

Health and Economic Benefits of Coconut Oil Production Development in Thailand ^{1/}

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Abstract

Coconut oil is one of the world's oldest oils, if not the oldest. People from countries where the coconut palms are grown have made use of it to cure all kinds of ailments for thousands of years. Its amazing properties include having: (i) saturated fatty acids (SFAs), whose single bonds prevent oxidation and hydrogenation, their end products - free radicals and trans fats - of which are detrimental to health (ii) medium chain fatty acids (MCFAs) that are directly converted into energy in the liver; they also increase the metabolic rate resulting in a better conversion of food into energy and thermogenesis that stimulates the breakdown of stored fats into energy, all of which culminate in weight loss; (iii) antimicrobial property of lauric acid (C-12, 48-52%) and other MCFAs that kill pathogenic bacteria, fungi, viruses, protozoa and parasites; and (iv) antioxidants in the form of vitamin E, phenolic compounds and phytosterols that prevent oxidation from occurring; thus no dangerous free radicals are formed. In addition to its numerous beneficial health effects, coconut oil has proven to be effective against heart disease, cancer and diabetes which are considered as emerging new diseases simply because of the adoption of modern lifestyle of the people, e.g., consuming processed foods, changing from saturated to unsaturated oils, having no exercise, staying away from sunlight, having not enough rest and too much stress, etc. Several new viral diseases occur as a result of changing climate, convenient and rapid transportation, and the raising of domesticated livestock which culminate in new strains of the viruses causing HIV/AIDS, SARS, and 2009 pandemic influenza that cannot be treated by the use of chemical drugs and antibiotics because they possess lipid coat that does not allow drugs to penetrate the viral particles, but surrender to the coconut oil, which, being lipid itself, could dissolve and break down their lipid coat, thereby penetrating them.

The author founded CDCOT in August 2007 aiming at providing proper knowledge of virgin coconut oil (VCO) and encouraging people to use it to promote health and beauty. Its activities include the publication of technical bulletins and a quarterly newsletter, giving lectures to public and academic gatherings and sharing information through television and radio broadcasting, news releases, technical seminars, etc. Seventeen technical bulletins (300,000 copies) have already been published. CDCOT members have reached 700 in less than three years and coconut oil is now "talk-of-the town" of people of all walks of live. The number of manufacturers of

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VCO has increased from three at the beginning to more than 100 at present, and still increases at a rapid rate as the demand of VCO has never been met. Several innovative techniques of VCO extraction have been developed. VCO worth of over 65 million Bath (US\$ 2.2 million) has been exported in 2008. Although this is still a small amount as compared to other export commodities from Thailand, a ten-fold increase is expected in 2009, and much more in 2010.

Keywords: Saturated fatty acid, medium chain, antioxidant, heart disease, cancer, diabetes, obesity, CDCOT, VCO, lauric acid.

1. Introduction

1.1 Ancient Use of the Coconut Oil

Coconut oil has a record in the Ayurvedic script of India of being used as food and to cure illness as far back as 4,000 years ago. The Chinese had used it for more than 2,000 years to cure 69 diseases (Fife 2005). Likewise, people in most other lands where the coconut palms are grown have made use of it to cure all kinds of ailments for thousands of years. Similarly, coconut oil, together with its precursor, the coconut milk, has been used as foods in most countries from time immemorial. In this connection, Thailand is number one in the world in using coconut milk as a food ingredient. It is fair to say that it is the coconut milk that has made Thai dishes one of the most popular foods in the world.

1.2 Dark Age of the Coconut Oil

Since almost 40 years ago coconut oil has been blamed to be the cause of heart disease. Because of its high saturated fat content it is assumed that it has a negative effect on blood cholesterol and, therefore, according to the diet-heart hypothesis (Weinberg 2004), promotes heart disease.

1.3 Rebirth of the Coconut Oil

After years of study researchers have been unable to link coconut oil consumption with an increased risk of heart disease. In fact, the evidence shows that coconut oil may actually protect against heart disease (Fife 2005). Research to date has shown that coconut

oil has the potential to protect against not only heart disease (Lindeberg and Lundh 1993) but a wide variety of chronic health problems including diabetes and cancer as well as a whole range of infectious diseases. It is now gaining popularity in being used as medicine, foods and cosmetics (Peat 2004, 2005).

2. Properties of the Coconut Oil that Make It A Miracle Oil

Coconut oil has the following properties which make it the best oil for food, medicine and cosmetic in the world.

2.1 Saturated Fatty Acids (SFAs)

The same property that has given it a bad name turns out to be the one that makes it far better for the health of the consumers than all other unsaturated oils which are predominantly produced for the world market at present. Coconut oil contains the highest amount of SFAs of 92% as compared to 10-20% of most other oils. The molecules of SFAs are made up of the chain of carbon atoms connected by single bonds which are stabilized and not replaced by oxygen atom known to create free radicals which affect the health of the consumers (Enig 2000). This is not the case of other oils having one or more double bonds, known as mono- (MUFAs) and poly-unsaturated fatty acids (PUFAs), in which their molecules are easily replaced by oxygen that is always plentiful in the atmosphere and in the body of the human beings. In addition, these unsaturated oils are hydrogenated when used in deep frying or in industrial food production when hydrogen gas is pumped into the oil to

make it solid, the end result of which is partially hydrogenated oil in which an isomer known as trans fat is formed. Only recently that trans fat, an un-natural isomer, is known to be hazardous to health, causing heart disease, cancer and diabetes, among others. SFAs, on the other hand, are not normally hydrogenated as their bonds are all single (Enig 1996, 1999, 2000).

2.2 Medium Chain Fatty Acids (MCFAs)

Coconut oil has 62% of MCFAs, having 6-12 carbon atoms, considered to be small molecule as compared to all other oils which consist of long chain fatty acids (LCFAs) having from 14 to 24 carbon atoms. As a result it does not need to be broken down by pancreatic enzyme, thus could move from the mouth, through the esophagus to the stomach where it is absorbed into the intestine and enters the liver right away where it is burned into energy. On the contrary, LCFAs, having larger molecules, move slowly and do not enter the liver, but instead end up in the fat cells where they are stored there as energy stock when the body needs. Moreover, coconut oil is known to stimulate thyroid gland which activates metabolism; consequently all food consumed along with coconut oil are broken down to release energy, thus do not turn into fat (Enig 1996, 1999, 2000).

2.3 Antimicrobial Property

Coconut oil contains four MCFAs, namely lauric acid (C-12, 48-53%), capric acid (C-10, 7%), caprylic acid (C-8, 8%), and caproic acid (C-6, 0.5%). When inside the body, they are transformed into corresponding monoglycerides, namely monolaurin, monocaprin, monocaprylin, and monocaproin, all of which are able to kill pathogenic microorganisms including bacteria, fungi and yeasts, viruses and protozoa (Dayrit, 2000). They also provide immunity to the body. One interesting fact is that lauric acid is also present, although in much less amount of 18%, in the mother's milk to provide immunity to the baby during its first six months of life when immunity has not yet developed (Enig 1996).

2.4 Effective Antioxidants

Not only possessing 92% of SFAs in which no oxidation can take place, coconut oil also contains several effective antioxidants which prevent oxidation to take place in the unsaturated portion of the oil (8%) as well as in the body. These are vitamin E, phytosterols and phenolic compounds. Antioxidants prevent the formation of free radicals that are hazardous to health, including aging and a range of degenerative diseases (Enig 2000).

3. Health Benefits of the Coconut Oil

Coconut oil has numerous beneficial health benefits (Enig 1996, 1999; Kabara 2000, 2004). These include:

3.1 Controlling Infectious Diseases

3.1.1 Old Infectious Diseases: In poor hygienic areas, infectious diseases of the olden days still prevail. They are, however, not widespread and become epidemic diseases. Medical progress in the modern world has kept most of the old infectious diseases under control through the uses of powerful drugs, both chemical and antibiotics. Coconut oil can also play a part in controlling such diseases through supporting immune system health and particularly through its antibacterial, antifungal and antiviral properties.

3.1.2 New Infectious Diseases: In spite of advancement in health care system, there still exist super germs which are tolerant to chemical drugs and antibiotics as they are protected from these drugs by having lipid coat that does not allow the drugs to penetrate. These super germs are a few strains of bacteria and most viruses. Examples of these super germs are several new viral diseases which occur as a result of changing climate, convenient and rapid transportation, the raising of domesticated livestock, as well as many unknown reasons. As a result, new strains of the viruses are causing HIV/AIDS, SARS, 2009 pandemic influenza, etc., that cannot be treated by the use of chemical drugs and antibiotics. They, however, surrender to the

coconut oil, which, being lipid itself, could dissolve and break down, or lyse, the lipid coat of the viruses, thereby penetrating them and literally killing them (Chomchalow 2009d).

3.2 Controlling Non-Infectious Diseases

A large number of people in the modern world die of heart disease, cancer and diabetes much more than any other illnesses. It is postulated that modern lifestyle is the real cause of these emerging new diseases. This includes consumption of processed foods, a change from saturated to polyunsaturated oil, no exercise, stay away from sunlight, not enough rest, too much stress and cigarette smoking (Chomchalow 2010b). Most of these newly emerging non-infectious diseases are effectively controlled by the coconut oil. These diseases are heart disease, cancer, diabetes and obesity (Chomchalow 2008a,b; 2009a,b,c). They are discussed below:

3.2.1 Heart Disease: The primary concern most people have about coconut oil is its effect on blood cholesterol levels. Being highly saturated, it is assumed that it has a negative effect on cholesterol. Studies, however, have shown that it does not have a harmful effect but improves cholesterol levels (Chomchalow 2008a). When people add coconut oil to their diets their total blood cholesterol levels may fluctuate either up or down slightly, but in either case their high-density lipoprotein (HDL - good cholesterol) increases. HDL is believed to protect against heart disease and the higher it is the better. Total cholesterol is not a very accurate measure of heart disease risk because it includes both low-density lipoprotein (LDL - bad cholesterol) and HDL, and we don't know how much of the good or the bad makes up the total. This is why nearly half of those people who die of heart attacks have normal or below normal total cholesterol levels. In fact, Forette, et al. (1989) found that among the elderly living in a nursing home in France, those that have low cholesterol have a death rate five times higher than those having high cholesterol.

3.2.2 Cancer: Coconut oil plays the following roles in preventing cancer (Chomchalow 2009b): (1) free from damage caused by free radicals because it is a saturated oil with effective antioxidants, (2) free from damage caused by trans fats because no hydrogenation takes place in saturated oil of the coconut, either through deep frying or artificial hydrogenation of industrial food products (Kohlmeier et al., 1997), (3) free from cancer-causing pathogens or their toxins due to the presence of antimicrobial agents and increasing immunity of the body, and (4) inhibits the growth of cancerous cells by altering the activity of these cells thereby inhibiting their growth (Anon. 2006).

3.2.3 Diabetes: Coconut oil plays the following roles in preventing diabetes (Chomchalow 2009c): (i) free from damage caused by free radicals, (ii) free from damage caused by trans fats, (iii) provides food and energy to the starving cells, (iv) increases the efficiency in synthesis of, and cellular response to, insulin, (v) stimulates metabolism, (vi) resumes the production of insulin of the pancreas, (vii) regulates the level of blood sugar, (viii) builds up glucose resistance, and (ix) reduces glycemic index of the food.

3.2.4 Obesity: Unlike all other LCFAs of most other edible oils, coconut oil, being MCFAs, does not need to be broken down by enzyme before being transported and utilized as fuel in metabolic reaction in the liver. Thus it does not store as fat in the body as other LCFAs. Moreover, it is able to regulate the thyroid gland to stimulate metabolism, thereby increasing the rate of food breakdown, resulting in the release of energy. It also gives rise to a higher body temperature, a process known as thermogenesis, resulting in the breakdown into energy of fat stored in the body, thus the saying, "Eat Fat - Look Thin" (Fife 2005).

4. The Role of CDCOT

The author founded the Conservation and Development of Coconut Oil of Thailand Forum (CDCOT) in August 2007 aiming at

providing proper knowledge of virgin coconut oil (VCO) and encouraging people to use it to promote health and beauty.

4.1 Activities of CDCOT

CDCOT's activities include:

➤ Publication of technical bulletins on various aspects of the coconut oil. So far 17 bulletins have been issued, with a total print run of 5,000 to 40,000 each, making a total of over 300,000 issues.

➤ A quarterly newsletter, name "Kalapaphruet", with a print run of each number of 3,000. So far, 12 numbers have been issued.

➤ Giving lectures to public and academic gatherings.

➤ Occasionally organizing technical seminars; so far, five seminars were held in Bangkok and a few provinces.

➤ Providing information through television and radio broadcasting, and news releases.

➤ Promotional campaign on the use of coconut oil among the tourists visiting the world famous Samui Island. Ten thousand 50-ml bottles of VCO have been distributed during 5-25 December 2552 to encourage tourists to be aware of the benefits of VCO. As a result, a lot of them bought back to their countries upon their return. Many mail orders have been received through the internet.

➤ Up to now, almost three years after its establishment, CDCOT members have reached 700. More importantly, each member has spread with words of mouth the beneficial effects of the coconut oil to his/her friends and relatives.

➤ The number of manufacturers of VCO has increased from three at the beginning to more than 100 at present, and still increases at a rapid rate as the demand of VCO has never been met.

➤ VCO worth of over 65 million Bath (US\$ 2.2 million) has been exported in 2008. Although this is still a small amount as compared to other export commodities from Thailand, a ten-fold increase was expected in 2009 (no statistics is available at present).

4.2 Innovative Techniques of Virgin Coconut Oil Production in Thailand

Many CDCOT committee members are producers of VCO using different oil extraction techniques, namely expeller press, centrifugation, distillation, fermentation, etc. Several innovative techniques have been invented, e.g.

➤ The use of enzyme and new strains of bacteria in fermentation process.

➤ The use of magnet to rearrange molecules of VCO.

➤ The development of new machine to extract the residue of grated coconut after milk extraction.

➤ Vacuum or nitrogen gas distillation to obtain better quality oil.

➤ Incorporation of fragrance from aromatic coconut water.

➤ The use of nanotechnology to filter the oil.

5. Economic Benefits

Although it is only less than three years that CDCOT has been actively engaged in promoting the use of coconut oil in Thailand, coconut oil is now talk-of-the town among people of all walks of life. More and more people are using it for their health and beauty. Two groups of people are beneficiaries of the coconut oil promotion campaign, namely:

5.1 Coconut Growers

Thai coconut farmers are among the poorest of all since they earn very little from the coconut planting. This is because the demand for its main products, the coconut oil and coconut milk, is small as the result of the widespread belief that they contain saturated fats blamed for high incidence of heart disease. Now that people have been properly educated about the true value of the coconut oil and coconut milk, they start to reuse them in their cooking, and as medicine and cosmetics. Farmers are now starting to pay attention to their coconut groves as they could obtain higher income from their coconuts.

5.2 Coconut Oil Producers

As most large-scale manufacturers of coconut oil have been forced to stop production due to the lack of customers for their product - the RBD coconut oil some 30 years ago, thus only a few remain in operation up to the present. However, a new type of coconut oil business emerges in recent years. They are the one producing virgin coconut oil (VCO), either on a small-, medium- or large-scale operation. As the demand for VCO is increasing every single day, the number of VCO-producing factories has steadily increased in all part of the country. A recent survey by the author reveals that there are more than 100 coconut oil producers in Thailand.

6. Saving the Life of the Coconut Palms

The planting area of the coconut palm has continuously decreased from 2.5 million rai (400,000 ha) in 1997 to 1.4 million rai (224,000 ha) in 2009. Several reasons have been envisaged, namely: (i) poor income of the coconut farmers due to the low price of the coconut, (ii) higher income of other economic crops such as oil palm, rubber, coffee, etc., and (iii) the demand for land for tourist industry. However, with the rise in price of the coconut due to higher demand for its oil, several projects have been launched to replant the coconut palms. Among these are the followings:

6.1 The Office of the Agricultural Economics' Project

According to the APCC resolution in 2008 in Manado, Indonesia, it is recommended that Thailand, as one of the five APCC members in which coconut planting area has been decreasing, should make a plan to increase planting area for coconut palm to maintain the present figure of 1.4 million rai (224,000 ha). The Government of Thailand, through the Office of the Agricultural Economics, is implementing coconut replant-

ing project at the rate of 8,000 rai (1,280 ha) a year, using 200,000 hybrid seedlings to keep pace with the areas of the coconut palms being cut down. The project started in January 2009 and to be ended in September 2012, with a total budget of Baht 22.76 million.

6.2 The Municipality of Samui Island's Project

In cooperation with various agencies including CDCOT, the Municipality of Samui Island has launched a campaign to replant coconut palms, starting on 5th December 2009 by planting 100,000 seedlings of aromatic-water cultivar (Nam Hom) throughout the whole island. CDCOT has joined the campaign by organizing two seminars on VCO in order to promote the use of VCO on the island so that the local coconut farmers can earn better income through the sale of their coconut fruits to be used in the extraction of VCO. A few spa operators also use VCO in their spa massage oil. As such, Samui has now claimed to be the capital of coconut oil spa of the world.

6.3 The Province of Prachuap Khiri Khan's Project

Being the province having the largest area of the coconut palms (450,000 rai, or 72,000 ha) as well as of pineapple plantation, Prachuap Khiri Khan Province has also launched a project to increase coconut planting area by inter-planting coconut palms in pineapple plantation so that the farmers can have higher income from both crops as their prices are reasonably high at present. It started the activities by preparing 30,000 seedlings since May 2009, and distributed the seedlings to pineapple growers in the districts of Mueang, Sam Roi Yot and Pran Buri, where each farmer has less than 20 rai (3.2 ha) of land. The total budget amounts to 1 million Baht. Every farmer is also encouraged to plant two seedlings of primitive cultivars on his or her household area as a measure for germplasm conservation.

7. References

- Anon. 2006. Cancer and virgin coconut oil. <<http://salaswildthoughts.blogspot.com/2006/10/cancer-virgin-coconut-oil.html>>
- Chomchalow, N. 2008a. How can coconut oil prevent heart disease? CDCOT Technical Bulletin No. 1/2551. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2008b. How can coconut oil prevent cancer? CDCOT Technical Bulletin No. 2/2551. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2009a. How can coconut oil make you beautiful? CDCOT Technical Bulletin No. 1/2552. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2009b. How can coconut oil reduce your weight? CDCOT Technical Bulletin No. 2/2552. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2009c. How can coconut oil prevent diabetes? CDCOT Technical Bulletin No. 3/2552. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2009d. How can coconut oil prevent influenza A H1N1? CDCOT Technical Bulletin No. 5/2552. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2010a. How can coconut oil delay aging. CDCOT Technical Bulletin No. 3/2553. CDCOT, Bangkok, Thailand (in Thai).
- Chomchalow, N. 2010b. Using the world's oldest oil as a remedy to cure emerging new diseases. Paper presented at the International Symposium on Medicinal Plants and Aromatic Plants (AROMED), CIMAP, Lucknow, India, 21-24 February 2010. The paper was also published in AU J.T. 14(2): 106-10, October 2010.
- Dayrit, C.S. 2000. Coconut oil in health and disease: Its and Monolaurin's potential as cure for HIV/AIDS. Paper presented at the XXXVIII Cocotech Meeting, Chennai, India, 25 July 2000.
- Enig, M.G. 1996. Health and nutritional benefits from coconut oil: An important functional food for the 21st century, AVOC (ASEAN Vegetable Oils Club) Lauric Oils Symposium, Ho Chi Min, Vietnam, 25 April 1996.
- Enig, M.G. 1999. Coconut: In support of good health in the 21st century. Paper presented at the 36th Meeting of APCC.
- Enig, M.G. 2000. Know your fats: The complete primer for understanding the nutrition of fats, oils and cholesterol. Bethesda Press, Bethesda, MD, USA.
- Fife, B. 2005. Eat fat, look thin: A safe and natural way to lose weight permanently. 2nd ed., Piccadilly Books, Colorado Springs, CO, USA.
- Forette, B.; Tortrat, D.; and Wolmark, Y. 1989. Cholesterol as risk factor for mortality in elderly women. *The Lancet* 1: 868-70.
- Kabara, J.J. 2000. Health oils from the Tree of Life: Nutritional and health aspects of coconut oil. *Indian Coconut J.* 31(8): 2-8.
- Kohlmeier, L.; Simonsen, N.; van 't Veer, P.; Strain, J.J.; Martin-Moreno, J.M.; Margolin, B.; Huttunen, J.K.; Fernández-Crehuet Navajas, J.; Martin, B.C.; Thamm, M.; Kardinaal, A.F.; Kok, F.J. 1997. Adipose tissue trans fatty acids and breast cancer in the European Community multicenter study on antioxidants, myocardial infarction, and breast cancer. *Cancer Epidemiology, Biomarkers and Prevention* 6(9): 705-10, September.
- Lindeberg, S.; and Lundh, B. 1993. Apparent absence of stroke and ischaemic heart disease in a traditional Melanesian island: A clinical study in Kitava. *J. Internal Med.* 233: 269-75.
- Peat, R. 2004. Coconut oil and its virtues for weight loss, preventing cancer and heart disease. Available: <www.naturadoc.com/library/nutrition/coconut_oil.htm>.
- Peat, R. 2005. Coconut oil: You want a food loaded with real health benefits? You want coconut oil. Available: <www.mercola.com/2001/mar/24/coconut_oil.htm>.
- Weinberg, S.L. 2004. The diet-heart hypothesis: A critique. *J. Amer. Coll. Cardiol.* 43: 731-3.