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Special Contribution

Cultural perspectives and current consumption changes of cooked rice in Korean diet

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Abstract

Cooked rice is a staple food for Koreans which provides more than 60% of daily required energy. In 1960's, Koreans ate 600 g-800 g of cooked rice per meal and the energy obtained from cooked rice was almost more than 80% of the daily intake of energy. However, as the economy of Korea improved, the major industry has been shifted from agriculture to various manufacturing industries and the export of those products has been increased thus increasing the national income but decreasing the farming population and thus rice consumption have been decreased. It has been said that the decreased rice consumption is caused solely by decreased farming population but it can also be said that the decreased farming population is caused by decreased rice consumption.

As the national income increases, the type of foods people consume have become diversified. Various processed foods such as convenience food or ready-to-eat food have been widespread, which are mostly made of wheat flour rather than rice.

Key Words: Rice, cooked rice, bibimbap, Korean diet

History of Cooked Rice

Let us first examine when the crop farming began before inquiring the origin of cooked rice, our staple food. The evidence that the first ever crop cultivated was not rice. It has been 4-5 million years since the human race existed on earth as *Homo erectus*, and farming has been thought as the motive power for entering into the production economy with stabilized food supply after being through the hunting period in which hunting and gathering had been done for a long time.

According to the data found and investigated recently, over 400 remaining places of the Neolithic Age were found and most of them had vestiges dependent on hunting and gathering. There have been traces of cultivating millet and barnyard millet in some part of the west coast regions centering on the drainage area of the Daedong-gang since the middle of the Neolithic Age. Farm equipments related to places of remains were found suggesting that some grains were cultivated in some parts of the country from the middle of the Neolithic Age and that rice farming has been started in some parts of the west coast regions since the later Neolithic Age (Yoon, 2001).

Carbonized rice was found in the remains of the Bronze Age in Namgyeong, Pyeongyang, Heunam-ri, Yeoju-gun, Gyeonggi-do, Songguk-ri, Buyeo-gun, Chungnam, Gonam-ri, Anmyeondo, Chungnam. Also, earthenware imprinted with rice seeds were found in many historic sites of the Bronze Age mostly in the southern part of the country including Misa-ri, Hanam, Gyeonggi-do, Hyuam-ri, Seosan, Chungnam, Daegok-ri, Seungju-gun, Jeonnam, Ueolnae-dong, Yeocheon, Jeonnam, Bonggye-ri, Hapcheon, Gyeongnam, Daeya-ri, Geochang, Gyeongnam, Daepyeong-ri, Jinyang-gun, Gyeongnam, suggesting that rice farming was regularized centering around the southern part of the country in the beginning of the Bronze Age (Im, 2001).

It has been thought that life in the Neolithic Age in Korea relied mainly on hunting. But there were some evidence reported that farming was already started in the area near Daedong- gang (river) during the Neolithic Age (Yoon, 2001). The evidence for the very first grain cultivated in the Korean Peninsula was carbonized grains inside the comb-pattern earthenware excavated at the habitation district No. 2, Jidap-ri, Bongsan-gun, Hwanghae-do, which was not rice but assumed to be millet or barnyard millet. Also, millet was excavated at the nearby Masan-ri No. 7 habitation and its time was assumed to be the middle of the Neolithic Age. Considerable amount of millet was excavated from the No. 31 habitation at the remains of Namgyeong, Pyeongyang, which belonged to the later Neolithic Age, suggesting that millet farming was quite settled near the Daedong-river area in the Neolithic Age. As seen in the remains of Jitap-ri, Namgyeong, and Masan-ri as the above, farming of other grains such as millet and barnyard millet was done before

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rice farming (Yoon, 2001).

In Korea, other grains such as millet, proso-millet, and barnyard millet appeared first before rice and evidences for these grains as daily foods have been excavated. Besides our country, many other countries have eaten foods made of miscellaneous grains. Miscellaneous grains were not easy to polish and had been pounded in a mortar with pestle before the introduction of mechanized polishing, and according to the remains found in southern India or northern China, miscellaneous grains were polished under a large stone roller-pulled by cow (Im, 2001).

Grain food has been thought as two aspects of powder type and whole grain type. Powder-type food prevailed in the savannah areas of Africa and India and whole grain-type food prevailed in northern China. Powder-type foods included powder gruel, baked, steamed, and stir-fried foods and whole grain-type foods included cooked rice and gruel. Later when these were classified, powder-type food was developed in the wheat and barley cultural area or near the root vegetables cultural area and whole grain-type food was developed near the rice cultural area. Korea has been included in the rice cultural area and thus whole grain-type foods have been mainly developed until now. There have been traces of polishing and cooking millet, sorghum, and kaoliang.

When sorts of barley were first cultivated in the wheat and barley cultural area, the use of wheat and barley did not show the superiority of wheat as in today. Grain foods in primitive life had common forms regardless of eastern and western world, such as roasting and hulling by dry heat (on the heated stone or earthenware), roasting and hulling and then pulverizing, or boiling into thick gruel. Thus there was almost no difference in cooking wheat or barley in the ancient society. Later when the milling technology was developed, the stickiness of wheat flour was found, which made it possible to be used in noodles and breads, resulting in the significant increase in the use of wheat. The foundation stocks of millet and proso-millet are widely distributed in tropical and temperate zones in the world. Millet and proso-millet have been found in the remains of BC 5000-BC 4000 northern China, BC 3000 northern central Europe, BC 5500 Greece, and BC 3000 Iraq. These excavated remains can become the evidence that miscellaneous grains were used as human food before the use of rice (Yoon, 2001).

Rice farming in Korea was assumed to begin around BC 1000 when rice farming had been combined with the farming of other grains and beans since the very beginning of farming with miscellaneous grains 2000 years ago, which was proved by the findings of historic sites. Rice seeds have been excavated in several places in the country, including the excavation of rice seeds of around BC 2400 at New Ilsan City development zone and that of the 4th century in the areas of Boyang-gun, Gyeongnam and Danjeong-myeon, Sancheong-gun, Gyeongnam (Yoon, 2001).

Rice farming in Korea was done at similar periods around BC 1000 from the areas of Pyeongyang to the north, Gyeonggi-do and the environs in the central region, and the areas of Muan-gun, Jeonnam to the south. Also, the history of farming rice along with the farming of beans and red beans 3000 years ago was found in the habitation of the remains of Namgyeong near Pyeongyang. At that time, it was thought that rice was not the staple food but consumed as one of the five grains. Based on these evidences, the period that rice started to be consumed in the Peninsula is 3000 years ago but not as the staple food as it is today. Among grains found in the historic site of Namgyeong, millet, proso-millet, or barnyard millet are the grains of early agricultural development period and sorghum is considered as being introduced from the Kingdom of Shu (蜀) of ancient China after proso-millet or millet.

It is not certain when the barley farming started in the country but wild type barley was used as food before BC 10000 and it has been known that sorts of barley were regularly cultivated from around BC 7000. In addition, barley along with carbonized rice was excavated from the habitation of the remains No. 12 at Heunam-ri, Gyeonggi-do of BC 1030, and barley farming was active during the Era of the Three States particularly in Silla. Based on these findings, barley farming was widely cultivated in suitable lands during the Iron Age (Yoon, 2001).

Cooking or processing implements in the primitive Agricultural Age, such as saddle quern and stone grinding pestle, have been found all over the world. These were used as tools to polish, pulverize, and grind. There were traces of using saddle quern and stone grinding pestle regularly in the country at the later Neolithic Age. In the Bronze Age, the use of such cooking implements was decreased and then later changed to stone mortar or mortar in the early Iron Age. Several earthenware found after the Neolithic Age were used as cooking utensils for boiling foods and tableware for serving foods. *Ddukbaegi* of today is thought as the vestiges of earthenware that had been used to boil and serve foods and from the ancient Agricultural Age. *Siru (earthenware steamer)* was found in the remains of the Bronze Age, including Najin Chodo kitchen midden, Hwangju Chimchon, and Musan Hogok. Also, kettles and steamers have been found as pairs in other regions including Liaotung Peninsula. The appearance of steamer (siru) in our country is thought as being followed by the introduction of the culture of the Bronze Age.

Development of Cooking and Processing of Foods in Ancient Society

According to the above studies, ancient countries of Korea showed the traces that other grains except rice were used as edible foods before rice became the staple food, and thus millet, barnyard millet, and proso-millet first appeared as ancient crops and then sorghum appeared and then rice, soybeans, and red beans followed.

In ancient times, saddle quern and stone grinding pestle, both

made of stone, appeared for food processing. Millet or barnyard millet were placed on the saddle quern and hulled by using stone grinding pestle, and the hulled outer skins were blown away by wind. Not only grains but also fruits were ground on the saddle quern for convenient eating. As the Stone Age was passed and the Iron Age began, the use of saddle quern and stone grinding pestle was decreased and developed into stone mortar. They were more functionally changed types compared to saddle quern and stone grinding pestle. Thus they could be used more functionally in polishing, pulverizing, and grinding. Mortar was used when dry grains were ground and stone mortar was used when soaked beans or rice were ground. The beginning of food processing was from the polishing of grains and the beginning of cooking was from pulverizing dried grains or grinding soaked grains.

Cooking of foods mostly started by boiling on fire and thus cooking was possible after the time when human race started to use fire. The period that human started to use fire is not accurate but assumed to have started about 10000 years ago. Pulverized grain powder was mixed with water to make dough and cooked on a heated saddle quern with animal fat on it to make pancakes. This is thought as the primitive form of pancakes among Korean rice cakes. Cooked rice appeared considerably much later that time and this type of grain pancakes appeared in the field. Also, grains were pulverized with stone grinding pestle to hull the outer skins and then ground again on a heated saddle quern to make powder of roasted grains of today. In addition, sorghum was hulled and powdered which was then mixed with water or alcoholic drinks and wrapped with leaves and baked on a bonfire. Jeung-bo-san-lim-kyung-je introduced how to make bran cake, which is considered as today's bran cake (gae-ddeok), and which was a sort of pancake made of coarse buckwheat flour by mixing with honeyed water and dropped into a fire turning to ashes and baked and then eaten after shaking the ashes during the primitive Agricultural Age (Yoon, 2001). Also during that time, dugout mud hut was built and stones were piled inside the hut, which was heated by making a fire and then grains were cooked inside. Such tradition might turned into the idea of today's oven. Grain cooking such as gruel type started using earthenware found after the Neolithic Age. As earthenware steamer (siru) was found in the Bronze Age, cooking method such as steaming was practiced. Rice was steam boiled to make steamed cooked rice and other grains were pulverized to make steamed grain cakes. There were traces of making cakes from other grains except rice before the appearance of cooked rice, and even in case of using rice, it was mixed with other grains and then ground to powder for making cakes.

The Appearance of Cooked Rice

Our meal is made of cooked rice and side dishes, which has been established during the Era of the Three States of Goguryeo, Silla, and Baekje. At that time, the kinds of side dishes were different depending on social status and rank and this phenomenon begun in the end of the Era of the Three States and ended in the Unified Silla.

Cooked rice requires complicated cooking process in which rice is placed in a kettle with rice and boiled and then covered to allow boiled rice to settle by its own heat, and thus cooking utensil with a lid is needed. The kettle with a lid was finally devised in the Era of the Three States, when the cooking methods were largely divided into two methods; one was steaming in the earthenware steamer (siru) and the other was cooking in a cast iron kettle in which rice was boiling and steaming (Yoon, 2001).

The rice cooking had not been generalized until the Era of the Three States, when the meal content was also formed as cooked rice and side dishes during that time. As rice cooking was generalized, steamed rice with steamer (siru) for making rice cake have been shifted from common daily food to special treatment for ceremonies and gifts, and also the tradition of food processing techniques such as brewing rice wine and fermenting sweet rice beverage (sik-hye) have been established. Because our country is geographically located on the relatively higher latitude in the north and source plants for sugar such as sugar cane or sugar beet, which are tropical plants, cannot grow and the source for sugar is relatively poor, thus maltose beverage such as sweet rice beverage (sik-hye) has been the only source of sugar source. Glutinous rice candy (yeot), molasses (jo-cheong), and sweet rice beverage (sik-hye) have been familiarized as the sources of maltose in our minds.

Three countries in the Era of the Three States were centralized aristocratic nations where the royal authority was established and the physiocracy was enforced. As cooked rice was settled as a daily food of the people, the physiocracy policy with rice farming as the first priority became the basis. Land was basically owned and readjusted by the state and the tax system was established, and irrigation works for rice farming were actively promoted and also related laws and regulations for years of bad harvest and smooth distribution of grains were systemized. Under such circumstances, the yield of rice was increased and those of miscellaneous cereals such as barley, wheat, millet, proso-millet, and sorghum, and grains such as soybeans, red beans, and mungbeans were increased, too.

After the Unification of the Three States, the foods of three countries were exchanged. As a result, food culture at that time was greatly developed. The difference in food life by social status became distinct and the hierarchy was established in the society. The Unified Silla organized the members of the society as upper, middle, and lower classes, which was then followed by the classification of housing, clothing, tableware, and the use of a means of transport according to the social classes. It is thought that the distinction between common foods in the daily life and foods for special occasions such as treatment for guests and birthday for the elderly has been settled in out culture. On the other hand, the social status of a household could be roughly guessed by the level of foods on its dinner table.

Such tradition has been in the basis of our food life and culture in these days. White cooked rice and delicious beef soup are still the symbol of rich household in the mind of most Korean people and in the similar context, cooked rice that was consumed during the barley hump (the farm hardship period) is still the symbol of poverty in the mind of people who suffered from the hardship period without eating cooked rice.

Science and Nutrition of Cooked Rice

The taste of cooked rice varies depending on the species of rice. Currently, the mostly known species of rice in Asia are Japonica type, which is widely consumed in Northern Asia including China and Japan, and Indica type, which is mostly consumed in tropical Asian regions including India. Japonica type is a short grain type with short and plump grains, while Indica type is a long grain type with long and slender grains. The Japonica type has less a-1,4-bond and more a-1,6-bond than long grain rice. Thus when cooking rice, Japonica type rice requires 1.2 times as much water because it has more a-1,6-bonds and thus larger grains. Indica type rice has a-1,4-bonds stacked one by one and thus requires 1.4-1.5 times as much water. The taste of cooked rice from Japonica type rice has more stickiness (glutinousness) than that from Indica type rice, which has less stickiness and thus less soft. The rice type what we called Annam rice is Indica type and the rice we have eaten, that is, our traditional rice type is Japonica type.

The major component of rice is starch, that is, carbohydrates. Most people in the world take more than 50% of energy they need from carbohydrates. In Korea, the energy obtained from carbohydrates was 64.3% of the total energy intake recently, which was significantly decreased for 35 years compared to 78.5% in 1970 (Fig. 1) (MOHW, 2006).

The ratio of rice among the sources of carbohydrates we ingest was 71.8% in 1970 and looked like being increased to 90.7% in 2005, but the total amount of intake was decreased from 136.4 kg per year per capita in 1970, which was about 373.7 g per day per capita, roughly almost 4 bowls of cooked rice, to 78.8 kg per year per capita in 2006. This was about 216 g per day per capita, roughly 2 bowls of cooked rice, as of 2006 (Fig. 2) (KNSO, 2007).

The cooked rice consumption of Koreans has been decreased to half during the past 35 years while the meat consumption increased about 4.8 times in 2005 compared to 1970, and the

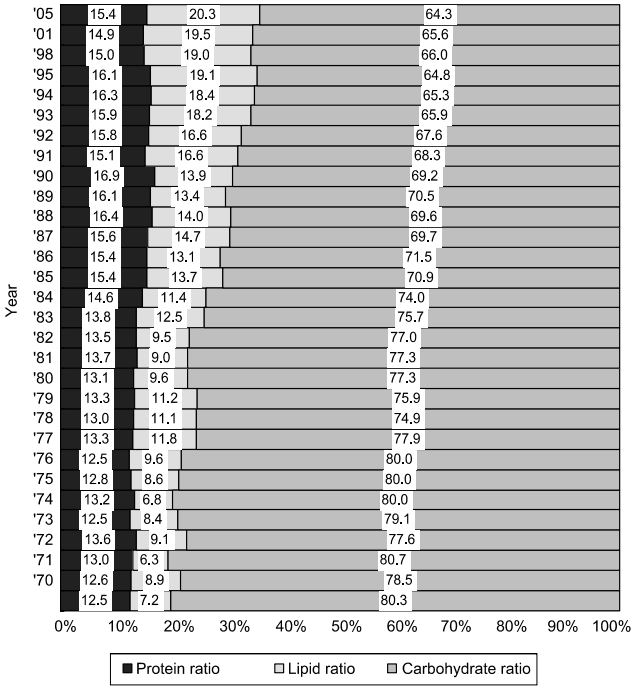

Fig. 1. Changes in the ratios of protein, lipid, and carbohydrate energy
Protein ratio : [protein energy/(protein+lipid+carbohydrate) energy] × 100
Lipid ratio : [lipid energy/(protein+lipid+carbohydrate) energy] × 100
Carbohydrate ratio : [carbohydrate energy/(protein+lipid+carbohydrate) energy] × 100
Source : Ministry of Health and Welfare (2006), 2005 National Health and Nutrition Survey-Nutrition Survey-, Republic of Korea.

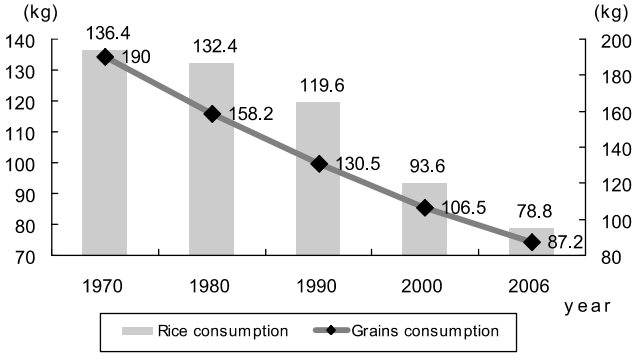

Fig. 2. Decreasing trend of national rice consumption and grain consumption
Source : Korea National Statistical Office (2007), 2006 the rice consumption per capita, Republic of Korea

Table 1. Changes in the ranking of causes of death & mortality : 1995, 2005
(unit: per 100,000)

ranking	1995		2005		increase / decrease	
	ranking	mortality	ranking	mortality	ranking	mortality
cancer (malignant neoplasm)	1	110.8	1	134.5	-	23.7
cerebrovascular disease	2	79.7	2	64.3	-	-15.4
heart disease	4	36.9	3	39.6	1	2.7
intentional self-harm (suicide)	9	11.8	4	26.1	5	14.3
diabetes	7	17.2	5	24.2	2	7.0
liver disease	5	29.4	6	17.3	-1	-12.1
transport accidents	3	38.7	7	16.3	-4	-22.4
chronic lower respiratory disease	8	14.9	8	15.5	-	0.6
hypertension	6	18.3	9	9.3	-3	-9.0
pneumonia	12	4.2	10	8.6	2	4.4

Source : Korea National Statistical Office (2006), 2005 Statistical data of the cause of death, Republic of Korea

cancer mortality has been increased 21.4% during the past 10 years between 1995 and 2005 along with these changes in dietary life. In addition to the increased cancer mortality, the incidence of cardiovascular diseases or chronic diseases due to obesity has been increased, and for the worse, the age of incidence of chronic diseases has become earlier, showing the seriousness of our public health problems (Table 1) (KNSO, 2006).

Recently, since the interests on national health have been centered in the body weight increase, it is considerably interesting that rice starch is gelatinized and then cooled to make resistant starch which produces about 2.7 kcal from 1 g of carbohydrate compared to conventional 4 kcal from 1 g of carbohydrate. This can be considered in relation to the fact that cold cooked rice gives out less caloris than fresh hot cooked rice.

In the past, people greatly preferred cooked polished (white) rice and cooked polished rice with well-fermented Kimchi and delicious beef soup was the most satisfactory meal for everyone. However, at the present time, there is strong indication that whoever considering own health avoids cooked polished rice and prefers cooked rice with several grains, cooked unpolished rice or cooked black rice. When comparing the years 2001 and 2005, the consumption of cooked polished rice was decreased by the average of 10.2 g per day per capita and that of unpolished rice was increased by 3.3 g. Also, the consumption of mixed grains was increased by 3.9 g per day per capita during the same period and that of soybeans was increased by 2.2 g (KNSO, 2007). These results showed that people preferred cooked polished rice in the past but have shifted to cooked mixed grains currently. In the past, there was a time called 'barley hump (the farm hardship period)' in which farm household was out of rice but far from the harvest time and thus threshed barley for staple food in the early spring. The meaning of cooked barley rice back then is different from that of today. Cooked barley rice or mixed grains of today is food for health, not the symbol of poverty in the past when it was eaten because of no rice available.

There are 6.7 g of protein per 100 g rice. For the quality of proteins in rice, lysine, one of essential amino acids, is present with very small amount or lacked, and thus the nutritional value is increased if making cooked rice with beans which has sufficient amount of lysine when compared to cooked polished rice. However, the quality of rice is considerably concerned in these days and if the protein content of rice is reduced, the texture of cooked rice becomes soft and the product value is increased, and thus the improvement in quality has tended to decrease the protein content. People do not have the idea of getting proteins from cooked rice anymore in these days.

The World is Watching Our Healthy Food "Bibimbap"

Recently, Bibimbap has appeared as a healthy food with spotlight from the world. Also, according to the New York Times, Pa-jeon (pan-fried green onions) of Korea has been appeared as a healthy food with spotlight from people around the world. So-called Korean pancake is made by placing green onions on thin flour dough on a heated and slightly greased pan, which is delicious and has no cholesterol and saturated fatty acids that people concerned about.

We have boiled rice with cold water in a kettle and then covered the kettle for additional steaming for sufficient gelatinization to make warm cooked polished rice for long since old times. In other countries, for comparison, some pour milk instead of plain water and others pour beef stock to cook rice. Also, the regions that consume cooked polished (white) rice might include Japan and China, in addition to Korea. While in Korea, the regular meal is cooked rice with several side dishes. But families or close friends have liked to mix cooked rice with leftover seasoned vegetables or beef, and sliced Kimchi and sesame oil and hot bean paste, rather than having formal meals with cooked rice and side dishes. Thus, Bibimbap does not have regular recipe and is usually made with some seasoned vegetables and Kimchi available at the time in the house. Also, Bibimbap is rather a sort of convenient food or informal snack-like food, for example, for hungry teens back from school, before dinner than a formal dinner. Recently, Bibimbap has been upgraded and listed as one-dish meal in the menu of Korean restaurant at first-class hotels. It has become the food admired by visitors or celebrities from other countries. Some Japanese who often visit Korea have said that Bibimbap is the best food that Koreans should be proud of and recommended as a healthy food for people around the world. Also, a so called modification of Bibimbap is Hoideopbap. Thinly sliced fresh lettuce, turnip sprouts, perilla leaves, and cabbages are mixed with raw fish cubes or slices such as flounder, sea bream, and arrow squid, with addition of hot bean paste and sesame oil, gives out very delicious meal. This is another type of bibimbap giving the taste of fresh vegetables and raw fish, enhanced by hot bean paste and sesame oil, which is incomparable savory taste. In addition, there are Kimchi Bokkembap (stir-fried rice with Kimchi) and Yeolmu Kimchi Bibimbap (Bibimbap with leafy radish Kimchi), which have been mother's special treatments. Bibimbap is made of cooked rice mixed with raw vegetables or cooked, seasoned

Table 2. The recipe of Bibimbap

dish	ingredients & amounts
Bibimbap	rice 70 g, seasoned bean sprouts 20 g, seasoned spinach 20 g, seasoned bracken 20 g, seasoned Chwi-namul 20 g, carrot 10 g, beef 20 g, sesame oil 10 g, hot bean paste 10 g, green onions 2 g, salted sesame seeds 0.5 g, soy sauce 10 g
Hoideopbap	rice 70 g, raw tuna 30 g, raw arrow squid 30 g, raw croaker 30 g, lettuce (native) 20 g, lettuce 30 g, cucumber 10 g, perilla leaves 5 g, crown daisy 5 g, green pepper 5 g, garlic 5 g, hot bean paste 15 g, vinegar 6 g, sugar 6 g
Kimchi Bokkeumbap	rice 70 g, Baechu Kimchi 70 g, pork loin 20 g, carrot 10 g, onion 15 g, green onion 5 g, soybean oil 10 g, sesame oil 5 g
Yeolmu Bibimbap	rice 50 g, barley 20 g, leafy radish Kimchi 50 g, hot bean paste 15 g, sesame oil 15 g

Table 3. The nutritional values of Bibimbap

dish	energy (kcal)	protein (g)	lipid (g)	carbohydrate (g)	fiber (g)	Ca (mg)	Fe (mg)	vitamin A (RE)	β-carotene (ug)	vitamin C (mg)	cholesterol (mg)
Bibimbap	403.8	10.7	12.5	61.6	3.7	54.4	2.6	286.1	1708	5.8	6.4
Hoideopbap	491.4	24.0	12.6	68.7	3.4	84.0	3.1	253.2	1451	15.4	46.8
Kimchi Bokkeumbap	445.3	10.5	18.8	57.7	3.4	53.9	1.9	166.3	993	13.2	11.2
Yeolmu Bibimbap	419.7	7.4	15.9	62.1	4.6	60.1	2.1	312.4	1475	12.5	0

vegetables along with small amount of beef or raw fish, which provides proteins, vitamins and minerals in a dish but with very low contents of saturated fatty acids or cholesterol that modern people wish to avoid. Also in Bibimbap, negligible amount of cholesterol can be present from small amount of beef. Fried egg as a topping of Bibimbap can contribute some cholesterol, and thus it is better not to top Bibimbap with fried egg, if concerned about cholesterol.

The following are recipes and nutritional values of a few kinds of Bibimbap (Table 2, 3). The calorie from one dish of Bibimbap is slightly over 400 kcal, which is not so high. Also, the cholesterol content, which is seriously concerned by many people, is very low, and thus Bibimbap is strongly recommended as a healthy meal.

Literature cited

Im Hyo-Jae (2001). Historical origins of rice farming culture in Korea. Hak-yeon publishing, Korea

Yoon Seo Suk (2001). History of food culture in Korea. Shin-kwang publishing, Korea

Ministry of Health and Welfare (2006). 2005 National Health and Nutrition Survey-Nutrition Survey-. Korea

Korea National Statistical Office (2006). Social indicators in Korea, p.323. Korea

Ministry of Health and Welfare (2006). Yearbook of health and welfare statistics, pp.51-52. Korea

Korea National Statistical Office (2006). 2005 Statistical data of the cause of death. Korea

Korea National Statistical Office (2007). 2006 the rice consumption per capita. Korea