Company.

3.3 MONGOLMILK Company and APU Company

3.3.1 MONGOLMILK company

MONGOLMILK company is the first company which operates in milk and dairy products. It has been keeping its reputation, that is, the company is the leading company for milk and dairy products in Mongolia. Before World War II, Mongolia had a disadvantage in food and daily products. According to Baterdene (2008), Mongolia began to produce butter for the first time and supply it to domestic market. About 300 farms for milk and two firms for butter were established in 1941. Consequently, Mongolia overcame the crisis in food demand and these productions, and farms had the ability to supply domestic food demand. In 1946, Mongolia exported 300 ton butter to foreign countries. Then in 1958, “MONGOLMILK” Company was founded as a 100% state owned company by the assistance of Russian Federation. In that time, the production capacity and the ability of imported technology from Russian Federation achieved 30 ton milk producing per a day.

The history of MONGOLMILK company from 1958 to 1990

- In 1958, 100% state owned “Milk” company was established
- The year 1961 is the developing period of the company and the Russian experts came to provide and give consultant for production technology.
- In 1971, the technology for production of milk and dairy products for kids was introduced by the assistance of Russian Federation
- In 1985, the production capacity raised up to 200 tons per a day.

The history after 1990

In the period of 1990, or the period of privatization, the “MONGOLMILK” state owned company changed to as “MONGOLMILK” Company with the share of 51% state owned and 49% privatized.

In 1992, milk production process extremely decreased comparing with the production in 1990.

In 1993, the farms, from which MONGOLMILK Company receives the milk, were privatized and the suppliers of the milk had decreased. The milk production was decreased by 35% in 1995 comparing with that in 1990.

In 1996, the company used just 2% of its total facilities because of the material milk supply was gotten into poorness. As result of the company’s reformation in 1997, its production had recovered with 175 staffs and

produced 20 kinds of milk and dairy products.

The company began to operate with 20% of its total equipments in 1998, when milk cooling technology and milk cooker machine imported by the assistance of Japan. So there was a great progress in milk and dairy production and their distribution.

In 2005, the company imported the equipments that produces Italian ice-cream from Italy and Czech Republic.

In 2006, the company imported Pure Pack technology.

In 2010, the bucket – milker machine to be used in cattle farms was introduced.

In 2013, TCP NIMCO 680 milk packing machine was introduced.

Seeing from this history, MONGOLMILK introduced technology and machines for milk and dairy production by the help of foreign investment between 2000 and 2010, in which is the company achieved great progress. Currently the company produces and prepares about 100 kinds of milk and dairy products. The company adheres and complies with ISO 9001:2008³ which is international management standard in order to correctly manage and organize the company. About 2010 staffs have employment contracts and work in/with the company. To improve quality of its products, the technologists visit herdsman family to receive information and check quality of the milk for the food safety management, and 13 kinds of analysis are undertaken in the production laboratory. Although MONGOLMILK Company is considered as the biggest milk and dairy company in Mongolia, it has not been complied with requirements of ISO 22000 international food standard yet.

3.3.2 APU Company

APU Company has 883 staffs and about 4000 stock holders, and is the one of the 10 leading companies in Mongolia. It produces 116 kinds of products including vodka, beer, pure water, juice, non-alcoholic drinking and milk. The milk factory of this company has capacity to produce 45tons of milk in a year.

Next , I introduce the history of APU.

In 1924, The company firstly established by the state as, the name of “Arkhi Factory” with 14 staffs in Ulaanbaatar.

In 1927, the company opened beer factory by the assistance of Czech Republic.

In 1940, the first Mongolian beer factory began its operation.

In 1958, it introduced cooling technology to beer factory.

In 1972, the complex construction equipment and network for vodka and beer installation were introduced by the assistance of Soviet Union.

The company was the state leading factory in vodka and beer production between 1976 and 1981. In 1992, it changed its name as “APU” JSC, and the state owned 51% of its total stock and remaining 49% was privately owned.

In 2000, the company introduced production technology for pure water and non-alcohol drinking.

In 2001, the state sold its 51% stock and the company is wholly privatized in November of the year.

In 2005, the company obtained ISO 9001 standard certificate.

In 2012, the company introduced production technology of FRUTTA juice. Also, the company started to produce long-life milk with the name of “Tsever Suu” (means “Pure Milk” in English). The company introduced new production technology for milk and dairy production cooperating with GEA Co.,Ltd of Germany, which is the leading company in equipments for milk and dairy production in the world, in 2014.

Besides producing multi-fruit milk, pure milk and chocolate milk branded “Mamuu”, it began to produce many kinds of fruit yogurt as well. Also, APU Company supplies “Sain” brand milk, yogurt and honey for the family use market.

In 2015, APU Company obtained the certificate of ISO 22000 standard. It produces and receives original pure cow milk from about 300 farms nearby Ulaanbaatar. It is the Mongolian first company which obtained ISO 22000 standard certificate. As for product distribution of this company, annual distribution level is raising up by 15% between 2009 and 2015. This increase directly related with Mongolians preference for more modern products than traditional dairy products which are made from unprocessed milk and dairy product. Currently in 2016, the products of APU Company occupy 19% of Mongolian milk market.

Seeing from above comparison between APU Company and MONGOLMILK company, the former is younger than the latter by 50 years, APU Company actively holds international standards such as ISO 9001, ISO 22000 and ISO 14001⁴ it indicates that the company could export its products to foreign countries in the future. Notwithstanding, MONGOLMILK company produces about 120 kinds of milk and dairy products, APU Company produces just 21 kinds of milk and dairy products which comply with international standards. In other words, APU Company mainly pays attention to the quality of its products than the number of product varieties.

Since November of 2014, APU Company has been duly organizing “World Quality Day” event in the first week of November.

4. Safety standards of Mongolian dairy products

4.1 Issues of food quality and the safety of Mongolian food

There are many nomads in Mongolia. They provide citizens with milk and meat. But it is difficult to control the safety and the quality of their products. Therefore, it is also one of the big problems for Mongolian food safety.

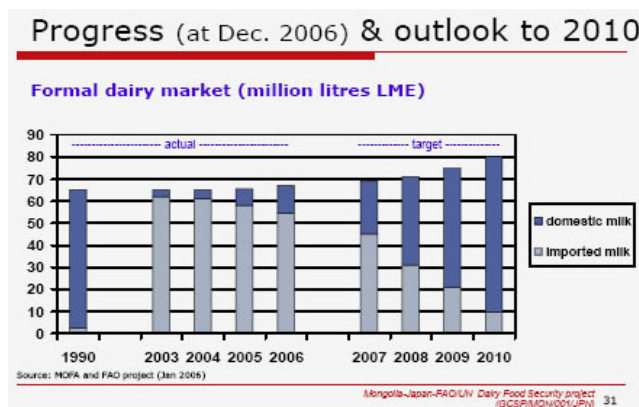
On the other hand, in 1990, the Mongolia changed its social and economic system to capitalism. After this change, Mongolian international food trade is expanding quickly. In this situation, the safety of imported food became an important issue in Mongolia. The control over them is very difficult and there are many health problems as explained before.

The causes of these issues are said that:

1. There are a lot of domestically produced and imported food with expired date.
2. Due to weak requirement and control over the imports, unhealthy and poisonous food products are imported. There are also cases of fake Mongolian domestically produced flour, which had been produced in China and imported via city of Erlian.
3. Mongolian lack of legislation and knowledge about the food security. Even today among the countryside Mongolian, there are ones who haven't consideration about the food expiry date.
4. Mongolia, due to a complicated geographical location without sea exit, is importing vegetable and fruits from the nearest neighboring China, from which food contains poisonous chemical substances and sometime worms are found.

In the socialist period, Mongolia used to provide enough milk by her. After the change of economic system, because of the obsolete infrastructure and technologies and the shortage of trained people and consumer, who concern about quality and safety of domestic milk and dairy products, the dairy industry was failed like other industries. As a result, food safety worsened, and many people lost their livelihoods. The sales of domestic milk fell from more than 65million litres to less than 3million litres in 2003. Consequently, Mongolia began to import milk and dairy products. You can see it in the statistic in the Figure5. In order to reduce the milk imports, I think that Mongolia needs to increase the value-added tax from 10% to 15% on selected food and milk imports.

Figure5. Formal dairy market



Source: <http://www.fao.org/reviews/> 15Jan, 2015

For now, Mongolia is importing (exporting) from over 100 countries. Most traders import their products by bulk but some traders import their products by small amounts. For the latter kind of traders, it is difficult or even impossible to inspect the imported goods. Food distribution and storage in ship container are now becoming an unacceptably wrong condition. Because, the container is not normally intended for food, it makes food vulnerable to physical factors such as heat and cold.

Thus, food issues are caused by the expiration date, failing to meet safe frozen condition and improper package. A survey of Mongolian dairy industry conducted by the Mongolian Food Processors Association identified many shortcomings in the dairy food chain as follows:

- After trade liberalization, the old state dairy system struggled with obsolete equipment and inexperienced management. Many of the new processors failed because their competitiveness with subsidized imports was constrained by overwhelming difficulties to obtain modern technology and knowledge.
- The quality of milk is low, because widely dispersed small milk producers who lack modern equipment and modern packaging materials.
- Domestic production is now trying to revive and technological improvement are made especially in packaging and labelling technology. However, domestic food industries need to introduce HACCP, ISO22000 and GMP⁵.

The issue of the food safety is an emerging area in Mongolia, which needs strong international support for training of different stakeholders, establishment of training programs, and strengthening of laboratory capacity.

Changing economic circumstances contributes significantly to the food safety situation. For the traders and poor people, the different kinds of inspection penalties are very high which affects food production and the labour. Much to be done building for national consensus in order building to consolidate different food safety agencies, and it requires more radical approaches by both the government and the international agencies.

4.2 The Law of Food Safety and the safety standards of dairy products in Mongolia

The Mongolia has reduced the tax on imported goods up to zero since 1997. Since then, food imports and the number of small and medium size food enterprises and food outlets were increased quickly.

Because of the low grade food, some diseases have been developed among the Mongolian. For now, health reports of Mongolia show that gastrointestinal infections, diarrhoeal diseases and toxico-infections are 30 percent of the total infectious diseases. According to the survey conducted in 2015, typhoid, paratyphoid fever, shigellosis, hepatitis A, and brucellosis were registered too much. For diarrhoeal diseases and bacterial food-borne infections, it isn't often reported because only extensive outbreaks of food-borne infectious diseases are reported and diagnosed.

4.2.1 The Law of Food Safety

To ensure food safety, The Mongolian parliament enacted the "The Law of Food Safety (LFS)" in 1999. The development of the legal system has been advancing rapidly.

One of the efforts for the food security is a new policy that began in March 2013. Mongolia's food safety systems in LFS are in Chapter1 (Article1.1), Chapter2 (Article2.1~2.2), Chapter3 (Article3.1), Chapter11 (Article11.1~11.2), Chapter15 (Article15.1~15.2), and Chapter16 (Article16.1~16.2), as the following:

Chapter1. Purpose of the Law

Article1.1 The purpose of this Law is to ensure food necessities of the population, food safety and to regulate relations that arise between the government, individuals and legal entities in connection with the food production and services.

Chapter2. Food Legislation

Article2.1 The food legislation shall consist of the Constitution of Mongolia, this Law, and other legislative acts issued in conformity with them.

Article2.2 The provisions of the international treaties of Mongolia shall prevail if such treaties stipulate otherwise than this Law.

Chapter 3. Terms used in this Law.

Article 3.1 The terms used in this Law shall be defined as follows:

Article 3.1.1 “Food/Foodstuff” means raw materials, intermediate products, foodstuff, beverages and drinking water that provide nourishment necessary to cover energy losses of a human body, its growth and development.

Article 3.1.2 “Food Safety” means a condition where appropriate norms of food hygiene and quality are satisfied.

Article 3.1.3 “Food hygiene” means a condition where food safety in food production and service is satisfied.

Article 3.1.4 “Food additive” means substances and mixtures used according to the technology to give special qualities to food.

Article 3.1.5 “Specific food item” means food especially made to suit peculiarities of the job and the organism of an individual, or made especially for medical treatment purposes.

Article 3.1.6 “Strategic food” means meat, grains, drinking water and salt that a Mongolian is accustomed to, and required for physiological needs of an individual.

Article 3.1.7 “Food enrichment” means a process of adding crucial for human health microelements, vitamins and amino acids lacking or lost during processing to food in accordance with the standards and special technology.

Article 3.1.8 “Food safety indicator” means permissible levels of bacterial, fungous, physical and chemical pollution allowed for food.

Article 3.1.9 “Primary indicator of food safety” means hygienic levels defined by human senses or by prompt examination methods.

Chapter 11. Control over the food safety.

Article 11.1 The control over the food safety shall aim at complying with the food safety requirements during the procurement, processing, production, packaging, transportation, selling and recycling of the food.

Article 11.2 The control over the food safety includes the following areas:

Article 11.2.1 Implementation of must-to-observe standards, and permissible levels of pollution for food.

Article 11.2.2 Hygienic and sanitary requirements for food production sites, equipment and environment.

Article 11.2.3 Implementation of safety indicators and requirements for imported food.

Article 11.2.4 Veterinary, sanitary and hygienic requirements and their implementation when importing livestock, animal, raw materials and products of their origin to towns and settled areas, butchering, and when engaging in production and service which uses such items.

Article 11.2.5 Plant quarantine requirements and their implementation when transporting and engaging in production which uses seeds, plants, raw materials and products of their origin.

Chapter15. Audit on hygiene, sanitation and safety of food.

Article 15.1 Legal entity that possesses a warrant from a laboratory may audit hygiene, sanitation and safety of food.

Article 15.2 Competent control authority shall issue warrants to food audit organizations.

Chapter16. Internal and public control on sanitary safety of food.

Article 16.1 Entities engaged in production and service shall approve the technological process and sanitation rules in accordance with the general requirements established by a competitive authority, and conduct internal control on the implementation of its standards and sanitary requirements.

Article 16.2 Individuals and non-government organizations shall control the food safety, inform the competent State administrative and control authorities on revealed violations and warn the public through mass media.

4.2.2 MASM and the safety standards of dairy products

Safety standards ensure the safety of products, activities or processes. These standards may be advisory or compulsory. It is laid down by an advisory or regulatory body that may be either voluntary or statutory. Recently, Mongolia has faced some trouble with the product standards. The Government of Mongolia is striving to address this challenge through active involvement with partners, employers and workers, research and training institutions, mass media, and civil society and with support from international organizations and donor countries.

In 1953, standardization services were established in Mongolia. Mongolian Agency for Standardization and Metrology (MASM⁶) implements them over the whole country. All Mongolian standards are approved and published by MASM. It represents Mongolia in international standardization within ISO, and MASM is the Mongolian WTO/TBT enquiry point.

to protect consumers and ensure whether imported goods meet the standards stipulated by MASM, MASM tests and verifies imported goods. If the importing goods meet the requirement, MASM will issue a joint certificate of conformity. This Conformity Assessment Program facilitates international trade by ensuring that:

- Importing goods must meet the Mongolian Standards or other MASM's standards' requirement
- Trade fraud and malpractices are minimized, especially counterfeit goods
- The health and safety of the community are protected
- Information is adequate to enable accurate customs classification
- Goods are eligible to be imported into Mongolia

For Mongolia's milk industries, they implement standards following standards of MASM. These are ISO/TC 34/SC 5 for milk and milk products.

Milk standards

1. Milk-Determination of fat content
2. Milk-Gravimetric method (Reference method)
3. Milk and milk products - Enumeration of colony-forming units of yeasts and/or moulds - Colony-count technique at 25 degrees C
4. Milk - Enumeration of colony-forming units of psychrotrophic microorganisms - Colony-count technique at 6,5 degrees C
5. Milk and milk products - Determination of iron content - Spectrometric method (Reference method) Milk and milk products - Determination of lead content - Graphite furnace atomic absorption spectrometric method
6. Milk and milk products -- Determination of antimicrobial residues -- Tube diffusion test
7. Milk -- Determination of lactose content -- Enzymatic method using difference in pH
8. Milk fat from enriched dairy products -- Determination of omega-3 and omega-6 fatty acid content by gas-liquid chromatography Chromatography (Reference method)
9. Milk and milk products -- Sensory analysis -- Part 3: Guidance on a method for evaluation of compliance with product specifications for sensory properties by scoring
10. Milk -- Determination of total milk-clotting activity of bovine rennets
11. Milk and milk products -- Determination of the lipase activity of pregastric lipase preparation

Milk products standards

1. Milk and milk products -- Specification of Mojonnier-type fat extraction flasks
2. Milk and milk products- Guidance on sampling
3. Milk and milk products - Determination of iron content - Spectrometric method (Reference method)
4. Milk and milk products - Determination of lead content - Graphite furnace atomic absorption spectrometric method
5. Milk products - Enumeration of presumptive bifidobacteria - Colony count technique at 37 degrees C
6. Milk and milk products -- Determination of antimicrobial residues -- Tube diffusion test
7. Milk products -- Determination of the acidification activity of dairy cultures by continuous pH measurement (CpH)

Dried milk standards

1. Dried milk products - Determination of fat content- Gravimetric method-(Reference method)
2. Dried milk - Determination of titratable acidity (Reference method)
3. Dried milk -- Enumeration of the specially thermoresistant spores of thermophilic bacteria
4. Dried milk -- Determination of content of lactic acid and lactates
5. Dried milk and dried milk products -- Determination of insolubility index
6. Dried milk and dried milk products -- Determination of bulk density

4.3 Safety standards in the world

Due to globalization, international standard is very important for countries and firms to trade each other. International standards help us to know world-class specifications for products, services and systems, and to ensure quality, safety and efficiency. It is important to abide by the international standard systems such as International organization for Standardization (ISO)

ISO is an independent, non-governmental international organization with a membership of 162 national standards bodies. Through it members, it brings together experts to share knowledge and develop voluntary consensus-based provides, market relevant International Standards that support innovation and

provide solutions to global challenges. It has published more than 21000 International Standards and related documents, covering almost every industry, from technology, to food safety, to agriculture and healthcare.

(www.iso.org/about)

ISO22000:2005standard

ISO22000:2005 describes the requirements for a food safety management system where an organization in the food chain should demonstrate its ability to control food safety hazards in order to ensure that food is safe to use. It is applicable to all organizations, regardless of size, which are involved in any aspect of the food chain and want to implement systems that consistently provide safe products. The means of meeting any requirements of ISO 22000:2005 can be accomplished through the use of internal and or external resources.

(www.iso.org/about)

ISO9000: ISO 9000 is a set of international standards on quality management and quality assurance developed to help companies effectively document the quality system elements to be implemented to maintain an efficient quality system. They are not specific to any one industry and can be applied to organization of any size. ISO 9000 can help a company satisfy its customers, meet regulatory requirements, and achieve continual improvement. (www.iso.org/about)

ISO9001: ISO 9001 certification is suitable for all sizes and types of organizations and is well established around the world as an invaluable Quality Management System standard. It is suitable for organization in all industry sectors and will help all organization to improve management process to compete locally and globally. The process encompasses the entire organization and requires senior management buy-in, it is not just a function of the Quality Department. To achieve ISO 9001 certification organization needs to demonstrate that it can meet the regulatory requirement and apply the system effectively to be of real benefit to customer.

(www.iso.org/iso/home/about)

ISO14001: An ISO 14001 environment management system is a systematic and process driven approach to controlling those aspects of business that have a significant impact on the environment. The system is proven to make business owners and managers be more aware of their environmental responsibilities, including legal

and regulatory accountabilities, and being able to manage and control the associated risks.
(www.iso.org/iso/home/about.htm)

HACCP

Firstly, I introduce the principles of the Hazard Analysis and Critical Control Point (HACCP⁷) system that was adopted by the Codex Alimentarius Commission. Then I will provide general guidance for the application of the system while recognizing that the details of application may vary depending on the circumstances of the food operation. The HACCP system is science based system which identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing. Any HACCP system is available to accommodate changes, for example, advances in equipment design, processing procedures or technological developments.

HACCP can be applied throughout the food chain from primary production to final consumption and its implementation should be guided by scientific evidence of risks to human health. As well as enhancing food safety, implementation of HACCP can provide other significant benefits. In addition, the application of HACCP systems can aid inspection by regulatory authorities and promote international trade by increasing confidence in food safety. In order to be successful in HACCP application, it requires the full commitment and involvement of management and the work force. It also requires a multidisciplinary approach; this multidisciplinary approach should include, when appropriate, expertise in agronomy, veterinary health, production, microbiology, medicine, public health, food technology, environmental health, chemistry and engineering, according to the particular study.

The HACCP's application is compatible with the quality management systems' implementation, such as the ISO 9000 series, and is the system of choice in the management of food safety within such systems. While the application of HACCP to food safety was considered here, the concept can be applied to other aspects of food quality.

GMP-Good Manufacturing Practice

A GMP is a system for ensuring that products are consistently produced and controlled according to quality standards. It is designed to minimize the risks involved in any pharmaceutical production that cannot be

eliminated through testing the final product. GMP covers all aspects of production from the starting materials, premises and equipment to the training and personal hygiene of staff. Detailed, written procedures are essential for each process that could affect the quality of the finished product. There must be systems to provide documented proof that correct procedures are consistently followed at each step in the manufacturing process - every time a product is made. (www.ispe.org/gmp)

5. Conclusion

Mongolia has faced with so many social and economical problems directly related with its transition from socialist economy to free market economy in 1990. The largest decreasing in number of animals due to blizzard had been caused for 3 consecutive years between 1999 and 2002 was harmful to the Mongolian economy as well. By the harm of the disaster, thousands of livestock was died and the herdsmen lost their animals have been continuing influx from rural to the capital city. The weakness in daily production caused the increase in import products by day due to over population in Ulaanbaatar. Mongolia can't fill the domestic food demand so that it has to import foods from foreign countries. It is the main problem and harmful to Mongolian economy, because Mongolian tugrik flows out to foreign market. This is the main reason why Mongolian economy was in difficult condition. In other words, if we could not increase domestic production and exports, it will plunge into danger to lose Mongolian money, resource and the wealth.

I performed a research focusing on milk and dairy products that are Mongolian traditional food. As mentioned in Chapter 2, Mongolia has established several small and middle sized farms after the transition of Mongolian economy. These farms could not supply domestic consumers with needed milk and the amount of long -life milk and dried milk which are imported from foreign countries have been increasing in connection with decreasing in animal original milk supply to milk production and increasing of capital city population. The import of dried milk and dairy product have been increasing year by year. The price of imported milk is higher than that of domestic milk but the quality of the imported milk is poor. These are main problem to the food security and the economy of Mongolia. Mongolia had been exporting milk to highly developed countries including Japan, China and Russian Federation until 2005. The question raises why we buy imported milk? I studied the reason and tried to find answers to the question. Exactly, ISO 22000 international standard for food security was introduced in 2005. The milk export was stopped in 2005, because, Mongolia could not obtain the certificate of ISO 22000 standard. Since the economic crisis of 1990 has been continuing till now, and it difficult

for poor herdsmen to obtain and get certificate of ISO 22000 standard. So Mongolian Government must assist herdsmen to investment in developing milk and dairy productions in order to secure food security of Mongolia. Governmental assistance for herdsmen means that to invite individual herdsmen to join and establish strong farming system. In my opinion, it is very important to develop milk production of Mongolia and to recover exports in this sector. Finding the way to resolve these problems is the most important and urgent issue in order to secure Mongolian food security. I will try to pay special attention on other food security issues in the products other than milk and dairy products for my next research works.

Notes

- 1) This paper is the extension of Munguntuya (2015).
- 2) I will explain ISO22000 in Section 4.
- 3) I will explain ISO9001 in Section 4.
- 4) I will explain ISO14001 in Section 4.
- 5) I will explain HACCP and GMP later.
- 6) For details of MASM, See <http://inspection.gov.mn/info/eng>
- 7) For details of HACCP, See <http://fao.org/docer/005/y1579/y1579e03.htm>

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