Overview of the Korean dairy sector

December 2017
LAN, Seoul

1. Basic economic data on South Korea (Hereinafter referred to as Korea) in 2016

- Population : 52 million
- Per capita GNI: US$ 27,561
- Total export: US$ 495 billion
- Total import: US$ 406 billion
- Percentage of agricultural sector (primary production value only) in the whole GDP of Korea : 2.2 %
- Average exchange rate: EUR 1 = KRW 1286.22

2. History of Korean dairy sector

The history of Korea's dairy farming can be traced back to the introduction of 20 cows by a French priest in 1902. In 1935, the first dairy processing operation was established by a Japanese dairy company. The first Korean dairy cooperative, Seoul Milk Cooperative, was established in 1937, and the first private dairy company, Namyang Dairy Products Co., Ltd., was founded with drying facilities in 1953.

In the 1960's, President Park (President of Korea during 1961 – 1979) was convinced that dairy products could be a crucial nutrition source for tyoung generation, especially after his visit to New Zealand. With the strong support from the government, Korea's dairy industry developed quickly. From 1962, the first five-year Livestock Industry Promotion Plan was inaugurated and a large number of cows were imported. Thereafter, the Dairy Industry Promotion Plan was implemented in 1967. From 1974 onwards, dairy companies were allowed to import and distribute cows to their member dairy farms. All this had a great impact on the development of the dairy industry.

At that time, Korea relied on processing technology from the US, Denmark and New Zealand. Cows were imported mainly from New Zealand and Australia in the 1960's and 1970's and from the US and Canada in the 1980's. Almost all breeding lines are Holstein. Korea is currently importing semen from the US and Canada for dairy cattle breeding. The Netherlands joined this bovine semen market in 2016.

3. Dairy farming

Dairy farming was generally known as one of the most profitable farming sectors in Korea. It even attracted private investors from urban areas, sometimes for land speculation as well. However, due to increasing import of cheaper foreign dairy products and fast increasing labor costs, the profit is getting smaller. Furthermore, frequent outbreaks of animal diseases such as Foot and mouth disease are demanding innovation from farmers. Only for those who have large-scale farms with good bio-security facilities can survive.

Table 1. Number of dairy farms and dairy cattle

	Number of dairy farms (1,000 farms)	Number of dairy cattle (1,000 animals)	Number of milking cattle (1,000 animals)	Avg. Milk production per farm per year(Kg)
2001	12.8	548	258	15,848
2002	11.7	544	252	17,614
2003	10.5	519	241	18,309
2004	9.6	497	236	19,707
2005	8.9	479	227	20,664
2006	8.3	464	220	22,027
2007	7.7	453	216	23,558
2008	7.0	446	209	24,929
2009	6.8	445	208	25,961
2010	6.3	430	204	25,892
2011	6.1	404	191	26,305
2012	6.0	420	209	28,481
2013	5.8	424	206	30,224
2014	5.7	431	208	32,622
2015	5.5	411	197	31,917
2016	5.4	404	194	32,137

Table 2. Number of dairy farms by farm size by year (unit: 1,000 farms)

Number of animals per farm	**2000**	**2005**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total	13.3	8.9	6.3	6.1	6	5.8	5.7	5.5	5.4
50~	3.7	4.5	4.1	3.8	3.9	4	4.1	3.9	3.8
2-~49	7.1	3.4	1.9	2	1.8	1.5	1.3	1.2	1.2
0~20	2.5	1	0.3	0.3	0.3	0.3	0.3	0.3	0.4

4. Milk chain

1) Raw milk supply

In the beginning of 1999, the Korean ministry of agriculture established the Korea Dairy Committee that is exclusively in charge of deciding prices of raw milk and a raw milk collection system between dairy farmers and milk processors. They intended to stabilize the supply and demand of raw milk by unification of raw milk gathering and state's direct management. However, since the year 2002 when Seoul Milk Cooperative decided to leave from the committee for the first time, some Korea's major dairy companies also left from the committee. That is because they wanted to develop differentiated new milk products with differentiated raw milk, and it was not possible if they received raw milk from the Korea Dairy Committee. Therefore, Korean dairy companies are presently supplied with raw milk by three ways. One is a way to be supplied from Korea Dairy Committee, another is a way to be supplied from their cooperative member farms, and the third is a way to be supplied directly from dairy farms based on one-to-one contract. Therefore, there are three ways to approach the sector and become involved.

2) Milking and collection

The main issue on farm level in relation to milk quality in Korea is Mastitis. Antibiotics was also a big problem for farmers in the past, but it is much less now as farmers keep withdrawal period strictly to get rid of anitibiotics.

Milking is generally done two milkings per day in small farms and three milkings per day in big farms. Collection is done once a day.

Milk from different farmers is mixed in one collection truck. Some dairy companies promote special milk products such as "No.1 grade milk" or "High DHA milk". In this case, it should be collected separately from regular raw milk.

Milking robot was introduced for the first time in 2006 from the Netherlands. Most of farmers in Korea cannot afford to buy expensive milking robots, and therefore they buy milking robots through governmental subsidy programs. A prominent Dutch company is now quite active for this business together with its Korean partner.

3) Raw milk grading and pricing

The Korean government introduced a new milk pricing system called "Raw milk price linkage system" in August 2013. Before this system, the Korean government and dairy farmers had tough negotiations every two or three years to set an official price of raw

milk. After this raw milk price linkage system was introduced due to political pressure by dairy farmers, the price is yearly set based on farmer's production cost and the national inflation. This system however has faced a criticism that it does not reflect supply and demand in the market; In spite of over-production of milk and increasing stocks of milk powder, the price stays high. For farmers, there is no reason to innovate for efficient milk production because the price is guaranteed regardless of the situation in the market. This weakens the price competitiveness of local dairy products. To decrease the production of raw milk, the Korean government is trying to introduce quota system. However, it cannot be a fundamental solution. Korea's raw milk price is one of the highest in the world.

Raw milk price is calculated by Basic price (KRW 922/liter as of 1 August 2017) + Milk content factors + Sanitation factors.

Table3. Milk content factors (as of 1 August 2017)

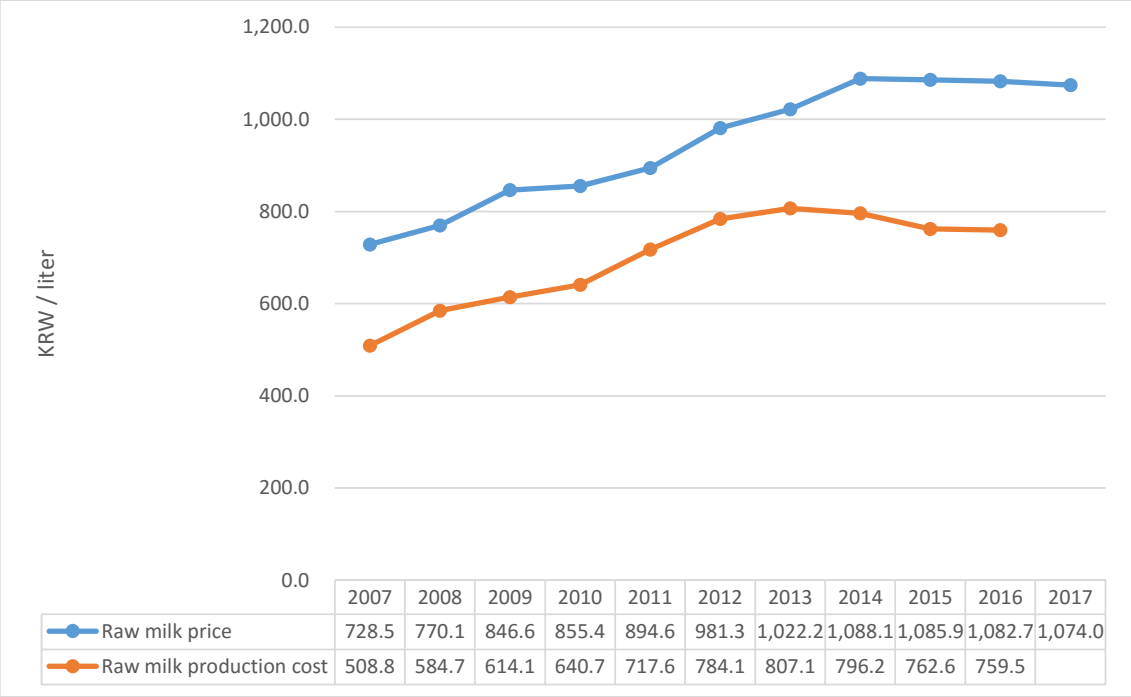
Milk fat	**%**	**~3.0**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**3.6**	**3.7**	**3.8**	**3.9**	**4.0**	**4.1~**
	KRW /liter	**-103**	**-41.2**	**-30.9**	**-20.6**	**-10.3**	**0**	**+10.3**	**+20.6**	**+30.9**	**+41.2**	**+51.5**	**+56.65**
Pro tein	**%**	**~2.9**	**3.0**	**3.1**	**3.2~**								
	KRW /liter	**0**	**+4**	**+11.65**	**+19.41**								

Table 4. Sanitation factors (as of 1 August 2017)

By total number of bacteria			By somatic cell		
Grade	KRW/liter	Number microbes (/ml)	Grade	KRW/liter	Number somatic cell(/ml)
1st-A quality	+52.53	Less than 30,000	1st quality	+52.69	Less than 200,000
1st-B quality	+ 36.05	30,000 ~ 100,000	2nd quality	+39.25	200,000 ~ 350,000
2nd quality	+ 3.09	100,00 ~ 250,000	3rd quality	0	350,000 ~ 500,000
3rd quality	- 15.45	250,000 ~ 500,000	4th quality	Basic price (regardless of other factors)	500,000 ~ 750,000
4th quality	Basic price (regardless of other factors)	More than 500,000	5th quality		More than 750,000

By total number of bacteria, 1st-A quality milk accounted for 92.3% of the total milk produced in 2016, followed by 1st-B quality milk (6.9%). In terms of somatic cell counts, 1st quality milk accounted for 61.3% of the total milk produced in 2016, followed by 2nd quality milk (33.2%)

Fig. 1 Average prices and production costs of raw milk per liter



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Raw milk price	728.5	770.1	846.6	855.4	894.6	981.3	1,022.2	1,088.1	1,085.9	1,082.7	1,074.0
Raw milk production cost	508.8	584.7	614.1	640.7	717.6	784.1	807.1	796.2	762.6	759.5	

5. Dairy production and consumption

The total raw milk production in Korea was KRW 2.2 trillion in 2016 accounting for 3.6% of the whole GDP of the agricultural sector. The total domestic market of dairy products in Korea was KRW 6.2 trillion in 2014 accounting for approx. 8.8 % of the turnover of all processed foods in Korea. The dairy processing industry is the third largest food processing industry in Korea after the alcoholic drinks industry and the wheat processing industry.

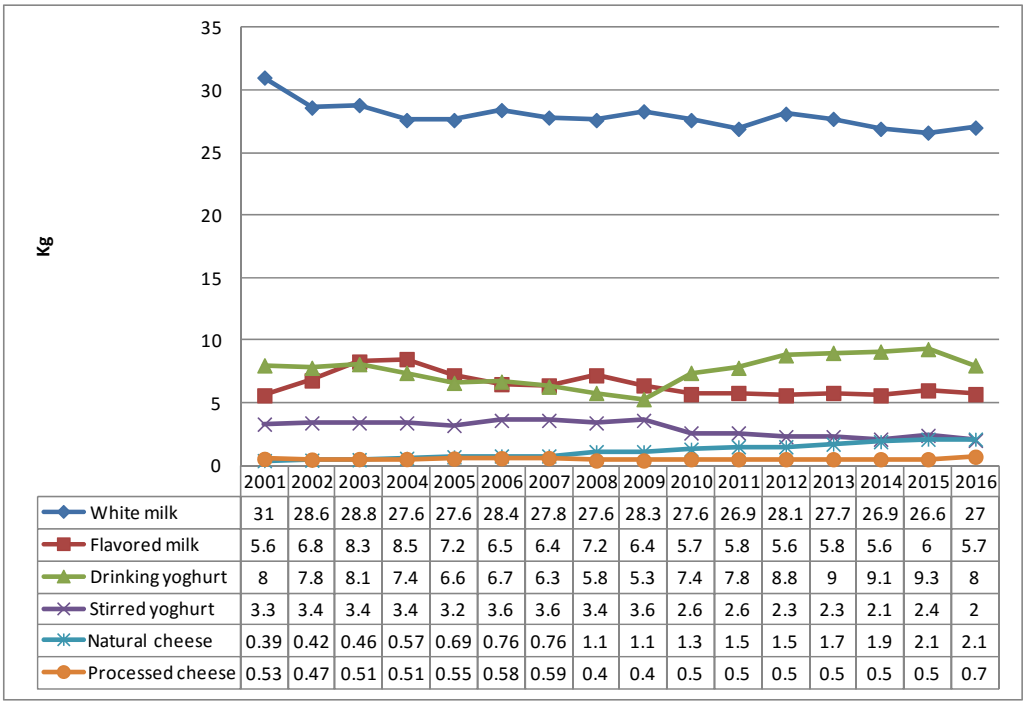
Table 5. Supply of dairy products per year (local production + import)

	Raw milk (1,000 ton)	Milk consumption (1,000 ton)	Per capita milk consum-ption(kg)	White milk (1,000 ton)	Flavore-d milk (1,000 ton)	Yoghurt (1,000 ton)	Cheese (1,000 ton)	Butter (1,000 ton)
2002	2,537	3,060	64.2	1,362	302	540	53	7.0
2003	2,366	2,990	62.4	1,380	448	555	59	6.6
2004	2,255	3,074	63.9	1,328	453	525	64	8.1
2005	2,229	3,028	62.7	1,311	380	483	69	9.0
2006	2,176	3,070	63.6	1,344	340	504	72	7.0
2007	2,188	3,054	63	1,362	335	485	74	8.0
2008	2,139	2,981	61.3	1,352	350	455	72	6.6
2009	2,110	3,036	62.3	1,390	312	446	72	8.6
2010	2,073	3,171	64.2	1,362	279	503	88	9.1
2011	1,889	3,518	70.7	1,338	286	522	101	9.8
2012	2,111	3,359	67.2	1,405	280	558	100	10.4
2013	2,093	3,582	71.3	1,392	291	574	107	8.0
2014	2,214	3,646	72.4	1,356	281	573	121	9.2
2015	2,168	3,834	75.7	1,345	302	597	135	10.2
2016	2,070	3,913	76.4	1,384	290	521	138	11.6

* Milk consumption: Consumption quantity of major dairy products converted into raw milk equivalent

The raw milk production has been stable over the last years. Milk consumption is slightly increasing as per-capita milk consumption is growing. The cheese and butter market has grown remarkably, while the flavored milk market has been shrunk.

Fig. 2 Per-capita consumption of main dairy products in Korea per year



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
White milk	31	28.6	28.8	27.6	27.6	28.4	27.8	27.6	28.3	27.6	26.9	28.1	27.7	26.9	26.6	27
Flavored milk	5.6	6.8	8.3	8.5	7.2	6.5	6.4	7.2	6.4	5.7	5.8	5.6	5.8	5.6	6	5.7
Drinking yoghurt	8	7.8	8.1	7.4	6.6	6.7	6.3	5.8	5.3	7.4	7.8	8.8	9	9.1	9.3	8
Stirred yoghurt	3.3	3.4	3.4	3.4	3.2	3.6	3.6	3.4	3.6	2.6	2.6	2.3	2.3	2.1	2.4	2
Natural cheese	0.39	0.42	0.46	0.57	0.69	0.76	0.76	1.1	1.1	1.3	1.5	1.5	1.7	1.9	2.1	2.1
Processed cheese	0.53	0.47	0.51	0.51	0.55	0.58	0.59	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.7

Table 6. Main dairy items of major dairy companies in Korea (2016)

Company by turnover ranking		Main items
Company	Turnover (KRW billion)	Main products (ranking by turnover)
Seoul Milk	1,118	White milk(1), flavored milk, yoghurt, butter(2), cheese (1)
Maeil Dairy	651	White milk(2), flavored milk(2), yoghurt, cheese(3), Infant formula(1)
Namyang Dairy	647	White milk(3), flavored milk(3), yoghurt(2), cheese, Infant formula (2)
Binggae	560	White milk, flavored milk(1), yoghurt(3)
Yakult Korea	413	White milk, Yoghurt(1)
Lotte food(Pasteur)	350	White Milk, flavored milk, yoghurt, butter(1), infant formula (3)
Dongwon F&B	266	White Milk, flavored milk, yoghurt, cheese (2)
Purmil	226	White milk, flavored milk, yoghurt

6. Import

There are several factors that influence on the import of dairy products. The Free Trade Agreement (FTA) between the EU and Korea that came into effect on 1 July 2011 is a positive factor for trade. Korea is the first country that signed a FTA with the EU. In accordance with the tariff schedule in FTA, tariffs for dairy products are going down gradually. Local situation on milk supply/demand and SMP stocks are also

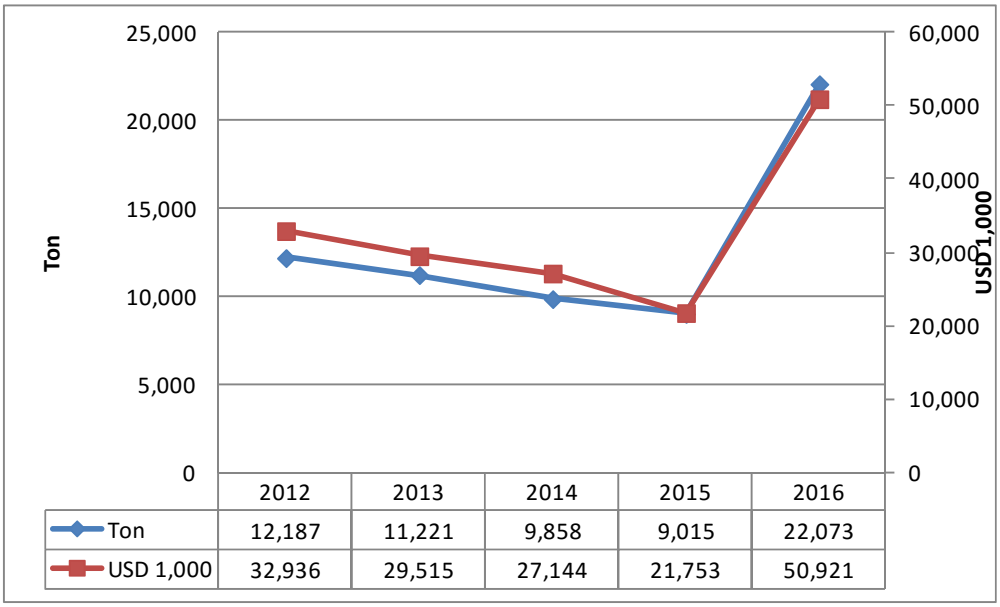
important factors. Over-production of raw milk put negative effect on the import of foreign dairy products.

1) Milk, yoghurt and cream

White/flavored milk and yoghurt are not easy to import into Korea. One of the reasons is that Koreans do not like UHT milk for its UHT flavor. Therefore UHT packaged products are regarded as cheap products. The other reason is due to political pressure from farmers. There are more than 5,000 dairy farms in Korea, and if there is any import of milk or yoghurt from abroad, it will strongly be resisted by the famers. This is mainly relevant to consumer products such as white/flavored milk and yoghurt. Cream, cheese, butter and milk powder that are generally imported for industry are accepted by the local sector. Cheese and butter for retail market are also accepted as the local production cannot satisfy the demand.

Cream products are largely imported into Korea as shown in Figure 3. France and Italy are the largest exporters of cream products into Korea accounting for 29% and 26% of the total import respectively. There is no import from the Netherlands.

Fig.3 Import of cream products into Korea by year



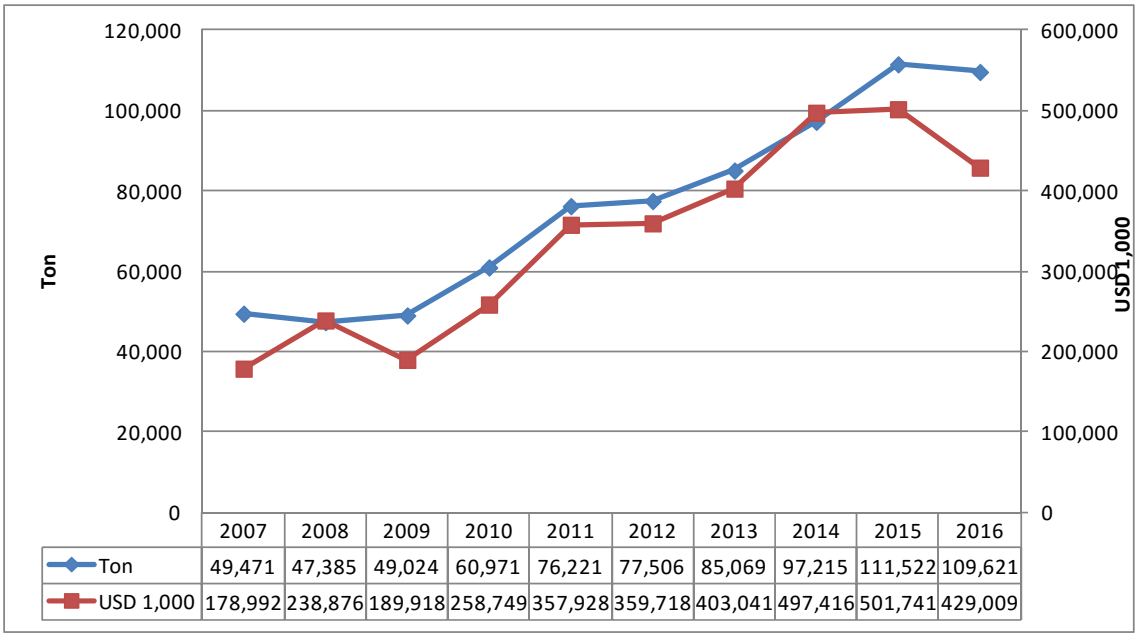
	2012	2013	2014	2015	2016
Ton	12,187	11,221	9,858	9,015	22,073
USD 1,000	32,936	29,515	27,144	21,753	50,921

2) Cheese and butter

Cheese does not exist in Korean traditional cuisine. In the beginning when cheese

was introduced into Korea, Korean people did not know how to eat cheese and could not enjoy its real taste. With the growing interest of South Korean consumers in Western foods such as pizza, hamburger and sandwiches, the consumption of cheese has increased accordingly, which played an important role in making Korean consumers be used to cheese. The market grew 15-fold in volume over the last 20 years. Imported cheese is increasingly covering the demand as the local production is stagnating.

Fig. 4 Cheese import into Korea by year

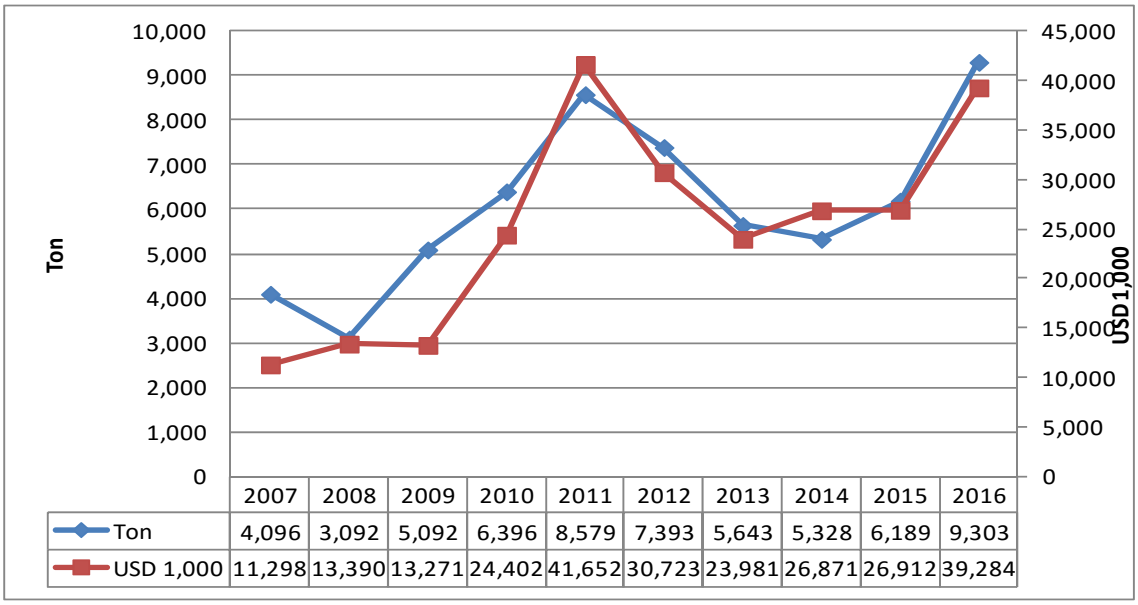


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ton	49,471	47,385	49,024	60,971	76,221	77,506	85,069	97,215	111,522	109,621
USD 1,000	178,992	238,876	189,918	258,749	357,928	359,718	403,041	497,416	501,741	429,009

Table 7. Import volume and main exporting countries by kind of cheese in 2016

Kind of cheese		Import(ton)	Import share by exporting country
Natural cheese	Mozzarella	59,893	US 33%, Germany 22%
	Cream	11,362	US 68%, Australia 25%
	Cheddar	16,720	New Zealand 59%, US 16%
	Gouda	4,788	Netherlands 38%, New Zealand 32%
	Camembert	176	France 79%
	Emmental	274	France 75%
Processed cheese		6,572	US 47%, France, Australia, New Zealand, Netherlands
Cheese powder		3,978	US 77%, Denmark

Fig. 5 Butter import by year



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ton	4,096	3,092	5,092	6,396	8,579	7,393	5,643	5,328	6,189	9,303
USD 1,000	11,298	13,390	13,271	24,402	41,652	30,723	23,981	26,871	26,912	39,284

Butter is also largely imported into Korea. New Zealand was the largest exporter of butter into Korea in 2016 accounting for 34% of the total import, followed by Australia and France. The Netherlands also exported 220 ton of butter into Korea in 2016.

3) Milk powder

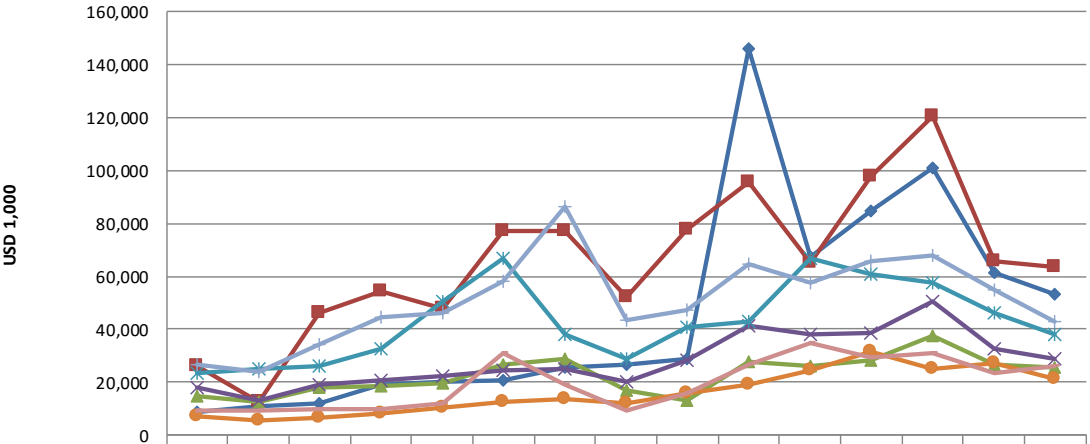
The Netherlands is the largest exporter of milk powder products into Korea. Especially Milk Powder Preparation has been one of top 10 commodities among all kinds of commodities exported from the Netherlands into Korea. Korea is an interesting market for foreign dairy exporters because the raw milk price in Korea is very expensive: almost double price of the Netherlands. Milk powder products are largely imported as an ingredient for local production of dairy, confectionery and bakery products. Imported milk powder has played an important role in Korea in decreasing costs for food production.

Milk powder products imported into Korea varies from Skim Milk Powder (SMP) to Whole Milk Powder (WMP), Skim Milk Powder Preparation (SMPP), Whole Milk Powder Preparation (WMPP), Cocoa Preparation (CP), Whey Powder, Whey Protein, Casein and Lactose. The Netherlands is particularly strong in SMPP, WMPP and CP in the Korean market.

Table 8. List of milk Powder products imported into Korea

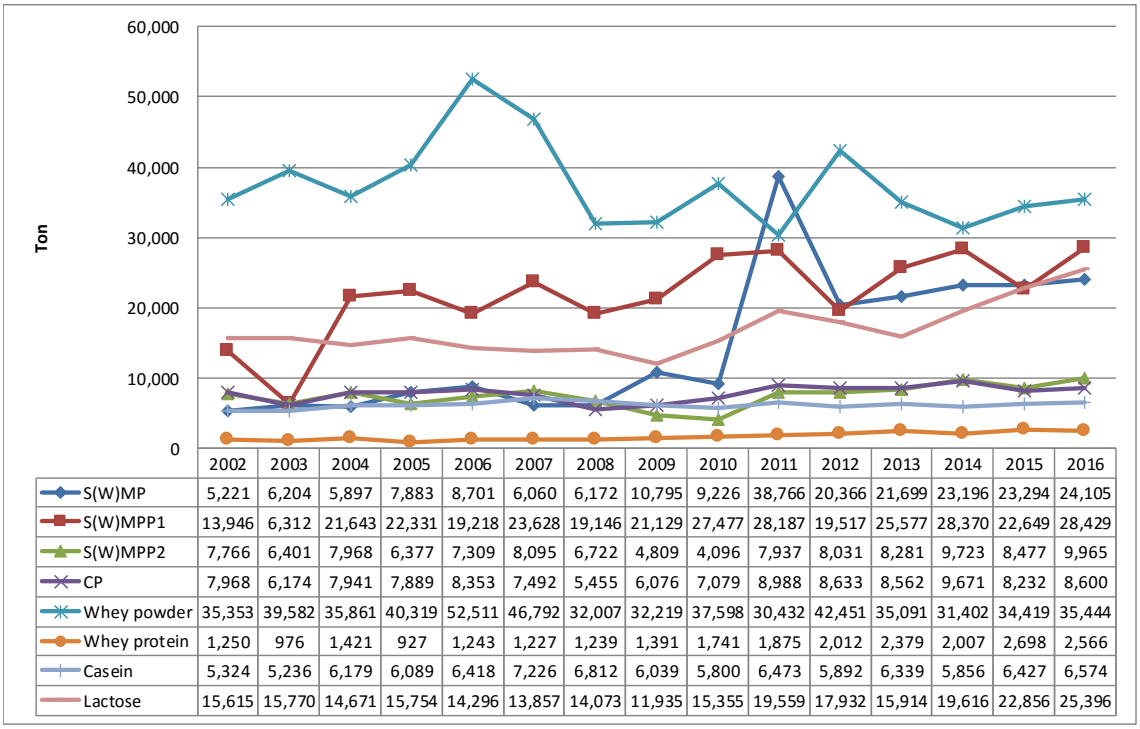
	Definition	HSK code (Korean code)	Use
SMP	Skim Milk Powder	0402101010	Flavored milk,
WMP	Whole Milk Powder	0402211000	Yoghurt, Ice cream, Infant formula,
S(W)MPP1	S(W)MP + Other milk powder (Whey powder or whey protein)	SMPP: 0404901000 WMPP: 0404902000	Flavored milk, Yoghurt, Ice cream,
S(W)MPP2	S(W)MP + Other powder (malt, flour and starch)	SMPP: 1901902010 WMPP: 1901902020	Ice cream
CP	SMP + Cocoa mass	1806209010	Chocolate, Ice cream Choco snack/biscuit
Whey Powder	Whey protein <80%	040410	Infant formula, Flavored milk, Beverage,
Whey Protein	Whey protein >80%	3502200000	Yoghurt, Infant formula
Casein	Casein and Caseinate	3501	Coffee creamer Artificial milk powder
Lactose	Lactose	1702111000 1702191000	Dairy products, medicine

Fig. 6 Import of milk powder products into Korea by value by year



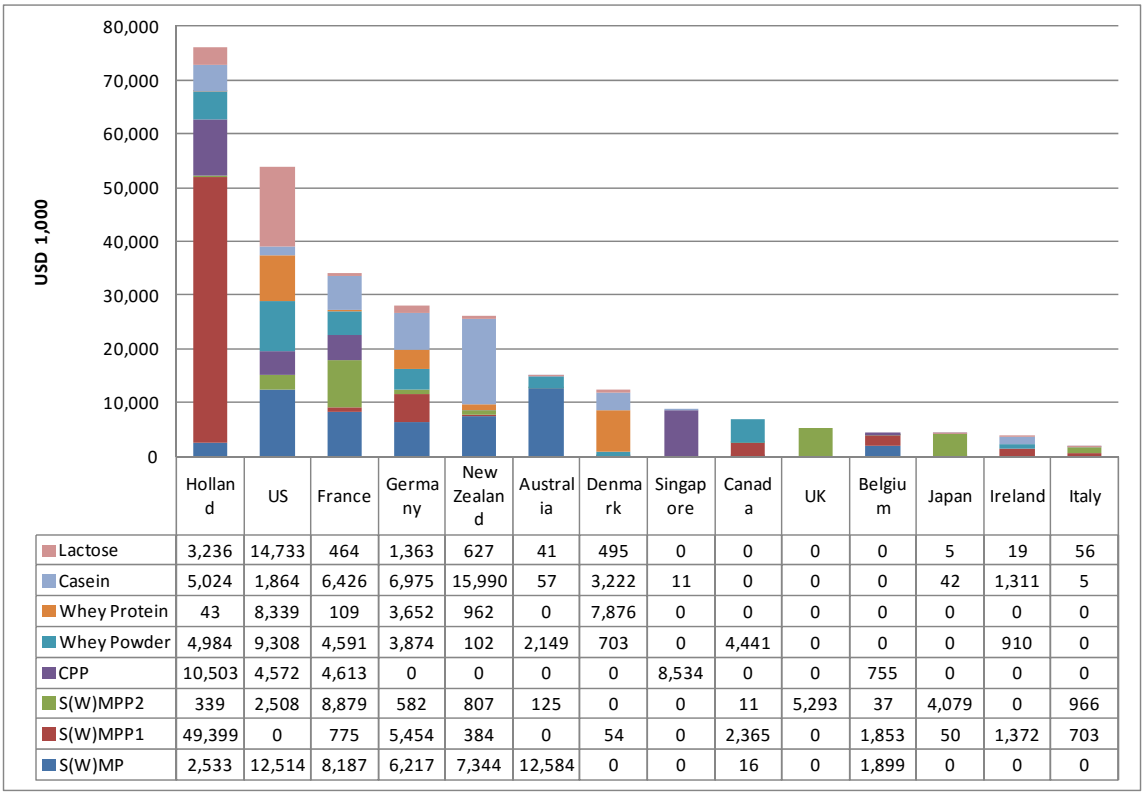
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
S(W)MP	8,672	10,785	11,895	18,881	20,146	20,654	25,571	26,699	28,617	145,92	67,174	84,828	101,19	61,426	53,012
S(W)MPP1	26,277	12,696	46,067	54,092	48,034	76,870	77,373	52,349	77,764	95,317	65,014	97,719	120,33	65,539	63,358
S(W)MPP2	14,887	12,304	17,886	18,565	19,568	26,912	28,891	16,827	12,933	27,984	26,315	28,414	37,774	26,834	25,691
CP	17,727	13,012	18,971	20,547	22,578	24,691	24,945	20,320	28,156	41,329	37,966	38,808	50,652	32,683	28,979
Whey powder	23,237	25,035	26,334	32,786	50,449	67,083	38,306	28,888	40,661	42,969	66,687	60,835	57,833	46,444	38,203
Whey protein	7,074	5,375	6,813	8,176	10,263	12,758	13,914	12,240	15,555	19,183	24,680	31,699	25,157	27,212	21,239
Casein	26,595	23,977	34,411	44,641	45,947	58,236	86,286	43,467	47,456	64,906	57,344	65,614	68,131	55,072	42,878
Lactose	9,265	9,287	9,678	9,759	12,156	31,008	19,125	9,528	15,647	26,747	34,900	29,412	30,976	23,358	26,169

Fig. 7 Import of milk powder products into Korea by volume by year



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
S(W)MP	5,221	6,204	5,897	7,883	8,701	6,060	6,172	10,795	9,226	38,766	20,366	21,699	23,196	23,294	24,105
S(W)MPP1	13,946	6,312	21,643	22,331	19,218	23,628	19,146	21,129	27,477	28,187	19,517	25,577	28,370	22,649	28,429
S(W)MPP2	7,766	6,401	7,968	6,377	7,309	8,095	6,722	4,809	4,096	7,937	8,031	8,281	9,723	8,477	9,965
CP	7,968	6,174	7,941	7,889	8,353	7,492	5,455	6,076	7,079	8,988	8,633	8,562	9,671	8,232	8,600
Whey powder	35,353	39,582	35,861	40,319	52,511	46,792	32,007	32,219	37,598	30,432	42,451	35,091	31,402	34,419	35,444
Whey protein	1,250	976	1,421	927	1,243	1,227	1,239	1,391	1,741	1,875	2,012	2,379	2,007	2,698	2,566
Casein	5,324	5,236	6,179	6,089	6,418	7,226	6,812	6,039	5,800	6,473	5,892	6,339	5,856	6,427	6,574
Lactose	15,615	15,770	14,671	15,754	14,296	13,857	14,073	11,935	15,355	19,559	17,932	15,914	19,616	22,856	25,396

Fig.8 Exporting countries of milk powder products into Korea by value in 2016



	Holland	US	France	Germany	New Zealand	Australia	Denmark	Singapore	Canada	UK	Belgium	Japan	Ireland	Italy
Lactose	3,236	14,733	464	1,363	627	41	495	0	0	0	0	5	19	56
Casein	5,024	1,864	6,426	6,975	15,990	57	3,222	11	0	0	0	42	1,311	5
Whey Protein	43	8,339	109	3,652	962	0	7,876	0	0	0	0	0	0	0
Whey Powder	4,984	9,308	4,591	3,874	102	2,149	703	0	4,441	0	0	0	910	0
CPP	10,503	4,572	4,613	0	0	0	0	8,534	0	0	755	0	0	0
S(W)MPP2	339	2,508	8,879	582	807	125	0	0	11	5,293	37	4,079	0	966
S(W)MPP1	49,399	0	775	5,454	384	0	54	0	2,365	0	1,853	50	1,372	703
S(W)MP	2,533	12,514	8,187	6,217	7,344	12,584	0	0	16	0	1,899	0	0	0

7. Source

- Korea Dairy Committee: http://www.dairy.or.kr/english/english.html
- KDIA (Korea Dairy Industries Association): http://www.koreadia.or.kr/_eng/index.html
- MAFRA (Ministry of Agriculture, Food and Rural Affairs): http://www.mafra.go.kr
- MFDS (Ministry of Food and Drug Safety): http://www.mfds.go.kr
- KCS (Korean Customs Service): http://www.customs.go.kr
- KITA (Korea International Trade Association): http://www.kita.net
- Euromonitor: http:// http://www.euromonitor.com/