

Dietary Oils and Fats in South Korea

— Current and Future Trends

Teah Yau Kun and Yoon Suk Hoo**

Lipids constitute one of the three major components of foods and are recognized as essential nutrients in both human and animal diets. Fats and oils provide the most concentrated source of energy among foodstuffs, supply essential fatty acids, contribute greatly to the feeling of satiety after eating, and are carriers of fat-soluble vitamins. Functionally, oils and fats provide texture and flavour to most foods.

In the early 1960s the total calorie intake per person per day in South Korea averaged 1900 kilocalories. By the mid-1980s, it had increased to 2600 kilocalories and the contribution of oils and fats to this intake had increased from 6% to 15 percent. The total calorie intake at the present day appears to be relatively constant but the calorie intake attributable to oils and fats has increased and is expected to increase further. In the year 2000, the total calorie intake is expected to be 2700 kcal per person per day.

SUPPLY OF AND DEMAND FOR OILS AND FATS IN SOUTH KOREA

There are two basic kinds of lipids, namely visible and invisible. Traditionally, oils and fats in the Korean diet have been mainly invisible and there have been two concepts regarding their use.

Firstly, oils may be used for seasoning purposes, e.g. sesame oil.

Secondly, they may be actual food, as in salads and some manufactured foods.

In late 1970s, the emphasis shifted from seasoning towards the use of oils and fats as food. Nowadays, visible oils and fats constitutes

nearly half of the lipid intake. In 1967, the total consumption of edible oil in South Korea was 18 600 tonnes, while in 1976 it had increased to 110 700 tonnes, and in 1986 consumption reached 389 900 tonnes. This, during the two decades from 1967 to 1986 the consumption increased 20-fold. Considering the rate of increase in population of 1%–2% per annum, it is expected that consumption will rise further. *Tables 1 to 3* show figures for the consumption, domestic production and importation of oils and fats by South Korea during 1981 – 1986.

There are various reasons behind the dramatic increase in consumption of oils and fats, the main one being a change in life-style as a result of industrialization and urbanization, which encouraged consumption of instant, frozen and snack foods. The resulting shortage of oils and fats triggered off increased domestic production and imports. However, domestic production is limited by the shortage of land, so South Korea has to rely mainly on imports. In 1967, the country was 74% self-sufficient in oils and fats, but this figure fell to 24% in 1976, and in 1986 it was less than 10%, which represented one of the lowest self-sufficiency rates among major food items in South Korea.

The imports of oils and fats take two forms. Firstly, oil is imported ready to use and then incorporated as one of the ingredients in product manufacturing. Secondly, oilseeds are imported. The first category includes palm oil, olive oil, lard and tallow, while the second is represented by corn, soyabeans and sesame seed.

Among the imported oils and fats, palm oil in particular has played a very significant role in South Korea recently. In terms of edible usage, palm oil increased sharply from 53 000 tonnes in 1981 to about 117 990 tonnes in 1986, while for non-edible purposes, palm

* *Palm Oil Research Institute of Malaysia.*

+ *Korean Advanced Institute of Science and Technology*

oil (mainly palm stearin) increased from nil in 1980 to 73 000 tonnes in 1986. The current ratio of palm oil usage for food and non-food uses in South Korea is about 60:40.

USAGE OF OIL IN FOOD PRODUCT

Of the total consumption of edible oils and fats in South Korea, 80% is used for household cooking and industrial frying. The remaining 20% goes into margarine, shortening, salad dressing, bakery use and items generally other downstream processed lipid foodstuffs.

Margarine production has begun to increase in importance only in recent years. In the mid-1970s, annual domestic production was 7 000 tonnes and in the early 1980s it had increased to 11 000 tonnes. The current estimate for all kinds of margarine in South Korea is about 30 000 – 40 000 tonnes. In the case of shortening, the consumption since the 1970s has remained around 25 000 tonnes.

With the increased consumption of oils and fats, the proportion of vegetable origin has increased drastically while the annual uptake of animal fat has remained in the range of 50 000 – 80 000 tonnes. In the edible sector, palm oil has largely replaced tallow, principally in industrial frying and in the manufacture of margarine and shortening. The sharp increase in the proportion of vegetable oil is mainly due to the fear of coronary heart disease associated with high consumption of animal fat.

In 1986, the consumption of soyabean oil was about 150 000 tonnes (*Table 3*). Almost all the soyabean oil is used as cooking oil, for domestic frying and small-scale frying operations; about 6% – 8% is used for salad dressing and mayonnaise. In the case of corn oil, 80% – 85% is used for frying (small-scale frying) and as cooking oil in 15% – 20% is for margarine. In the case of palm oil, 60% – 65% is used for frying, 20% – 25% for bakery, and 9% – 19% for shortening. The use of palm olein for cooking oil has been limited, partly because of the clouding problem associated with palm olein at low temperature and partly by the prohibition of blending of cooking oils, consequently, soyabean and corn oil have been the predominant cooking oils thus far. With the lifting of the ban on blending in South Korea in

1988, and in view of the good results from blending palm olein shown by the joint research work of PORIM and the Korean Advanced Institute of Science and Technology (KAIST), it is expected that part of the market share of soyabean and corn oil will be replaced by palm olein in future.

The domestically-produced rice bran oil is all used for frying and cooking. Blending with palm olein up to 20% has been shown to improve quality during frying. Table margarine is produced mainly from fish oil and corn oil. For bakery margarine, palm oil and coconut oil are used. In the case of shortening, lard, fish oil, tallow, palm oil and coconut oil are used. For confectionery, ice cream and imitation dairy products, coconut oil is mainly used. There is a preferential use of coconut oil because of tradition as well as the higher tariff imposed on palm kernel oil. Currently, the quota tariff rate for coconut oil is 12.5% as compared to the standard rate for palm kernel oil of 20 per cent. Efforts are being made to convince the South Korean Government to standardize the tariff for all vegetable oils.

OIL PRODUCTION

The history of oil production in South Korea is as old as the rice milling industry. Production was originally very primitive, with rudimentary technology and very small capital investment.

Industrial production of rice bran oil started in 1910 on a small scale but the equipment used was old-fashioned and of very low capacity. As a result, the quality of rice bran oil remained low. But from the middle 1980s the Korean Oils and Fats Association started to consolidate all scattered rice bran factories into one large factory in a single province and with the introduction of caustic refining, the quality of rice bran oil was improved. On 1 January 1985, consumer packs of rice bran oil were marketed. To further improve the quality of rice bran oil, rice bran stabilizer was developed by the Korean Advanced Institute of Science and Technology and is now utilized commercially nationwide. Currently, Yosino plant from Japan is also used for the refining of rice bran oil.

During 1986, soyabean was imported at

TABLE 1. CONSUMPTION OF OILS AND FATS IN SOUTH KOREA, 1981 – 1986 (tonnes)

	1981	1982	1983	1984	1985	1986
Domestic Production	34 557	29 913	33 424	37 260	44 620	36 500
Imports	206 874	265 977	282 706	303 730	337 630	353 480
Total	241 431	295 890	316 130	340 990	382 250	389 980
Vegetable Oil	173 462	227 237	263 785	261 900	309 350	342 600
Animal Fat	67 969	68 653	52 345	79 090	72 900	47 800

TABLE 2. DOMESTIC PRODUCTION OF OILS AND FATS BY SOUTH KOREA, 1981 – 1986 (tonnes)

	1981	1982	1983	1984	1985	1986
Vegetable Oils						
Sesame	6 502	5 274	10 527	12 830	13 250	12 310
Perilla	—	—	—	—	4 850	4 800
Rapeseed	7 905	7 905	6 990	3 430	3 020	220
Ricebran	13 875	13 920	11 214	12 550	18 150	16 840
Cottonseed	409	384	310	340	210	—
Red pepper seed	830	866	866	1 230	740	520
Miscellaneous	710	79	1 293	1 480	—	460
Sub-Total	30 231	28 428	31 200	31 860	40 220	35 550
Animal Fats						
Fish oil	4 326	1 485	2 224	5 400	4 400	950
Total	34 557	29 913	33 424	37 260	44 620	36 500

TABLE 3. IMPORTS OF OILS AND FATS BY SOUTH KOREA, 1981 – 1986 (tonnes)

	1981	1982	1983	1984	1985	1986
Vegetable Oils						
Soyabean	64 638	80 881	104 832	107 240	133 850	154 160
Palm oil	53 053	82 349	91 666	84 000	84 550	117 990
Coconut	8 528	19 002	11 703	20 000	16 870	10 740
Cottonseed	2 480	2 483	2 819	1 850	16 660	4 970
Corn	8 210	5 821	—	160	17 200	19 190
Miscellaneous	6 322	8 273	21 565	16 790	—	—
Sub-Total (Vegetable Oils)	143 231	198 809	232 585	230 040	269 130	307 050
Animal Fats						
Tallow	54 413	65 168	44 646	70 950	53 090	35 420
Lard	3 637	2 000	2 517	940	9 280	4 700
Fish oil	—	—	—	—	6 130	6 310
Miscellaneous	5 593	—	2 958	1 800	—	—
Sub-Total (Animal Fats)	63 643	67 168	50 121	73 690	68 500	46 430
Total	206 874	265 977	282 706	303 730	337 630	353 480

about one million tonnes. Of this, 15% was used for direct food consumption, as soya sauce, tofu, soya paste and bean sprouts. The remaining 85% was for animal feed. Soyabean oil was produced as a by-product of feed manufacture. The equipment used for soyabean extraction was imported from West Germany, the USA, Sweden and Japan. The most commonly used extractor was the Rotocel and the refining process was carried out with equipment from Lurgi, EMI, Nissin, Alfa Laval and Westfalia. It was all new, which resulted in the production of high quality soyabean oil in Korea.

RESEARCH ON OILS AND FATS

The earliest work done and the papers published on this subject in South Korea were mainly on rice bran oil. Up to 1969, the total number of papers published in Korea was less than ten; they were mainly concerned with the fatty acid composition, carotene and xanthophyll of rice bran oil, and were very elementary. From 1969 to 1976, the topics covered became more diversified and the number of papers published in Korea rose to more than twenty. Two areas of work were covered. The first included the composition, unsaponifiable matter and natural antioxidant of seasoning or spice oils such as sesame, perilla and red pepper seed oil. The second concerned food products and included solvent extraction of rice bran oil (wet milling), soya-bean oil oxidation, effect of antioxidant, frying with tallow and characterization of commercial margarine. From 1977 to 1981, 80 papers were published with the research work diversified to characterization of various oils and fats, safety and flavour stability of lipids and additives, erucic acid content, refining, bleaching, dewaxing, hydrogenation, interesterification and single cell oil. In the period 1982 – 1986, more diversification of topics took place with more than 150 papers being published.

CONCLUSION

Future development and the production of oil seeds in South Korea has to be viewed

with special reference to the local environment. The development of the oils and fats based industry in South Korea has been a rapid one over the recent years. In the past, most of the efforts were in the development of rice bran oil industries. However, there has been a diversification in the oils and fats industries in South Korea. The current view in South Korea has been centred in national nutrition rather than in commercial exploitation as well as efficient regulation to utilize more effectively oil as food. In view of this, the current research and development has been centred on the search of possible new oil sources such as camelia oil, polyunsaturated fatty acids from fish oil and production of lipids from single cell. New technological development included supercritical fluid extraction, membrane separation for refining and modification of lipids by biotechnological means.

It was felt that in order to fulfill the demand by consumers, outdated regulations must be upgraded and approval procedure simplified and adapted to the environment. The permission granted recently by the Ministry of Public Health and Social Affairs of South Korea in blending of cooking oils was a good example on their efforts made towards this direction.

REFERENCES

- Korean Society of Food Science and Technology. Korean Food Research Review. Vol. 1 – 3. 1968 – 1981.
- Korean Society of Food Science and Technology Lipids Short Course. 1984 – 1987.
- Korean Rural Economics Institute Fats and Oils Industry 1983.